

RII06 Civil Construction

Training Package

Volume II of III

This Training Package comprises three (3) volumes.
Volume 1 contains the Introduction and the RII Units of Competency (to RIICC400 series). Volume II contains RIICC500 and 600 series Units of Competency.
Volume III contains the Imported Units of Competency.

RII06 Civil Construction Training Package

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RIICC501A Implement civil construction plans

Unit Descriptor

This unit covers the implementing of civil construction plans. It includes the requirements to: preparing for planning; preparing detailed implementation plans; and initiating the implementation; monitoring, adjusting, reporting and supporting the implementation of civil construction plans. The civil construction implementation plan could cover the execution of a specific part of an overall civil works construction plan. It could cover a specific geographic section or a specific class of work (e.g. land clearing) that forms part of a larger project.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Prepare for the planning of the implementing of civil construction plans
2. Prepare the detailed plan for the implementation of civil construction

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative and organisational requirements and procedures*** required for construction of civil works.
- 1.2 Access, interpret and clarify the civil construction plan requirements for the implementation of civil construction, in accordance with the relevant ***organisational and manufacturer's requirements and procedures***.
- 1.3 ***Confirm*** the availability and accuracy of the ***project information*** required for implementation of the specific civil construction in accordance with the plan and relevant ***organisational and manufacturer's requirements and procedures***.
- 1.4 Prepare the scope of work required for the safe effective and efficient implementation of the specific civil construction in accordance with relevant ***organisational requirements and procedures***.
- 2.1 Identify the viable available options for the implementation of the specific civil construction in accordance with the relevant ***organisational and manufacturer's requirements and procedures***

- 2.2 Select the preferred option and draft the implementation program in consultation with relevant team members, which makes best use of the available resources and meets the specific civil construction requirements.
- 2.3 Identify contingency requirements to be allowed for in the execution of the plan in accordance with the relevant *organisational requirements and procedures*
- 2.4 Monitor and coordinate the progress of other team members involved in the planning process to ensure the effective and efficient completion of the plan in accordance with the relevant *organisational requirements and procedures*
- 2.5 Identify and schedule the resources required for the execution of the implementation plan in accordance with the relevant *organisational requirements and procedures*
- 2.6 Identify the key performance indicators to be used in the monitoring and assessment of the project performance, in accordance with the construction plan the relevant *legislative and organisational requirements and procedures*
- 2.7 Identify and clarify the construction milestones required in the construction plan and relevant *organisational requirements and procedures*.
- 2.8 Prepare an accurate estimate of the cost of execution of the implementation plan in consultation with relevant team members and in accordance with relevant *organisational requirements and procedures*.
- 2.9 Gain approval of the implementation plan in accordance with the construction plan requirements and the relevant *organisational requirements and procedures*
- 2.10 Document the implementation plan in accordance with the construction plan requirements and the relevant *legislative and organisational requirements and procedures*
- 3. Initiate civil construction implementation plans
 - 3.1 Acquire and make available the necessary *resources* for the safe, effective and efficient conduct of the plan, in accordance with the relevant *legislative, organisational and manufacturer's requirements and procedures* and the *specific task information and requirements*.

- 3.2 Issue clear and timely *instructions* to team members and others involved, for the safe, effective and efficient conduct of the plan, to meet the *specific task requirements* and the relevant *legislative, organisational and manufacturer's requirements and procedures*.
4. Monitor, adjust and report on the execution of civil construction plans
- 4.1 Ensure the safe, effective and efficient execution of the plan in accordance with the relevant *legislative, organisational and manufacturer's requirements and procedures and the task requirements*.
- 4.2 **Monitor** the civil construction *implementation plan* performance to ensure it achieves the *required outcomes*.
- 4.3 Initiate adjustments to civil construction *implementation plan* to ensure achievement of *required outcomes*.
- 4.4 Provide ongoing clarification and advice to those applying the plan to ensure the successful completion of the project.
- 4.5 Ensure reports are complete and submit as required by the construction plan and *relevant legislative, organisational and task requirements*.
- 4.6 Participate in performance review the *implementation plan* in accordance with the relevant *organisational requirements and procedures*
- 4.7 Recommend changes to improve the safety, efficiency and effectiveness of civil construction implementation in accordance with the relevant *organisational requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following, as required for the safe, effective and efficient completion of the implementation of civil construction plans:

- Interpreting legislative requirements
- Interpreting organisational requirements
- Interpreting project plans and drawings
- Interpreting project specifications

- Interpreting project construction briefs
- Interpreting project engineering survey information
- Interpreting project hydrological data
- Interpreting meteorological data
- Interpreting project geotechnical data
- Providing team leadership and coordination
- Applying innovative solutions and new technology
- Applying consultative processes
- Choosing appropriate operational techniques
- Developing and applying construction plans
- Applying project scheduling and resource management technology
- Calculating of construction resource quantities and project costs
- Maintaining construction cost records
- Providing clarification and advice
- Applying negotiation techniques
- Applying feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following, as required for the safe, effective and efficient completion of the implementation of civil construction plans:

- Risk management requirement and procedures
- Statutory compliance requirements and procedures
- Construction implementation plan development and implementation requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards
- Industry and organisational construction procedures and practice
- Civil construction works options
- Sources of information on innovation and new technology

- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of civil construction projects
- Civil construction plant and equipment capabilities
- Cost estimation techniques
- Construction plan review principles and procedures
- Construction plan documentation requirements
- Construction plan reporting requirements and procedures
- Construction plan approval requirements and procedures
- Construction plan records filing requirements and procedures
- Performance review requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Civil construction projects may include:

- Land clearing
- Bulk earthworks
- Surface drainage works
- Water storage dams construction
- Tailings dams construction
- Topsoil management
- Rehabilitation works
- Road works preparation (including the sub grade)
- Pavement construction, including:
 - Flexible pavements, including:
 - natural pavement materials
 - manufactured pavement materials
 - asphalt placement
 - spray seal application
 - stabilisation
 - Rigid pavement construction
- Underground services construction
- Construction of civil structures

Legislative requirements
may include:

- Tunnelling
- Dredging
- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations
- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Legislative, organisational, client and manufacturers requirements and procedures may include:

Confirmation of information may include:

- Consultation with the client
- Consultation with others within the organisation
- Obtaining further site data, including:
 - Geological data
 - Survey data
 - Hydrological data
 - Meteorological data

Project information may include:

- Project designs
- Project specifications
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site meteorological data
- Project site environmental requirements
- Community considerations
- Heritage issues
- Impact assessment information
- Available resources
- Existing project drawings
- Relevant Australian or other standards

Instructions may include:

- Project plans
- Briefings
- Handovers
- Work orders
- Toolbox meetings
- Site meetings

Monitor may include:

- Engineering survey
- Sampling and testing
- Recording and observation of construction practice,
- General supervision

Civil construction implementation plans may include:

- Risk management requirements and procedures
- Statutory compliance requirements and procedures

- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Quality requirements and procedures
- Inspection and testing requirements and procedures
- Communication and consultation requirements and procedures
- Community relations requirements and procedures
- Traffic management requirements and procedures
- Training requirements and procedures
- Allocation of responsibilities
- Position descriptions
- Administration requirements and procedures, including records and reporting
- Operational techniques required for the execution of civil construction projects
- Cost management requirements and procedures
- Client liaison requirements and procedures
- Construction plan review requirements and procedures
- Construction plan documentation requirements and procedures
- Construction plan reporting requirements and procedures
- Implementation plan approval requirements and procedures
- Construction plan records filing requirements and procedures
- Performance review requirements and procedures
- Scheduling requirements and procedures
- Resource requirements and procedures
- Production rates requirements and procedures
- Coordination requirements and procedures
- Review requirements
- Communication and reporting requirements
- Drawings

- Ancillary documentation, which may include:
 - Construction notes
 - Construction notes
 - Supplementary drawings
 - Specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking civil construction implementation.
 - Implementation of procedures and techniques for the safe, effective and efficient completion of civil construction implementation
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - The identification of the relevant information and scope of the work required to meet the required outcomes of the project.
 - The identification of viable construction implementation program options and the selection of construction implementation programs that best meet the required project outcomes.
 - Working with others to undertake and complete the civil construction implementation plan that meets all of the required outcomes
 - Consistent and timely completion of civil construction implementation plans that safely, effectively and efficiently meets the required outcomes
 - Consistent and timely gaining of approval of civil construction implementation plans
 - Clear, timely required support and advice on the implementation of civil construction plans.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The suggested strategies for the assessment of this unit are:
 - Written and/or oral assessment of the candidate’s required knowledge to apply in undertaking civil construction implementation.
 - Observed, documented and/or first hand testimonial evidence of the candidate’s:
 - Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of civil constructions implementation plans.
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Identification of the relevant information and scope of the work required to meet the required outcomes of the project.
 - Identification of viable construction implementation program options and the selection of construction implementation programs that best meet the required project.

- First hand testimonial and documentary evidence of the candidate's:
 - Working with others to undertake and complete the civil construction implementation plans that meet all of the required outcomes
 - Consistent and timely completion of civil construction implementation plans that safely, effectively and efficiently meets the required outcomes
 - Consistent and timely gaining of approval of civil construction implementation plans
 - Clear, timely required support and advice on the implementation of civil construction plans
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC502A Implement civil works maintenance programs

Unit Descriptor

This unit covers the implementing of civil works maintenance programs. It includes the requirements to: preparing for planning; preparing detailed implementation plans; and initiating the implementation; monitoring, adjusting, reporting and supporting the implementation of civil works maintenance programs.

The civil works maintenance implementation plan may cover the execution of a specific part of an overall civil works maintenance program. It may cover a specific geographic section or a specific class of work (e.g. bridge maintenance) that forms part of a larger program.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Prepare for the planning of the implementing of civil works maintenance programs
2. Prepare the detailed plan for the implementation of civil works maintenance

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative and organisational requirements and procedures*** required for maintenance of civil works.
- 1.2 Access, interpret and clarify the civil works maintenance program requirements for the implementation of civil works maintenance, in accordance with the relevant ***contractual and organisational requirements and procedures***.
- 1.3 Confirm the current condition of the assets scheduled for maintenance and if appropriate recommend reclassification of serviceability in accordance with the relevant ***contractual and organisational requirements and procedures***.
- 2.1 Identify the viable available options for the implementation of the specific civil works maintenance tasks in accordance with the relevant ***contractual and organisational requirements and procedures***

- 2.2 Select the preferred option and draft the implementation program in consultation with relevant team members, which makes best use of the available resources and meets the specific civil works maintenance requirements *contractual and organisational requirements and procedures*.
- 2.3 Identify contingency requirements to be allowed for in the implementation of the plan in accordance with the relevant *contractual and organisational requirements and procedures*
- 2.4 Monitor and coordinate the progress of other team members involved in the planning process to ensure the effective and efficient completion of the plan in accordance with the relevant *contractual and organisational requirements and procedures*
- 2.5 Identify and schedule the resources required for the execution of the implementation plan in accordance with the relevant *contractual and organisational requirements and procedures*
- 2.6 Identify the key performance indicators to be used in the monitoring and assessment of the project performance, in accordance with the works maintenance program the relevant *contractual and organisational requirements and procedures*
- 2.7 Identify and clarify the maintenance works milestones required in the works maintenance program and relevant *contractual and organisational requirements and procedures*.
- 2.8 Prepare an accurate estimate of the cost of execution of the implementation plan in consultation with relevant team members and in accordance with relevant *contractual and organisational requirements and procedures*
- 2.9 Gain approval of the implementation plan in accordance with the works maintenance program requirements and the relevant *contractual and organisational requirements and procedures*
- 2.10 Document the implementation plan in accordance with the works maintenance program requirements and the relevant *contractual and organisational requirements and procedures*
- 3. Initiate civil works maintenance implementation plans
 - 3.1 Acquire and make available the necessary *resources* for the safe, effective and efficient conduct of the plan, in accordance with the relevant *contractual and organisational requirements and procedures*.

- 3.2 Issue clear and timely *instructions* to team members and others involved, for the safe, effective and efficient conduct of the plan, to meet the *specific task requirements* and the relevant *contractual and organisational requirements and procedures*.
4. Monitor, adjust and report on the implementation of civil works maintenance programs
- 4.1 Ensure the safe, effective and efficient execution of the plan in accordance with the relevant *contractual and organisational requirements and procedures*.
- 4.2 *Monitor* the civil works maintenance *implementation plan* performance to ensure it achieves the *required outcomes*.
- 4.3 Initiate adjustments to civil works maintenance *implementation plan* to ensure achievement of *required outcomes*.
- 4.4 Provide ongoing clarification and advice to those applying the plan to ensure the successful completion of the project *contractual and organisational requirements and procedures*.
- 4.5 Ensure reports are complete and submit as required by the works maintenance program and *relevant contractual and organisational requirements and procedures*.
- 4.6 Participate in performance review the *implementation plan* in accordance with the relevant *contractual and organisational requirements and procedures*
- 4.7 Recommend changes to improve the safety, efficiency and effectiveness of civil works maintenance implementation in accordance with the relevant *contractual and organisational requirements and procedures*

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied. This includes the ability to carry out the following, as required for the safe, effective and efficient completion of the implementation of civil works maintenance programs:

- Interpreting legislative requirements
- Interpreting organisational requirements
- Interpreting project plans and drawings
- Interpreting project specifications

- Interpreting project maintenance works briefs
- Interpreting project engineering survey information
- Interpreting project hydrological data
- Interpreting meteorological data
- Interpreting project geotechnical data
- Scheduling of inspection programs
- Interpreting of inspection data
- Classifying the levels of the serviceability of assets
- Prioritising maintenance works
- Providing team leadership and coordination
- Applying innovative solutions and new technology
- Applying consultative processes
- Choosing appropriate maintenance operational techniques
- Developing and applying works maintenance programs
- Applying project scheduling and resource management technology
- Calculating of maintenance works resource quantities and project costs
- Maintaining maintenance works cost records
- Providing clarification and advice
- Applying negotiation techniques
- Applying feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied. This includes knowledge of the following, as required for the safe, effective and efficient completion of the implementation of civil works maintenance programs:

- Risk management requirement and procedures
- Statutory compliance requirements and procedures
- Maintenance works implementation plan development and implementation requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards

- Inspection program scheduling requirements and procedures
- Inspection data interpreting requirements and procedures
- Asset condition classification requirements and procedures
- Maintenance works prioritisation requirements and procedures
- Industry and organisational maintenance works procedures and practice
- Civil works maintenance options
- Sources of information on innovation and new technology
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of civil works maintenance projects
- Civil works maintenance plant and equipment capabilities
- Cost estimation techniques
- Maintenance program review principles and procedures
- Maintenance program documentation requirements
- Maintenance program reporting requirements and procedures
- Maintenance program approval requirements and procedures
- Maintenance program records filing requirements and procedures
- Performance review requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Civil works maintenance projects may include:

- Surface drainage works
- Water storage dams
- Tailings dams
- Rehabilitation works
- Pavements, including:
 - Flexible pavements, including:
 - natural pavement materials
 - manufactured pavement materials
 - asphalt placement
 - spray seal application
 - stabilisation

- Rigid pavement
- Underground services
- Civil structures
- Tunnels
- Canals

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures

- Administration requirements and procedures, including records and reporting
 - Maintenance, servicing, and housekeeping requirements and procedures
- Instructions*** may include:
- Program documents
 - Briefings
 - Handovers
 - Work orders
 - Toolbox meetings
 - Site meetings
- Monitor*** may include:
- Review of records and reports
 - Engineering survey
 - Sampling and testing
 - Recording and observation of civil works maintenance practice,
 - General supervision
- Civil works maintenance implementation plans*** may include:
- Risk management requirements and procedures
 - Statutory compliance requirements and procedures
 - Occupational Health and Safety requirements and procedures
 - Environmental management requirements and procedures
 - Quality requirements and procedures
 - Inspection and testing requirements and procedures
 - Communication and consultation requirements and procedures
 - Community relations requirements and procedures
 - Traffic management requirements and procedures
 - Training requirements and procedures
 - Allocation of responsibilities
 - Position descriptions
 - Administration requirements and procedures, including records and reporting
 - Operational techniques required for the execution of civil works maintenance projects

- Cost management requirements and procedures
- Client liaison requirements and procedures
- Maintenance program review requirements and procedures
- Maintenance program documentation requirements and procedures
- Maintenance program reporting requirements and procedures
- Implementation plan approval requirements and procedures
- Works maintenance program records filing requirements and procedures
- Performance review requirements and procedures
- Scheduling requirements and procedures
- Resource requirements and procedures
- Production rates requirements and procedures
- Coordination requirements and procedures
- Review requirements
- Communication and reporting requirements
- Drawings
- Ancillary documentation, which may include:
 - Maintenance works notes
 - Construction notes
 - Supplementary drawings
 - Specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in implementing civil works maintenance.
 - Implementation of procedures and techniques for the safe, effective and efficient completion of the implementing civil works maintenance

- Consistent application of applicable health, safety and environmental requirements and procedures
- The identification of the relevant information and scope of the work required to meet the required outcomes of the program.
- The identification of viable maintenance options and the selection of options that best meet the required outcomes of the program.
- Working with others to undertake and complete the civil works maintenance implementation plan that meets all of the required outcomes
- Consistent and timely gaining of approval of civil works maintenance implementation plans
- Consistent and timely completion of civil works maintenance implementation plans that safely, effectively and efficiently meets the required outcomes
- Clear, timely required support and advice on the implementation of civil works maintenance programs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment.
- Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The suggested strategies for the assessment of this unit are:
 - Written and/or oral assessment of the candidate's knowledge of the requirements, procedures and instructions that are to apply in undertaking the implementing civil works maintenance.
 - Observed, documented and/or first hand testimonial evidence of the candidate's:
 - implementation of appropriate procedures and techniques for the safe, effective and efficient completion of the implementing civil works maintenance.
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Identification of the relevant information and scope of the work required to meet the required outcomes of the program.
 - Identification of viable civil works maintenance options and the selection of options that best meet the required outcomes of the program.
 - First hand testimonial and documentary evidence of the candidate's:
 - Working with others to undertake and complete the civil works maintenance implementation plans that meet all of the required outcomes
 - Consistent and timely gaining of approval of civil works maintenance implementation plans
 - Consistent and timely completion of civil works maintenance implementation plans that safely, effectively and efficiently meets the required outcomes
 - Clear, timely required support and advice on the implementation of civil works maintenance programs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and

should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions

- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be

authenticated by colleagues, supervisors, clients or other appropriate persons

- Assessment should also reinforce the integration of the Employability Skills

RIICC503A Prepare work zone traffic management plans

Unit Descriptor

This unit covers the completion of the preparation and documentation of work zone traffic management plans. It includes the planning for the preparation, undertaking of the preparation, finalisation of the preparation processes and supporting the application of the preparation.

This unit requires the identification of plan inputs, production of calculations, drawings, plan options and solutions and specifications required for the implementation of work zone traffic management plan, it does not include the certification of the plan.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

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| 1. Plan for the preparation of work zone traffic management plans | <p>1.1 Access, interpret and clarify relevant <i>legislative, organisational and manufacturer's requirements and procedures</i> required for preparation of the work zone traffic management plans.</p> <p>1.2 Identify and <i>confirm</i> the work zone traffic management plan <i>project requirements and information</i> for the completion of the plan in accordance with the relevant <i>organisational and client requirements and procedures</i>.</p> <p>1.3 Prepare a <i>preparation plan</i> which makes best use of the available resources and meets the traffic management plans requirements in accordance with the relevant <i>organisational, client requirements and procedures</i>.</p> |
| 2. Undertake the work zone traffic management plan preparation | <p>2.1 Interpret and analyse the relevant data and identify the available viable options for the work zone traffic management plan in accordance with the relevant <i>legislative, organisational, client and manufacturer's requirements and procedures</i>.</p> |

- 2.2 Interpret and analyse relevant data and recommend the *preferred option* that best meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
 - 2.3 Complete the *detailed plan* of the work zone traffic management plan that safely, effectively and efficiently meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
 - 2.4 Prepare a cost estimate of the execution of the work zone traffic management plan in accordance with the accuracy required by the relevant *organisational and client requirements and procedures*.
 - 2.5 Participate in the review the work zone traffic management plan preparation with peers and stakeholders in accordance with the relevant *organisational and client requirements and procedures*.
 - 2.6 Complete the documentation of the work zone traffic management plan preparation in accordance with the relevant *organisational and client requirements and procedures*.
 - 2.7 Monitor and coordinate the progress of other team members involved in the preparation process to ensure the effective and efficient completion of the plan in accordance with the relevant *organisational and client requirements and procedures*.
 - 2.8 Gain approval of the plan in accordance with the relevant *organisational and client requirements and procedures*.
3. Finalise preparation processes of work zone traffic management plan
 - 3.1 Ensure filing of preparation records is completed in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.2 Complete and submit preparation cost and other reporting in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.3 Participate in performance review of the preparation process in accordance with the relevant *organisational and the client requirements and procedures*.
 - 3.4 Seek client feedback and contribute to the verification of the plan in accordance with the relevant *organisational and client requirements and procedures*.

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| | 3.5 | Close out all systems in accordance with the relevant <i>organisational, client requirements and procedures</i> . |
| 4. Support and review the application of the work zone traffic management plan | 4.1 | Provide clarification and advice to those applying the plan in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.2 | Review the application of the plan and recommend changes for the continuous improvements of work zone traffic management plans, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.3 | Contribute to the validation of the plan in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the preparation and construction of work zone traffic management plan:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting traffic management plan briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting traffic analysis data
- Determining traffic management plan capacity requirements
- Selecting traffic management plan options
- Sizing traffic management plan components
- Providing leadership and coordination
- Choosing appropriate implementation techniques
- Developing and applying design plans

- Applying computer based design technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating flow rates, level of service, capacities and percentages
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the preparation, construction and maintenance of work zone traffic management plan:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Principles of road user behaviour
- Current industry best practice
- Traffic management plan options
- Traffic management plan geometric requirements
- Potential hazards, constraints and conditions that may effect traffic management plan design and implementation
- Current industry best practice in traffic management plan design and implementation
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of traffic management plan implementation tasks
- Traffic management plan implementation structures capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Work zone traffic

management plan may be applicable for:

- Any work zone where:
 - Members of the public can interact with construction or delivery personnel, vehicles, plant and equipment;
 - Delivery vehicles can interact with construction personnel, vehicles, plant and equipment
 - Internal to the work zone, where construction personnel, plant and equipment interact.
- The work zone traffic management plan may need to include the access roads to and from the public roads.

Legislative requirements

may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures

may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing

- Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data

Preparation plan
may include:

- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards
- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Preparation process communication and reporting requirements

Factors to be considered in
determining the **preferred**
option include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the plan
 - Maintainability of the completed works

Detailed plan includes:

- Calculations, including:
 - Level of service
 - Capacity
 - Construction materials and services quantities
 - Construction cost estimates
- Selection and specification of traffic management structures and systems, including:
 - Roundabouts
 - Mediums
 - Entry and exit lanes
 - Merging lanes
 - Traffic barriers
 - Lane marking requirements
 - Traffic speed limits
 - Traffic signals or control personnel

- Warning signs
- Communication requirements and procedures
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the plan
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Preparation notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking work zone traffic management plan preparation.
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of work zone traffic management plan preparation
 - Preparation of plans which reflect the requirements of the task and are capable of achieving all of their required work zone traffic management outcomes.
 - The identification of viable plan options and the selection of plan options that best meet the required work zone traffic management outcomes.
 - Working with other to undertake and complete the work zone traffic management plan preparation.

- Consistent timely completion of work zone traffic management plans.
- Consistent finalisation of work zone traffic management plan preparation processes.
- Clear, timely and appropriate support of the application of work zone traffic management plans
- Meaningful contribution to the review and validation of work zone traffic management plans.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking work zone traffic management plan preparation.
 - Documented and testimonial evidence of the implementation of appropriate procedures and techniques for the safe, effective and efficient completion of work zone traffic management plans, including evidence of:
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Plans prepared by the individual, which reflect the requirements of the task and are capable of

- achieving all of the required traffic management outcomes.
- That plan options proposed by the individual are viable and that the plan option selected by the individual are those that best meet the required outcomes
- First hand testimonial and documentary evidence of appropriate and successful:
 - Consultation by the individual in undertaking and completing the plans
 - Consistent timely completion of work zone traffic management plans
 - Consistent finalisation of work zone traffic management plan preparation processes,
 - Appropriate support of the work zone traffic management plans
 - Meaningful contribution to the review and validation of work zone traffic management plans
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC504A Prepare civil works bills of quantities

Unit Descriptor

This unit covers the preparation of civil works bills of quantities. It includes planning for the civil works bills of quantities process, identifying and calculating the on-site labour, materials and on-site sub-contractor service requirements of the civil works project, the finalise of the civil works bills of quantities process and supporting and reviewing the application of the bill of quantities

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the civil works bills of quantities

2. Identify and calculate on-site labour requirements

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the civil works bills of quantities.
- 1.2 Identify and ***confirm*** the civil works ***project requirements and information*** for the preparation of the bill of quantities in accordance with the relevant ***organisational requirements and procedures***.
- 1.3 Prepare a draft works program that details the various tasks or activities to be undertaken to complete the required civil works, in accordance with the relevant ***organisational requirements and procedures***.
- 1.4 Gain agreement on the draft works program in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the types and numbers of on-site labour required to undertake each task in the agreed draft works program in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Analyse and identify the total number of on-site labour required at each stage and overall to safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures.***
- 2.3 Complete the documentation of the stage by stage and overall labour requirements in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures.***
- 3. Identify and calculate materials requirements
 - 3.1 Interpret and analyse the relevant data and identify the types and quantities of materials required to undertake each task in the agreed draft works program in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures.***
 - 3.2 Analyse and identify the total quantity of materials required to safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures.***
 - 3.3 Complete the documentation of the total materials requirements in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures.***
- 4. Identify and calculate the on-site sub-contractor service requirements
 - 4.1 Interpret and analyse the relevant data and identify the types and numbers on-site sub-contractor services required to undertake each task in the agreed draft works program in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures.***
 - 4.2 Analyse and identify the number of on-site sub-contractor services required to undertake each ***stage*** of the works and for the safe, effective and efficient completion of all of the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures.***
 - 4.3 Complete the documentation of the stage by stage and overall on-site subcontractor services requirements in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures.***
- 5. Finalise civil works bills of quantities process
 - 5.1 Ensure filing of bill of quantities is completed in accordance with the relevant ***organisational and client requirements and procedures.***

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| | 5.2 | Complete and submit bill of quantities and other reporting in accordance with the relevant <i>organisational and client requirements and procedures</i> . | |
| | 5.4 | Gain approval of the bill of quantities in accordance with the relevant <i>organisational and client requirements and procedures</i> . | |
| 6. | Support and review the application of the bill of quantities | 6.1 | Provide clarification and advice to those applying the bill of quantities in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 6.2 | Review the application of the bill of quantities and recommend changes for the continuous improvements of civil works bill of quantities preparation processes, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the preparation of civil works bills of quantities:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting civil works construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting civil works options selection data
- Selecting civil works options
- Sizing civil works components
- Choosing appropriate construction techniques

- Calculating areas, volumes, labour hours, materials quantities, sub-contractor service capabilities, productivity and required hours
- Applying computer based works planning technology
- Maintaining cost records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the bill of quantities, construction and maintenance of civil works:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational construction procedures and practice
- Current industry best practice
- Civil works options
- Potential hazards, constraints and conditions that may effect civil works construction
- Current industry best practice in civil works construction
- Techniques for choosing preferred options
- Operational techniques required for the execution of civil works construction tasks
- Civil works construction plant and equipment capabilities
- Labour, materials and sub-contractor services estimation techniques
- Bill of quantities review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Bills of quantities approval requirements and procedures
- Bills of quantities records filing requirements and procedures

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 in the Performance Criteria is detailed below.

Civil works may include:

- Land clearing
- Bulk earthworks
- Surface drainage construction and maintenance
- Subsurface drainage construction and maintenance
- Water storage dams construction and maintenance
- Tailings dams construction and maintenance
- Topsoil management
- Rehabilitation works
- Road works preparation (including the sub grade)
- Pavement construction and maintenance, including:
 - Flexible pavements, including:
 - natural pavement materials
 - manufactured pavement materials
 - asphalt placement
 - spray seal application
 - stabilisation
 - Rigid pavement
- Underground services construction and maintenance
- Applying trenchless technology
- Construction and maintenance of civil structures
- Tunnelling
- Dredging

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination

- Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the clients (internal and external)
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data

Project requirements and information may include:

- Metrological data
- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking the preparation of civil works bills of quantities.
 - Implementation of procedures and techniques for the safe, effective and efficient completion of the preparation of civil works bills of quantities.
 - Working with other to undertake and complete the civil works bill of quantities.
 - Consistent timely completion of the preparation of civil works bills of quantities.
 - Consistent finalisation of the preparation of civil works bills of quantities processes.
 - Clear, timely and appropriate support of the application of civil works bills of quantities
 - Meaningful contribution to the review and improvement of civil works bills of quantities processes.
- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered

Context of and specific resources for assessment

using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking the preparation of civil works bills of quantities
 - First hand testimonial and documentary evidence of appropriate and successful:
 - Consultation by the individual in undertaking and completing the bill of quantities.
 - Consistent timely completion of the preparation of civil works bills of quantities
 - Consistent finalisation of the preparation of civil works bills of quantities processes
 - Appropriate support of the civil works bills of quantities
 - Meaningful contribution to the review and improvement of civil works bills of quantities processes
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the

work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions

- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC505A Prepare civil works schedule of rates

Unit Descriptor

This unit covers the preparation of civil works schedule of rates. It includes planning for the civil works schedule of rates process; preparing and documenting the details of the required materials and sub-contractor services; inviting quotations from materials suppliers and sub-contract service providers; assessing the quotations and prepares schedules of rates for materials and sub-contractor services; preparing the schedule of rates for on-site labour; and supporting and reviewing the application of and maintaining civil works schedules of rates

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the civil works schedule of rates

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Identify and list the types of on-site labour that may be employed in the areas of civil works to be undertaken by the organisation in consultation with ***relevant team members*** and in accordance with ***organisational requirements and procedures***
- 1.2 Identify and list the types of materials that may be required in the areas of civil works to be undertaken by the organisation in consultation with ***relevant team members*** and in accordance with ***organisational requirements and procedures***.
- 1.3 Identify and list the types of on-site sub-contractor services that may be employed in the areas of civil works to be undertaken by the organisation in consultation with ***relevant team members*** and in accordance with ***organisational requirements and procedures***.
- 1.4 Gain agreement on the lists of on-site labour, materials, and on-site sub-contractors services that may be employed or required in the areas of civil works to be undertaken by the organisation in accordance with the relevant ***organisational requirements and procedures***

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| 2. | Prepare and document the details of the materials and sub-contractor services requirements | 2.1 | Develop and document the details and specifications of the listed materials in consultation with <i>relevant team members</i> and accordance with the relevant <i>organisational requirements and procedures</i> . |
| | | 2.2 | Develop and document the details of the listed sub-contractor services in consultation with <i>relevant team members</i> and accordance with the relevant <i>organisational requirements and procedures</i> . |
| | | 2.3 | Gain agreement on the details and specifications of the materials, and on-site sub-contractors services in accordance with the relevant <i>organisational requirements and procedures</i> |
| 3. | Invite quotations from materials suppliers and sub-contract service providers | 3.1 | Prepare invitations to quote on supply of materials and sub-contractor services in accordance with the relevant <i>organisational requirements and procedures</i> . |
| | | 3.2 | Gain approval of invitations to quote in accordance with the relevant <i>organisational requirements and procedures</i> . |
| | | 3.3 | Issue the invitation to quote for the supply of materials and sub-contractor services in accordance with the relevant <i>organisational requirements and procedures</i> . |
| 4. | Assess quotations and prepares schedules of rates for materials and sub-contractor services | 4.1 | Assess submitted materials and sub-contractor services quotation documents against the details and specifications set out in the invitations to quote and determine their validity in accordance with the relevant <i>organisational requirements and procedures</i> . |
| | | 4.2 | List the selected suppliers and use their quoted prices to calculate the scheduled rates for the listed materials and sub-contractor services in accordance with the relevant <i>organisational requirements and procedures</i> . |
| | | 4.3 | Gain agreement on the schedules of rates for the listed materials and on-site sub-contractor services in accordance with the relevant <i>organisational requirements and procedures</i> |
| 5. | Prepare the schedule of rates for on-site labour | 5.1 | Develop and document the factors to be applied to hourly labour costs in determining the schedule of rates of on-site labour, in consultation with relevant team members and in accordance with the relevant <i>organisational requirements and procedures</i> . |
| | | 5.2 | Apply these factors to the hourly labour costs of the various types of on-site labour and determine the schedule of rates of on-site labour in accordance with the relevant <i>organisational requirements and procedures</i> . |

- 5.3 Gain approval of the on-site labour schedule of rates in accordance with the relevant *organisational requirements and procedures*
6. Support and review the application of and maintain the schedule of rates
- 6.1 Provide clarification and advice to those applying the schedule of rates in accordance with the relevant *organisational requirements and procedures*
- 6.2 Review the application of the schedule of rates and recommend changes for the continuous improvements of civil works schedule of rates preparation processes, in accordance with the relevant *organisational requirements and procedures*.
- 6.3 Monitor costs of relevant labour, materials and sub-contractor services and maintain the currency of the schedules of rates in accordance with the relevant *organisational requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the preparation of civil works schedule of rates:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting Australian and other appropriate standards
- Identifying types of on-site labour employed in civil works
- Identifying types of materials used in civil works
- Identifying types of on-site sub-contractor services employed civil works
- Developing and documenting details and specifications of civil works materials
- Developing and documenting details of civil works sub-contractor services
- Preparing invitations to quote on supply of materials and sub-contractor services
- Issuing invitations to quote for the supply of materials and sub-contractor services
- Assessing materials and sub-contractor services quotation documents
- Developing and documenting factors to be applied to hourly labour costs in determining the schedule of rates of on-site labour
- Calculating unit rates for labour, materials and sub-contractor services
- Applying computer based analysis and database technology

- Maintaining cost records
- Providing clarification and advice
- Applying client feedback techniques
- Monitoring costs of labour, materials and sub-contractor services

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of civil works:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational construction procedures and practice
- Current industry best practice in tendering and procurement processes
- Current industry best practice in civil works construction
- Operational techniques required for the execution of civil works construction tasks
- Labour, materials and sub-contractor services cost analysis techniques
- Schedule of rates review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Schedule of rates approval requirements and procedures
- Schedule of rates records filing requirements and procedures

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 in Performance Criteria is detailed below.

Civil works may include:

- Land clearing
- Bulk earthworks
- Surface drainage construction and maintenance
- Subsurface drainage construction and maintenance
- Water storage dams construction and maintenance
- Tailings dams construction and maintenance
- Topsoil management

- Rehabilitation works
- Road works preparation (including the sub grade)
- Pavement construction and maintenance, including:
 - Flexible pavements, including:
 - natural pavement materials
 - manufactured pavement materials
 - asphalt placement
 - spray seal application
 - stabilisation
 - Rigid pavement
- Underground services construction and maintenance
- Applying trenchless technology
- Construction and maintenance of civil structures
- Tunnelling
- Dredging
- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations
- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures

Legislative requirements may include:

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Organisational requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Quotation invitation preparation and submission analysis requirements and procedures
- Administration requirements and procedures, including records and reporting

Relevant teams members may include:

- Other members of the organisation's management team
- Suppliers representatives
- Sub-contractors representatives
- Supervisors or managers of other organisations who are involved in related tasks
- Experienced members of the team directly involved in the task

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking the preparation of civil works schedule of rates.
 - Implementation of procedures and techniques for the safe, effective and efficient completion of the preparation of civil works schedule of rates.
 - Working with other to undertake and complete the civil works schedule of rates.
 - Consistent timely completion of the preparation of civil works schedule of rates.
 - Consistent finalisation of the preparation of civil works schedule of rates processes.
 - Clear, timely and appropriate support of the application of civil works schedule of rates
 - Meaningful contribution to the review and improvement of civil works schedule of rates processes.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency

- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking the preparation of civil works schedule of rates.
 - First hand testimonial and documentary evidence of appropriate and successful:
 - Consultation by the individual in undertaking and completing the schedule of rates
 - Consistent timely completion of the preparation of civil works schedule of rates
 - Consistent finalisation of the preparation of civil works schedule of rates processes
 - Appropriate support of the civil works schedule of rates
 - Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC506A Prepare civil works cost estimates

Unit Descriptor

This unit covers the preparation of civil works cost estimates. It includes planning for the civil works cost estimates process; confirming the bills of quantities and the schedules of rates; developing and gaining agreement on the estimated cost of the civil works project; and supporting and reviewing the application of the cost estimate.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the civil works bills of quantities

2. Confirm bills of quantities

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the civil works cost estimate.
- 1.2 Identify and ***confirm*** the civil works ***project requirements and information*** required for the preparation of the cost estimate in accordance with the relevant ***organisational requirements and procedures***.
- 1.3 Review and confirm the draft works program that details the various tasks or activities to be undertaken to complete the required civil works, in accordance with the relevant ***organisational requirements and procedures***.
- 1.4 Confirm agreement on the draft works program in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.1 Review and confirm the on-site labour bill of quantities for the civil works project in accordance with the relevant ***organisational requirements and procedures***.
- 2.2 Review and confirm the materials bill of quantities for the civil works project in accordance with the relevant ***organisational requirements and procedures***.

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| | 2.3 | Review and confirm the sub-contractor services bill of quantities for the civil works project in accordance with the relevant <i>organisational requirements and procedures</i> . |
| 3. Confirm the schedule of rates | 3.1 | Review and confirm the on-site labour schedule of rates for the civil works project in accordance with the relevant <i>organisational requirements and procedures</i> . |
| | 3.2 | Review and confirm the materials schedule of rates for the civil works project in accordance with the relevant <i>organisational requirements and procedures</i> . |
| | 3.3 | Review and confirm the sub-contractor services schedule of rates for the civil works project in accordance with the relevant <i>organisational requirements and procedures</i> . |
| 4. Develop and gain agreement on the estimated cost of the civil works project | 4.1 | Apply the appropriate confirmed schedule of rates to the confirmed bill of quantities and estimate the civil works project cost in accordance with the relevant <i>organisational requirements and procedures</i> . |
| | 4.2 | Gain approval of the civil works cost estimate in accordance with the relevant <i>organisational requirements and procedures</i> . |
| | 4.3 | Complete and submit the documentation of the civil works cost estimate in accordance with the relevant <i>organisational, requirements and procedures</i> . |
| 5. Support and review the application of the cost estimate | 5.1 | Provide clarification and advice to those applying the cost estimate in accordance with the relevant <i>organisational requirements and procedures</i> . |
| | 5.2 | Review the application of the cost estimate and recommend changes for the continuous improvements of civil works cost estimate preparation processes, in accordance with the relevant <i>organisational requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the preparation of civil works bills of quantities:

- Interpreting plans and drawings
- Interpreting specifications

- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting civil works construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting civil works options selection data
- Selecting civil works options
- Sizing civil works components
- Choosing appropriate construction techniques
- Calculating areas, volumes, labour hours, materials quantities, sub-contractor service capabilities, productivity and required hours
- Applying computer based works planning technology
- Maintaining cost records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the bill of quantities, construction and maintenance of civil works:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational construction procedures and practice
- Current industry best practice
- Civil works options

- Potential hazards, constraints and conditions that may effect civil works construction
- Current industry best practice in civil works construction
- Techniques for choosing preferred options
- Operational techniques required for the execution of civil works construction tasks
- Civil works construction plant and equipment capabilities
- Labour, materials and sub-contractor services estimation techniques
- Bill of quantities review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Cost estimates approval requirements and procedures
- Cost estimates records filing requirements and procedures

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 in the Performance Criteria is detailed below.

Civil works may include:

- Land clearing
- Bulk earthworks
- Surface drainage construction and maintenance
- Subsurface drainage construction and maintenance
- Water storage dams construction and maintenance
- Tailings dams construction and maintenance
- Topsoil management
- Rehabilitation works
- Road works preparation (including the sub grade)
- Pavement construction and maintenance, including:
 - Flexible pavements, including:
 - natural pavement materials
 - manufactured pavement materials
 - asphalt placement
 - spray seal application
 - stabilisation
 - Rigid pavement
- Underground services construction and maintenance
- Applying trenchless technology

Legislative requirements may include:

- Construction and maintenance of civil structures
- Tunnelling
- Dredging
- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the clients (internal and external)
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Review and confirmation of bills of materials data
- Review and confirmation of the schedule of rates data
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking the

preparation of civil works cost estimates.

- Implementation of procedures and techniques for the safe, effective and efficient completion of the preparation of civil works cost estimates.
- Working with other to undertake and complete the civil works cost estimates.
- Consistent timely completion of the preparation of civil works cost estimates.
- Consistent finalisation of the preparation of civil works cost estimating processes.
- Clear, timely and appropriate support of the application of civil works cost estimates
- Meaningful contribution to the review and improvement of civil works cost estimating processes.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking the preparation of civil works bills of quantities.

- First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the cost estimates
 - consistent timely completion of the preparation of civil works cost estimates
 - consistent finalisation of the preparation of civil works cost estimating processes
 - appropriate support of the civil works cost estimates
 - meaningful contribution to the review and improvement of civil works cost estimating processes
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC507A Prepare detailed geotechnical design

Unit Descriptor

This unit covers the completion of the detailed geotechnical works design and documentation. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of geotechnical works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of geotechnical works
2. Undertake the detailed design of geotechnical works

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***geotechnical works***.
- 1.2 Identify and ***confirm*** the geotechnical works ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of geotechnical works in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the *preferred option* that best meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
- 2.3 Complete the *detailed design* of the geotechnical works that safely, effectively and efficiently meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
- 2.4 Prepare a cost estimate of the execution of the designed geotechnical works in accordance with the accuracy required by the relevant *organisational and client requirements and procedures*.
- 2.5 Participate in the review the geotechnical works design with peers and stakeholders in accordance with the relevant *organisational and client requirements and procedures*.
- 2.6 Complete the documentation of the geotechnical works design in accordance with the relevant *organisational and client requirements and procedures*.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant *organisational and client requirements and procedures*.
- 2.8 Gain design approval in accordance with the relevant *organisational and client requirements and procedures*.
- 3. Finalise design processes of geotechnical works
 - 3.1 Ensure filing of design records is completed in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.3 Participate in performance review of the design process in accordance with the relevant *organisational and the client requirements and procedures*.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.5 Close out all systems in accordance with the relevant *organisational, client requirements and procedures*.

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| 4. | Support and review the application of the design of geotechnical works | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.2 | Review the application of the design and recommend changes for the continuous improvements of geotechnical works detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of geotechnical works:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting geotechnical works construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting geotechnical works selection data
- Determining geotechnical works loadings
- Selecting geotechnical works options
- Sizing geotechnical works components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of geotechnical works:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Geotechnical works options
- Geotechnical works geometric requirements
- Geotechnical works surfacing requirements
- Potential hazards, constraints and conditions that may effect geotechnical works design and construction
- Current industry best practice in geotechnical works design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of geotechnical works construction tasks
- Geotechnical works plant and equipment capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Geotechnical works may include:

- Slope stability
- Settlement control and repair
- Soil reinforcement

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures

- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings

Design plan may include:

- Australian or other relevant standards
- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking geotechnical works detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of geotechnical works detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required geotechnical works design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required geotechnical works outcomes.
 - Working with other to undertake and complete the geotechnical works detailed design
 - Consistent timely completion of geotechnical works detailed designs
 - Consistent finalisation of geotechnical works detailed design processes
 - Clear, timely and appropriate support of the application of geotechnical works detailed designs
 - Meaningful contribution to the review and validation of geotechnical works designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.

- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking geotechnical works detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of geotechnical works detailed designs, including evidence of:
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - That detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - Consultation by the individual in undertaking and completing the detailed design
 - Consistent timely completion of geotechnical works detailed designs
 - Consistent finalisation of detailed geotechnical works design processes
 - Appropriate support of the detailed geotechnical works design
 - Meaningful contribution to the review and validation of geotechnical works designs

- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC508A Prepare detailed design of rural roads

Unit Descriptor

This unit covers the completion of the detailed design and documentation of rural road layout. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of rural roads works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of rural roads
2. Undertake the detailed design of rural roads

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed design of *rural roads*.
- 1.2 Identify and *confirm* the rural roads *project requirements and information* for the completion of the detailed design in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare a *design plan* which makes best use of the available resources and meets the design requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of rural roads in accordance with the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the rural roads that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed rural roads in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the rural roads design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the rural roads design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
- 3. Finalise design processes of rural roads
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

4. Support and review the application of the design of rural roads
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.2 Review the application of the design and recommend changes for the continuous improvements of rural roads detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of rural roads:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting rural roads construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting rural roads selection data
- Determining rural roads capacity requirements
- Selecting rural roads options
- Sizing rural roads components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of rural roads:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Rural roads options
- Rural roads geometric requirements
- Rural roads surfacing requirements
- Potential hazards, constraints and conditions that may effect rural roads design and construction
- Current industry best practice in rural roads design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of rural roads construction tasks
- Rural roads construction plant and equipment capabilities
- Cost estimation techniques

- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Rural Road design includes:

- The layout of the roads but does not include detailed design of the following:
 - Pavement
 - Surface treatment
 - Traffic signals
 - Sub-surface drainage
 - Traffic management systems
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development

- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works
- Health, safety and environmental requirements

- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking rural roads detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of rural roads detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required rural roads design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required rural roads outcomes.
 - Working with other to undertake and complete the rural roads detailed design
 - Consistent timely completion of rural roads detailed designs
 - Consistent finalisation of rural roads detailed design processes
 - Clear, timely and appropriate support of the application of rural roads detailed designs
 - Meaningful contribution to the review and validation of rural roads designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated

environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking rural roads detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of rural roads detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of rural roads detailed designs

- consistent finalisation of detailed rural roads design processes
 - appropriate support of the detailed rural roads design
 - meaningful contribution to the review and validation of rural roads designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC509A Prepare detailed design of urban roads

Unit Descriptor

This unit covers the completion of the detailed design and documentation of urban road layout. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of urban roads works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of urban roads

2. Undertake the detailed design of urban roads

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***urban roads***.
- 1.2 Identify and ***confirm*** the urban roads ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of urban roads in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the urban roads that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed urban roads in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the urban roads design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the urban roads design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
- 3. Finalise design processes of urban roads
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

4. Support and review the application of the design of urban roads
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*.
- 4.2 Review the application of the design and recommend changes for the continuous improvements of urban roads detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
- 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of urban roads:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting urban roads construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting urban roads selection data
- Determining urban roads capacity requirements
- Selecting urban roads options
- Sizing urban roads components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology

- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of urban roads:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Urban roads options
- Urban roads geometric requirements
- Urban roads surfacing requirements
- Potential hazards, constraints and conditions that may effect urban roads design and construction
- Current industry best practice in urban roads design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of urban roads construction tasks
- Urban roads construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures

- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Urban Road design includes:

- The layout of the roads but does not include detailed design of the following:
 - Pavement
 - Surface treatment
 - Traffic signals
 - Sub-surface drainage
 - Traffic management systems
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development

- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works
- Health, safety and environmental requirements

- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking urban roads detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of urban roads detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required urban roads design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required urban roads outcomes.
 - Working with other to undertake and complete the urban roads detailed design
 - Consistent timely completion of urban roads detailed designs
 - Consistent finalisation of urban roads detailed design processes
 - Clear, timely and appropriate support of the application of urban roads detailed designs
 - Meaningful contribution to the review and validation of urban roads designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated

environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking urban roads detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of urban roads detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of urban roads detailed designs

- consistent finalisation of detailed urban roads design processes
 - appropriate support of the detailed urban roads design
 - meaningful contribution to the review and validation of urban roads designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC510A Prepare detailed design of busways

Unit Descriptor

This unit covers the completion of the detailed design and documentation of busway layout. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of busways works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

1. Plan for the detailed design of busways

1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer’s requirements and procedures*** required for preparation of the detailed design of ***busways***.

1.2 Identify and ***confirm*** the busways ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.

1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.

2. Undertake the detailed design of busways

2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of busways in accordance with the relevant ***legislative, organisational, client and manufacturer’s requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the busways that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed busways in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the busways design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the busways design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of busways
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

4. Support and review the application of the design of busways
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.2 Review the application of the design and recommend changes for the continuous improvements of busways detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of busways:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting busways construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting busways selection data
- Determining busways capacity requirements
- Selecting busways options
- Sizing busways components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology

- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of busways:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Busways options
- Busways geometric requirements
- Busways surfacing requirements
- Potential hazards, constraints and conditions that may effect busways design and construction
- Current industry best practice in busways design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of busways construction tasks
- Busways construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures

- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Busway design includes:

- The layout of the busway but does not include detailed design of the following:
 - Pavement
 - Surface treatment
 - Traffic signals
 - Sub-surface drainage
 - Traffic management systems
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:

- Workplace safety
- Dangerous goods
- Occupational licensing
- Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking busways detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of busways detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required busways design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required busways outcomes.
 - Working with other to undertake and complete the busways detailed design
 - Consistent timely completion of busways detailed designs
 - Consistent finalisation of busways detailed design processes
 - Clear, timely and appropriate support of the application of busways detailed designs
 - Meaningful contribution to the review and validation of busways designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking busways detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of busways detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design

- consistent timely completion of busways detailed designs
 - consistent finalisation of detailed busways design processes
 - appropriate support of the detailed busways design
 - meaningful contribution to the review and validation of busways designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC511A Prepare detailed design of sub-divisions

Unit Descriptor

This unit covers the completion of the detailed design and documentation of sub-division layout. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of sub-divisions works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of sub-divisions
2. Undertake the detailed design of sub-divisions

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed design of *sub-divisions*.
- 1.2 Identify and *confirm* the sub-divisions *project requirements and information* for the completion of the detailed design in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare a *design plan* which makes best use of the available resources and meets the design requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of sub-divisions in accordance with the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the sub-divisions that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed sub-divisions in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the sub-divisions design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the sub-divisions design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of sub-divisions
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

4. Support and review the application of the design of sub-divisions
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.2 Review the application of the design and recommend changes for the continuous improvements of sub-divisions detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of sub-divisions:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting sub-divisions construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting sub-divisions selection data
- Selecting sub-divisions options
- Sizing sub-divisions components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software

- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of sub-divisions:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Sub-divisions options
- Sub-divisions geometric requirements
- Sub-divisions surfacing requirements
- Potential hazards, constraints and conditions that may effect sub-divisions design and construction
- Current industry best practice in sub-divisions design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of sub-divisions construction tasks
- Sub-divisions construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements

- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Sub-divisions design includes:

- Urban sub-divisions
- Industrial sub-divisions
- Commercial sub-divisions
- The layout of the sub-division but does not include detailed design of the following:
 - Pavement
 - Surface treatment
 - Traffic signals
 - Sub-surface drainage
 - Traffic management systems
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development

- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works
- Health, safety and environmental requirements

- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking sub-divisions detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of sub-divisions detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required sub-divisions design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required sub-divisions outcomes.
 - Working with other to undertake and complete the sub-divisions detailed design
 - Consistent timely completion of sub-divisions detailed designs
 - Consistent finalisation of sub-divisions detailed design processes
 - Clear, timely and appropriate support of the application of sub-divisions detailed designs
 - Meaningful contribution to the review and validation of sub-divisions designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated

environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking sub-divisions detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of sub-divisions detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of sub-divisions detailed designs

- consistent finalisation of detailed sub-divisions design processes
 - appropriate support of the detailed sub-divisions design
 - meaningful contribution to the review and validation of sub-divisions designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC512A Prepare detailed design of motorways and interchanges

Unit Descriptor

This unit covers the completion of the detailed design and documentation of motorway and interchange layouts. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of motorways and interchanges works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of motorways and interchanges
2. Undertake the detailed design of motorways and interchanges

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed design of *motorways and interchanges*.
- 1.2 Identify and *confirm* the motorways and interchanges *project requirements and information* for the completion of the detailed design in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare a *design plan* which makes best use of the available resources and meets the design requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of motorways and interchanges in accordance with the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the *preferred option* that best meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
 - 2.3 Complete the *detailed design* of the motorways and interchanges that safely, effectively and efficiently meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
 - 2.4 Prepare a cost estimate of the execution of the designed motorways and interchanges in accordance with the accuracy required by the relevant *organisational and client requirements and procedures*.
 - 2.5 Participate in the review the motorways and interchanges design with peers and stakeholders in accordance with the relevant *organisational and client requirements and procedures*.
 - 2.6 Complete the documentation of the motorways and interchanges design in accordance with the relevant *organisational and client requirements and procedures*.
 - 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 2.8 Gain design approval in accordance with the relevant *organisational and client requirements and procedures*.
3. Finalise design processes of motorways and interchanges
 - 3.1 Ensure filing of design records is completed in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.3 Participate in performance review of the design process in accordance with the relevant *organisational and the client requirements and procedures*.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant *organisational and client requirements and procedures*.

- | | | |
|---|-----|---|
| | 3.5 | Close out all systems in accordance with the relevant <i>organisational, client requirements and procedures</i> . |
| 4. Support and review the application of the design of motorways and interchanges | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.2 | Review the application of the design and recommend changes for the continuous improvements of motorways and interchanges detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of motorways and interchanges:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting motorways and interchanges construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting motorways and interchanges selection data
- Determining motorways and interchanges loadings and capacity requirements
- Selecting motorways and interchanges options
- Sizing motorways and interchanges components
- Providing leadership and coordination
- Choosing appropriate construction techniques

- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of motorways and interchanges:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Motorways and interchanges options
- Motorways and interchanges geometric requirements
- Motorways and interchanges surfacing requirements
- Potential hazards, constraints and conditions that may effect motorways and interchanges design and construction
- Current industry best practice in motorways and interchanges design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of motorways and interchanges construction tasks

- Motorways and interchanges construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Motorways and interchanges design includes:

- The layout of the motorways and interchanges but does not include detailed design of the following:
 - Pavement
 - Surface treatment
 - Traffic signals
 - Sub-surface drainage
 - Traffic management systems
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity

- Disability Discrimination
- Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data

Project requirements and information may include:

- Survey data
- Metrological data
- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design

- Maintainability of the completed works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking motorways and interchanges detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of motorways and interchanges detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required motorways and interchanges design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required motorways and interchanges outcomes.
 - Working with other to undertake and complete the motorways and interchanges detailed design
 - Consistent timely completion of motorways and interchanges detailed designs
 - Consistent finalisation of motorways and interchanges detailed design processes
 - Clear, timely and appropriate support of the application of motorways and interchanges detailed designs

- Meaningful contribution to the review and validation of motorways and interchanges designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking motorways and interchanges detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of motorways and interchanges detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes

- First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of motorways and interchanges detailed designs
 - consistent finalisation of detailed motorways and interchanges design processes
 - appropriate support of the detailed motorways and interchanges design
 - meaningful contribution to the review and validation of motorways and interchanges designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC513A Prepare detailed design of rail civil infrastructure

Unit Descriptor

This unit covers the completion of the detailed design and documentation of rail civil infrastructure layout. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of rail civil infrastructure works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of rail civil infrastructure
2. Undertake the detailed design of rail civil infrastructure

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***rail civil infrastructure***.
- 1.2 Identify and ***confirm*** the rail civil infrastructure ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of rail civil infrastructure in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the *preferred option* that best meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
- 2.3 Complete the *detailed design* of the rail civil infrastructure that safely, effectively and efficiently meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
- 2.4 Prepare a cost estimate of the execution of the designed rail civil infrastructure in accordance with the accuracy required by the relevant *organisational and client requirements and procedures*.
- 2.5 Participate in the review the rail civil infrastructure design with peers and stakeholders in accordance with the relevant *organisational and client requirements and procedures*.
- 2.6 Complete the documentation of the rail civil infrastructure design in accordance with the relevant *organisational and client requirements and procedures*.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant *organisational and client requirements and procedures*.
- 2.8 Gain design approval in accordance with the relevant *organisational and client requirements and procedures*.
3. Finalise design processes of rail civil infrastructure
 - 3.1 Ensure filing of design records is completed in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.3 Participate in performance review of the design process in accordance with the relevant *organisational and the client requirements and procedures*.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.5 Close out all systems in accordance with the relevant *organisational, client requirements and procedures*.

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|----|---|-----|--|
| 4. | Support and review the application of the design of rail civil infrastructure | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.2 | Review the application of the design and recommend changes for the continuous improvements of rail civil infrastructure detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of rail civil infrastructure:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting rail civil infrastructure construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting rail civil infrastructure selection data
- Determining rail civil infrastructure capacity requirements
- Selecting rail civil infrastructure options
- Sizing rail civil infrastructure components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of rail civil infrastructure:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Rail civil infrastructure options
- Rail civil infrastructure geometric requirements
- Rail civil infrastructure surfacing requirements
- Potential hazards, constraints and conditions that may effect rail civil infrastructure design and construction
- Current industry best practice in rail civil infrastructure design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of rail civil infrastructure construction tasks
- Rail civil infrastructure construction plant and equipment capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Rail civil infrastructure design includes:

- The layout of the rail civil infrastructure, including:
 - Line and grade
 - Track formations
 - Ballast
 - Sleepers
 - Rail joints
 - Rail fasteners
 - Turnouts and catchpoints
 - Diamond crossings
 - Level crossings
 - Track surface drainage systems
- It does not include detailed design of the following:
 - Capping
 - Ballast
 - Sleepers
 - Sub-surface drainage
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities

- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking rail civil infrastructure detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of rail civil infrastructure detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required rail civil infrastructure design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required rail civil infrastructure outcomes.

- Working with other to undertake and complete the rail civil infrastructure detailed design
- Consistent timely completion of rail civil infrastructure detailed designs
- Consistent finalisation of rail civil infrastructure detailed design processes
- Clear, timely and appropriate support of the application of rail civil infrastructure detailed designs
- Meaningful contribution to the review and validation of rail civil infrastructure designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking rail civil infrastructure detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of rail civil infrastructure detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures

- design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
- that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
- First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of rail civil infrastructure detailed designs
 - consistent finalisation of detailed rail civil infrastructure design processes
 - appropriate support of the detailed rail civil infrastructure design
 - meaningful contribution to the review and validation of rail civil infrastructure designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC514A Prepare detailed design of dams

Unit Descriptor

This unit covers the completion of the detailed design and documentation of dam layouts. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of dam construction works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of dams
2. Undertake the detailed design of dams

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***dams***.
- 1.2 Identify and ***confirm*** the dam ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of dams in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.3 Complete the ***detailed design*** of the dams that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed dams in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the dams design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the dams design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
- 3. Finalise design processes of dams
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.
- 4. Support and review the application of the design of dams
 - 4.1 Provide clarification and advice to those applying the design in accordance with the relevant ***organisational and client requirements and procedures***.

- 4.2 Review the application of the design and recommend changes for the continuous improvements of dams detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
- 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of dams:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting dam construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting dam options selection data
- Determining dam loadings and capacity requirements
- Selecting dam options
- Sizing dam components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques

- Calculating areas, volumes, flow rates, capacities, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of dams:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Dam options
- Dam geometric requirements
- Dam surfacing requirements
- Potential hazards, constraints and conditions that may effect dams design and construction
- Current industry best practice in dams design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of dams construction tasks
- Dam construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements

- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Dam design may include:

- Cofferdams
- Water storage dams
- Silt and sediment control dams
- Tailings dams
- It includes the layout of the dam and its spillways, but does not include detailed design of the following:
 - The geotechnical design
 - Sub-surface drainage
 - Underground services
 - Civil structures
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods

- Occupational licensing
- Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of existing and potential hazards
- Obtaining further site data, including:
 - known and potential hazards, constraints and conditions
 - cultural and heritage data
 - catchment size and characteristics
 - geological data
 - geotechnical data
 - hydrological data
 - survey data
 - meteorological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements

- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Catchment areas
 - Flow rates
 - Dam capacity
 - Spillway requirements
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking dams detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of dams detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required dams design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required dams outcomes
 - Working with other to undertake and complete the dams detailed design
 - Consistent timely completion of dams detailed designs
 - Consistent finalisation of dams detailed design processes
 - Clear, timely and appropriate support of the application of dams detailed designs
 - Meaningful contribution to the review and validation of dams designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not

possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking dams detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of dams detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of dams detailed designs

- consistent finalisation of detailed dams design processes
- appropriate support of the detailed dams design
- meaningful contribution to the review and validation of dams designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC515A Prepare detailed design of airfield civil works

Unit Descriptor

This unit covers the completion of the detailed design and documentation of airfield civil works layout. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of airfield civil works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of airfield civil works
2. Undertake the detailed design of airfield civil works

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed design of *airfield civil works*.
- 1.2 Identify and *confirm* the airfield civil works *project requirements and information* for the completion of the detailed design in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare a *design plan* which makes best use of the available resources and meets the design requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of airfield civil works in accordance with the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the airfield civil works that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed airfield civil works in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the airfield civil works design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the airfield civil works design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of airfield civil works
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

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|---|---|
| 4. Support and review the application of the design of airfield civil works | 4.1 Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.2 Review the application of the design and recommend changes for the continuous improvements of airfield civil works detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.3 Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of airfield civil works:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting airfield civil works construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting airfield civil works layout selection data
- Determining airfield civil works capacity requirements
- Selecting airfield civil works layout options
- Sizing airfield civil works components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of airfield civil works:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Airfield civil works layout options
- Airfield civil works geometric requirements
- Airfield civil works surfacing requirements
- Potential hazards, constraints and conditions that may effect airfield civil works design and construction
- Current industry best practice in airfield civil works design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of airfield civil works construction tasks
- Airfield civil works construction plant and equipment capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Airfield civil works
design includes:

- The layout of the airfield civil works, including:
 - Runways
 - Taxiways
 - Parking areas
 - Vehicle roadways
- But does not include detailed design of the following:
 - Pavement
 - Surface treatment
 - Sub-surface drainage
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements
may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity

- Disability Discrimination
- Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data

Project requirements and information may include:

- Survey data
- Metrological data
- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:

- The existing conditions
- The application of the design
- Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking airfield civil works detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of airfield civil works detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required airfield civil works design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required airfield civil works outcomes.
 - Working with other to undertake and complete the airfield civil works detailed design
 - Consistent timely completion of airfield civil works detailed designs
 - Consistent finalisation of airfield civil works detailed design processes
 - Clear, timely and appropriate support of the application of airfield civil works detailed designs

Context of and specific resources for assessment

- Meaningful contribution to the review and validation of airfield civil works designs
- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking airfield civil works detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of airfield civil works detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:

- consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of airfield civil works detailed designs
 - consistent finalisation of detailed airfield civil works design processes
 - appropriate support of the detailed airfield civil works design
 - meaningful contribution to the review and validation of airfield civil works designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC516A Prepare detailed design of bicycle ways

Unit Descriptor

This unit covers the completion of the detailed design and documentation of bicycle ways. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of bicycle ways works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of bicycle ways

2. Undertake the detailed design of bicycle ways

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***bicycle ways***.
- 1.2 Identify and ***confirm*** the bicycle ways ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of bicycle ways in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the bicycle ways that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed bicycle ways in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the bicycle ways design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the bicycle ways design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
- 3. Finalise design processes of bicycle ways
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

4. Support and review the application of the design of bicycle ways
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.2 Review the application of the design and recommend changes for the continuous improvements of bicycle ways detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of bicycle ways:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting bicycle ways construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting bicycle ways selection data
- Determining bicycle ways capacity requirements
- Selecting bicycle ways options
- Sizing bicycle ways components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of bicycle ways:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Bicycle ways options
- Bicycle ways geometric requirements
- Bicycle ways surfacing requirements
- Potential hazards, constraints and conditions that may effect bicycle ways design and construction
- Current industry best practice in bicycle ways design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of bicycle ways construction tasks
- Bicycle ways construction plant and equipment capabilities
- Cost estimation techniques

- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Bicycle ways design includes:

- The layout of the bicycle way, but does not include detailed design of the following:
 - Pavement
 - Surface treatment
 - Sub-surface drainage
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety

- Dangerous goods
- Occupational licensing
- Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements

- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:

- Design notes
- Construction notes
- Supplementary drawings
- Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking bicycle ways detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of bicycle ways detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required bicycle ways design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required bicycle ways outcomes.
 - Working with other to undertake and complete the bicycle ways detailed design
 - Consistent timely completion of bicycle ways detailed designs
 - Consistent finalisation of bicycle ways detailed design processes
 - Clear, timely and appropriate support of the application of bicycle ways detailed designs
 - Meaningful contribution to the review and validation of bicycle ways designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered

using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking bicycle ways detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of bicycle ways detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of bicycle ways detailed designs
 - consistent finalisation of detailed bicycle ways design processes

- appropriate support of the detailed bicycle ways design
- meaningful contribution to the review and validation of bicycle ways designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC517A Prepare detailed design of industrial hardstands

Unit Descriptor

This unit covers the completion of the detailed design and documentation of industrial hardstands. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of industrial hardstands works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of industrial hardstands
2. Undertake the detailed design of industrial hardstands

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed design of *industrial hardstands*.
- 1.2 Identify and *confirm* the industrial hardstands *project requirements and information* for the completion of the detailed design in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare a *design plan* which makes best use of the available resources and meets the design requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of industrial hardstands in accordance with the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the industrial hardstands that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed industrial hardstands in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the industrial hardstands design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the industrial hardstands design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of industrial hardstands
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

4. Support and review the application of the design of industrial hardstands
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.2 Review the application of the design and recommend changes for the continuous improvements of industrial hardstands detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of industrial hardstands:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting industrial hardstands construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting industrial hardstands selection data
- Determining industrial hardstands capacity requirements
- Selecting industrial hardstands options
- Sizing industrial hardstands components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of industrial hardstands:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Industrial hardstands options
- Industrial hardstands geometric requirements
- Industrial hardstands surfacing requirements
- Potential hazards, constraints and conditions that may effect industrial hardstands design and construction
- Current industry best practice in industrial hardstands design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of industrial hardstands construction tasks
- Industrial hardstands construction plant and equipment capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Industrial hardstands design includes:

- The layout of the industrial hardstands but does not include detailed design of the following:
 - Pavement
 - Surface treatment
 - Traffic signals
 - Sub-surface drainage
 - Traffic management systems
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development

- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements

- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking industrial hardstands detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of industrial hardstands detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required industrial hardstands design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required industrial hardstands outcomes.
 - Working with other to undertake and complete the industrial hardstands detailed design
 - Consistent timely completion of industrial hardstands detailed designs
 - Consistent finalisation of industrial hardstands detailed design processes
 - Clear, timely and appropriate support of the application of industrial hardstands detailed designs
 - Meaningful contribution to the review and validation of industrial hardstands designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated

environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking industrial hardstands detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of industrial hardstands detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of industrial hardstands detailed designs

- consistent finalisation of detailed industrial hardstands design processes
 - appropriate support of the detailed industrial hardstands design
 - meaningful contribution to the review and validation of industrial hardstands designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC518A Prepare detailed design of open car parks

Unit Descriptor

This unit covers the completion of the detailed design and documentation of open car parks. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of open car parks works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of open car parks
2. Undertake the detailed design of open car parks

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***open car parks***.
- 1.2 Identify and ***confirm*** the open car parks ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of open car parks in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the open car parks that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed open car parks in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the open car parks design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the open car parks design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of open car parks
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

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| 4. Support and review the application of the design of open car parks | 4.1 Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.2 Review the application of the design and recommend changes for the continuous improvements of open car parks detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.3 Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of open car parks:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting open car parks construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting open car parks selection data
- Determining open car parks capacity requirements
- Selecting open car parks options
- Sizing open car parks components
- Providing leadership and coordination
- Choosing appropriate construction techniques

- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of open car parks:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Open car parks options
- Open car parks geometric requirements
- Open car parks surfacing requirements
- Potential hazards, constraints and conditions that may effect open car parks design and construction
- Current industry best practice in open car parks design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of open car parks construction tasks
- Open car parks construction plant and equipment capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Open car parks design includes:

- The layout of the open car parks but does not include detailed design of the following:
 - Pavement
 - Surface treatment
 - Traffic signals
 - Sub-surface drainage
 - Traffic management systems
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development

- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements

- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking open car parks detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of open car parks detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required open car parks design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required open car parks outcomes
 - Working with other to undertake and complete the open car parks detailed design
 - Consistent timely completion of open car parks detailed designs
 - Consistent finalisation of open car parks detailed design processes
 - Clear, timely and appropriate support of the application of open car parks detailed designs
 - Meaningful contribution to the review and validation of open car parks designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking open car parks detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of open car parks detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design

- consistent timely completion of open car parks detailed designs
 - consistent finalisation of detailed open car parks design processes
 - appropriate support of the detailed open car parks design
 - meaningful contribution to the review and validation of open car parks designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC519A Prepare detailed design of intermodal facilities civil works

Unit Descriptor

This unit covers the completion of the detailed design and documentation of intermodal facilities civil works. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of intermodal facilities civil works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of intermodal facilities civil works
2. Undertake the detailed design of intermodal facilities civil works

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed design of *intermodal facilities civil works*.
- 1.2 Identify and *confirm* the intermodal facilities civil works *project requirements and information* for the completion of the detailed design in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare a *design plan* which makes best use of the available resources and meets the design requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of intermodal facilities civil works in accordance with the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the intermodal facilities civil works that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed intermodal facilities civil works in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the intermodal facilities civil works design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the intermodal facilities civil works design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of intermodal facilities civil works
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.

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| | 3.5 | Close out all systems in accordance with the relevant <i>organisational, client requirements and procedures</i> . |
| 4. Support and review the application of the design of intermodal facilities civil works | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.2 | Review the application of the design and recommend changes for the continuous improvements of intermodal facilities civil works detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of intermodal facilities civil works:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting intermodal facilities civil works construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting intermodal facilities civil works selection data
- Determining intermodal facilities civil works capacity requirements
- Selecting intermodal facilities civil works options
- Sizing intermodal facilities civil works components
- Providing leadership and coordination

- Choosing appropriate construction techniques
- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of intermodal facilities civil works:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Intermodal facilities civil works options
- Intermodal facilities civil works geometric requirements
- Intermodal facilities civil works surfacing requirements
- Potential hazards, constraints and conditions that may effect intermodal facilities civil works design and construction
- Current industry best practice in intermodal facilities civil works design and construction
- Techniques for choosing preferred options
- Team leadership techniques

- Operational techniques required for the execution of intermodal facilities civil works construction tasks
- Intermodal facilities civil works construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Intermodal facilities civil works design includes:

- The layout of the intermodal facilities civil works but does not include detailed design of the following:
 - Pavement
 - Surface treatment
 - Traffic signals
 - Sub-surface drainage
 - Traffic management systems
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:

- Equal Employment Opportunity
- Disability Discrimination
- Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data

Project requirements and information may include:

- Hydrological data
- Survey data
- Metrological data
- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions

- The application of the design
- Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking intermodal facilities civil works detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of intermodal facilities civil works detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required intermodal facilities civil works design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required intermodal facilities civil works outcomes.
 - Working with other to undertake and complete the intermodal facilities civil works detailed design
 - Consistent timely completion of intermodal facilities civil works detailed designs
 - Consistent finalisation of intermodal facilities civil works detailed design processes

- Clear, timely and appropriate support of the application of intermodal facilities civil works detailed designs
- Meaningful contribution to the review and validation of intermodal facilities civil works designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking intermodal facilities civil works detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of intermodal facilities civil works detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design

- option selected by the individual are those that best meet the required outcomes
- First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of intermodal facilities civil works detailed designs
 - consistent finalisation of detailed intermodal facilities civil works design processes
 - appropriate support of the detailed intermodal facilities civil works design
 - meaningful contribution to the review and validation of intermodal facilities civil works designs
 - Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC520A Prepare detailed design of rigid pavement

Unit Descriptor

This unit covers the completion of the detailed design and documentation of rigid pavement. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of rigid pavement works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of rigid pavement
2. Undertake the detailed design of rigid pavement

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***rigid pavement***.
- 1.2 Identify and ***confirm*** the rigid pavement ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of rigid pavement in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the rigid pavement that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed rigid pavement in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the rigid pavement design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the rigid pavement design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of rigid pavement
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

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|----|--|-----|---|
| 4. | Support and review the application of the design of rigid pavement | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.2 | Review the application of the design and recommend changes for the continuous improvements of rigid pavement detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of rigid pavement:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting rigid pavement construction materials test results
- Interpreting meteorological data
- Carrying out risk assessments
- Interpreting rigid pavement selection data
- Selecting rigid pavement options
- Determining rigid pavement loadings requirements
- Applying concrete mix design principles
- Sizing rigid pavement components
- Choosing appropriate construction techniques
- Providing leadership and coordination

- Developing and applying design plans
- Applying computer based design technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, grades, loads and stresses
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of rigid pavement:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Rigid pavement options
- Rigid pavement geometric requirements
- Rigid pavement reinforcement requirements
- Rigid pavement surfacing requirements
- Potential hazards, constraints and conditions that may effect rigid pavement design and construction
- Current industry best practice in rigid pavement design and construction
- Techniques for choosing preferred options
- Team leadership techniques

- Operational techniques required for the execution of rigid pavement construction tasks
- Rigid pavement construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Rigid pavement may include their application in:

- Roads
- Open car parks
- Industrial hardstands
- Airfields

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing

- Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data

- Project site engineering survey data
 - Project site cultural and heritage constraints
 - Existing project design and drawings
 - Australian or other relevant standards
- Design plan* may include:
- Human resource requirements
 - Design hardware and software
 - Coordination requirements
 - Scheduling
 - Review requirements
 - Design process communication and reporting requirements
- Factors to be considered in determining the *preferred option* include:
- Cost
 - Site constraints
 - Available resources
 - Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works
- Detailed design* includes:
- Calculations, including:
 - Pavement loading
 - Pavement stresses
 - Reinforcement requirements
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
 - Drawings
 - Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
 - Health, safety and environmental requirements
 - Contribution to ancillary documentation, which may include:
 - Design notes

- Construction notes
- Supplementary drawings
- Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking rigid pavement detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of rigid pavement detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required rigid pavement design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required rigid pavement outcomes.
 - Working with other to undertake and complete the rigid pavement detailed design
 - Consistent timely completion of rigid pavement detailed designs
 - Consistent finalisation of rigid pavement detailed design processes
 - Clear, timely and appropriate support of the application of rigid pavement detailed designs
 - Meaningful contribution to the review and validation of rigid pavement designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking rigid pavement detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of rigid pavement detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of rigid pavement detailed designs
 - consistent finalisation of detailed rigid pavement design processes
 - appropriate support of the detailed rigid pavement design

- meaningful contribution to the review and validation of rigid pavement designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC521A Prepare detailed design of flexible pavement

Unit Descriptor

This unit covers the completion of the detailed design and documentation of flexible pavement. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of flexible pavement works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of flexible pavement
2. Undertake the detailed design of flexible pavement

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***flexible pavement***.
- 1.2 Identify and ***confirm*** the flexible pavement ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of flexible pavement in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the flexible pavement that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed flexible pavement in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the flexible pavement design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the flexible pavement design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of flexible pavement
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

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| 4. | Support and review the application of the design of flexible pavement | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.2 | Review the application of the design and recommend changes for the continuous improvements of flexible pavement detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of flexible pavement:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting geotechnical information
- Interpreting flexible pavement construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting flexible pavement selection data
- Determining flexible pavement loadings requirements
- Selecting flexible pavement options
- Sizing flexible pavement components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans
- Applying computer based design technology

- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, density, mass, grades, loads and stresses
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of flexible pavement:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Flexible pavement options
- Flexible pavement geometric requirements
- Flexible pavement surfacing requirements
- Potential hazards, constraints and conditions affecting flexible pavement design and construction
- Current industry best practice in flexible pavement design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques for the execution of flexible pavement construction tasks
- Flexible pavement construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures

- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Flexible pavement may include their application in:

- Roads
- Open car parks
- Industrial hardstands
- Airfields
- Recreational facilities

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures

- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints

- Existing project design and drawings
 - Australian or other relevant standards
- Design plan* may include:
- Human resource requirements
 - Design hardware and software
 - Coordination requirements
 - Scheduling
 - Review requirements
 - Design process communication and reporting requirements
- Factors to be considered in determining the *preferred option* include:
- Cost
 - Site constraints
 - Available resources
 - Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works
- Detailed design* includes:
- Calculations, including:
 - Pavement loading
 - Pavement stresses
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
 - Drawings
 - Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
 - Health, safety and environmental requirements
 - Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking flexible pavement detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of flexible pavement detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required flexible pavement design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required flexible pavement outcomes
 - Working with other to undertake and complete the flexible pavement detailed design
 - Consistent timely completion of flexible pavement detailed designs
 - Consistent finalisation of flexible pavement detailed design processes
 - Clear, timely and appropriate support of the application of flexible pavement detailed designs
 - Meaningful contribution to the review and validation of flexible pavement designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy

demands of assessment should not be greater than those required on the job.

- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit may be assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking flexible pavement detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of flexible pavement detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of flexible pavement detailed designs
 - consistent finalisation of detailed flexible pavement design processes
 - appropriate support of the detailed flexible pavement design

- meaningful contribution to the review and validation of flexible pavement designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC522A Prepare stabilised materials mix design

Unit Descriptor

This unit covers the completion of the design and documentation of stabilised materials mix. It includes the preparation and planning for the detailed, undertaking of the design, finalisation of the design processes and supporting the application of the design.

This unit requires the identification of design inputs, production of calculations, design options and solutions and specifications required for the completion of stabilised materials mix design, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for stabilised materials mix design
2. Undertake the stabilised materials mix design

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of ***stabilised materials mix designs***.
- 1.2 Identify and ***confirm*** the stabilised materials mix design ***project requirements and information*** for the completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the stabilised materials mix design in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the stabilised materials mix ***design*** that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed stabilised materials mix in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the stabilised materials mix design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the stabilised materials mix design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise stabilised materials mix design
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.

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| | 3.5 | Close out all systems in accordance with the relevant <i>organisational, client requirements and procedures.</i> |
| 4. Support and review the application of the stabilised materials mix design | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures.</i> |
| | 4.2 | Review the application of the design and recommend changes for the continuous improvements of stabilised materials mix designs, in accordance with the relevant <i>organisational and client requirements and procedures..</i> |
| | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures..</i> |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of stabilised materials works:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting stabilised materials construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting stabilised materials mix design selection data
- Determining stabilised materials mix design loadings requirements
- Selecting stabilised materials mix design options
- Sizing stabilised materials mix design components
- Providing leadership and coordination

- Choosing appropriate construction techniques
- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, density, mass, grades, loads and stresses
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of stabilised materials works:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Stabilised materials binder characteristics
- Stabilised materials mix design options
- Stabilised materials mix design geometric requirements
- Stabilised materials mix design surfacing requirements
- Potential hazards, constraints and conditions that may effect stabilised materials mix design and construction
- Current industry best practice in stabilised materials mix design and construction
- Techniques for choosing preferred options
- Team leadership techniques

- Operational techniques required for the execution of stabilised materials construction tasks
- Stabilised materials works construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Stabilised materials mix design may include their application in:

- Roads
- Open car parks
- Industrial hardstands
- Airfields

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets

- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data

- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Design includes:

- Calculations, including:
 - Pavement loading
 - Pavement stresses
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes

- Supplementary drawings
- Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking stabilised materials mix designs
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of stabilised materials mix designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required stabilised materials mix design outcomes
 - The identification of viable design options and the selection of design options that best meet the required stabilised materials mix design outcomes
 - Working with other to undertake and complete the stabilised materials mix designs
 - Consistent, timely completion of stabilised materials mix design
 - Consistent finalisation of stabilised materials mix design processes
 - Clear, timely and appropriate support of the application of stabilised materials mix designs
 - Meaningful contribution to the review and validation of stabilised materials mix design

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment
- Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking stabilised materials mix design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of stabilised materials mix designs including evidence:
 - of consistent application of appropriate health, safety and environmental requirements and procedures
 - of design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that design options proposed by the individual are viable and that the design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the design
 - consistent timely completion of stabilised materials mix designs
 - consistent finalisation of detailed stabilised materials mix design processes
 - support of the stabilised materials mix design

- meaningful contribution to the review and validation of stabilised materials mix designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC523A Prepare asphalt mix design

Unit Descriptor

This unit covers the completion of the design and documentation of asphalt mixes. It includes the preparation and planning for the design, undertaking of the design, finalisation of the design processes and supporting the application of the design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of asphalt mix manufacture, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the asphalt mix design

2. Undertake the asphalt mix design

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the asphalt mix design.
- 1.2 Identify and ***confirm*** the asphalt mix ***project requirements and information*** for the completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the asphalt mix design in accordance with the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.
- 2.3 Complete the ***design*** of the asphalt mix that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed asphalt mix in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***
- 2.5 Participate in the review the asphalt mix design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the asphalt mix design in accordance with the relevant ***organisational and client requirements and procedures***
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***
3. Finalise design processes of asphalt mix design
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***

4. Support and review the application of the asphalt mix design
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*
 - 4.2 Review the application of the design and recommend changes for the continuous improvements of asphalt mix designs, in accordance with the relevant *organisational and client requirements and procedures.*
 - 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures.*

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carryout the following as applicable for the design and construction of asphalt mix design:

- Interpret plans and drawings
- Interpret specifications
- Interpret design briefs
- Interpreting Australian and other appropriate standards
- Interpret engineering survey information
- Interpret hydrological data
- Interpret geotechnical information
- Interpreting asphalt materials and product test results
- Interpret meteorological data
- Carry out risk assessments
- Interpret asphalt mix selection data
- Interpreting traffic data
- Determining asphalt mix traffic category and loadings requirements
- Selecting of asphalt mix design options
- Proportioning asphalt mix design components
- Providing leadership and coordination
- Choosing appropriate operational techniques
- Developing and applying design plans

- Applying computer based design technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating of areas, volumes, density, mass, grades, loads and stresses
- Applying mix design procedures, such as Marshall and Hubbard-Field
- Maintaining design cost records
- Maintain design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of asphalt mix design:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures, including materials and product sampling and testing requirements
- Asphalt laboratory procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Asphalt mix design options
- Potential hazards, constraints and conditions that may effect asphalt mix design and construction
- Current industry best practice in asphalt mix design and construction
- Traffic category application in asphalt mix design
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of asphalt construction tasks
- Asphalt mix manufacture and construction plant and equipment capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Asphalt mixes may include their application in:

- Urban and rural roads
- Car parks
- Industrial hardstands
- Airfields
- Recreational facilities
- Urban and rural pathways

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures

- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including;
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Mix materials data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data

- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design, and
 - Maintainability of the completed works

Design includes:

- Calculations, including:
 - Pavement loading
 - Pavement stresses
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design, and
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes

- Supplementary drawings
- Input to the specifications

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking asphalt mix design.
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of asphalt mix designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required asphalt mix design outcomes.
 - The identification of viable design options and the selection of design options that best meet the required asphalt mix design outcomes.
 - Working with other to undertake and complete the asphalt mix designs.
 - Consistent timely completion of asphalt mix designs.
 - Consistent finalisation of asphalt mix design processes.
 - Clear, timely and appropriate support of the application of asphalt mix design, and
 - Meaningful contribution to the review and validation of asphalt mix designs.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy

demands of assessment should not be greater than those required on the job.

- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking asphalt mix design.
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of asphalt mix designs, including evidence of:
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes.
 - That design options proposed by the individual are viable and that the design option selected by the individual are those that best meet the required outcomes.
 - First hand testimonial and documentary evidence of appropriate and successful:
 - Consultation by the individual in undertaking and completing the design.
 - Consistent timely completion of asphalt mix designs,
 - Consistent finalisation of asphalt mix design processes,
 - Appropriate support of the asphalt mix design, and
 - Meaningful contribution to the review and validation of asphalt mix designs.

- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC524A Prepare design of sprayed seal surfacing

Unit Descriptor

This unit covers the completion of and documentation of sprayed seal surfacing design. It includes the preparation and planning for the design, undertaking of the design, finalisation of the design processes and supporting the application of the design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of sprayed seal surfacing works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- | | |
|--|---|
| <p>1. Plan for the design of sprayed seal surfacing</p> | <p>1.1 Access, interpret and clarify relevant <i>legislative, organisational and manufacturer's requirements and procedures</i> required for preparation of the design of sprayed seal surfacing.</p> <p>1.2 Identify and <i>confirm</i> the sprayed seal surfacing <i>project requirements and information</i> for the completion of the design in accordance with the relevant <i>organisational and client requirements and procedures</i>.</p> <p>1.3 Prepare a <i>design plan</i> which makes best use of the available resources and meets the design requirements in accordance with the relevant <i>organisational, client requirements and procedures</i>.</p> |
| <p>2. Undertake the design of sprayed seal surfacing</p> | <p>2.1 Interpret and analyse the relevant data and identify the available viable options for the design of sprayed seal surfacing in accordance with the relevant <i>legislative, organisational, client and manufacturers' requirements and procedures</i>.</p> <p>2.2 Interpret and analyse relevant data and recommend the <i>preferred option</i> that best meets the required project outcomes and the relevant <i>legislative, organisational,</i></p> |

- client and manufacturers' requirements and procedures.*
- 2.3 Complete the **design** of the sprayed seal surfacing that safely, effectively and efficiently meets the required project outcomes and the relevant **legislative, organisational, client and manufacturers' requirements and procedures**.
 - 2.4 Prepare a cost estimate of the execution of the designed sprayed seal surfacing in accordance with the accuracy required by the relevant **organisational and client requirements and procedures**
 - 2.5 Participate in the review the sprayed seal surfacing design with peers and stakeholders in accordance with the relevant **organisational and client requirements and procedures**.
 - 2.6 Complete the documentation of the sprayed seal surfacing design in accordance with the relevant **organisational and client requirements and procedures**
 - 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant **organisational and client requirements and procedures**
 - 2.8 Gain design approval in accordance with the relevant **organisational and client requirements and procedures**
3. Finalise design processes of sprayed seal surfacing
 - 3.1 Ensure filing of design records is completed in accordance with the relevant **organisational and client requirements and procedures**
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant **organisational and client requirements and procedures**
 - 3.3 Participate in performance review of the design process in accordance with the relevant **organisational and the client requirements and procedures**
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant **organisational and client requirements and procedures**
 - 3.5 Close out all systems in accordance with the relevant **organisational, client requirements and procedures**

- | | | | |
|----|--|-----|--|
| 4. | Support and review the application of the design of sprayed seal surfacing | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> |
| | | 4.2 | Review the application of the design and recommend changes for the continuous improvements of sprayed seal surfacing designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of sprayed seal surfacing:

- Interpret plans and drawings
- Interpret specifications
- Interpret design briefs
- Interpreting Australian and other appropriate standards
- Interpret engineering survey information
- Interpret hydrological data
- Interpret geotechnical information
- Interpreting sprayed seal surfacing materials test results
- Interpret meteorological data
- Interpreting traffic data
- Carry out risk assessments
- Interpret sprayed seal surfacing selection data
- Determining traffic category to be used in sprayed seal surfacing design
- Selecting of sprayed seal surfacing options
- Binder selection criteria, (including bitumen, bituminous emulsion and polymer modified binders)
- Determining binder application rates and aggregate spread rates
- Requirements for the preparation of pavements for surfacing
- Providing leadership and coordination
- Developing and applying design plans

- Applying computer base design technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating of design traffic volumes, density, mass, grades, loads and stresses
- Maintaining design cost records
- Maintain design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of sprayed seal surfacing:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Traffic category application in sprayed seal surfacing designs
- Sprayed seal surfacing options
- Potential hazards, constraints and conditions that may effect sprayed seal surfacing design and construction
- Current industry best practice in sprayed seal surfacing design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of sprayed seal surfacing construction tasks
- Sprayed seal surfacing plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures

- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Sprayed seal surfacing may include:

- Bitumen, including multigrade bitumen
- Polymer modified binders
- Bituminous emulsions
- Various aggregate sizes

Sprayed seal surfacing may include its application on:

- New installations and maintenance of existing pavements
- Urban and rural roads
- Bridges
- Car parks
- Industrial hardstands
- Airfields
- Recreational facilities
- Urban and rural pathways

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:

- Workplace safety
- Dangerous goods
- Occupational licensing
- Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including;
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Traffic data
 - Surface texture and condition of existing pavements
 - Pavement geometry
 - Geological data
 - Geotechnical data
 - Sprayed seal materials data

Project requirements and information may include:

- Hydrological data
- Survey data
- Metrological data
- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design, and
 - Maintainability of the completed works

Design includes:

- Calculations, including:
 - Pavement loading
 - Pavement stresses
 - Traffic volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings

- Risk assessment of:
 - The existing conditions
 - The application of the design, and
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking a variety of sprayed seal surfacing design.
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of a variety of sprayed seal surfacing designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required sprayed seal surfacing design outcomes.
 - The identification of viable design options and the selection of design options that best meet the required sprayed seal surfacing outcomes.
 - Working with other to undertake and complete a variety of sprayed seal surfacing design.
 - Consistent timely completion of a variety of sprayed seal surfacing designs.
 - Consistent finalisation of a variety of sprayed seal surfacing design processes.

- Clear, timely and appropriate support of the application of a variety of sprayed seal surfacing designs, and
- Meaningful contribution to the review and validation of a variety of sprayed seal surfacing designs.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking a variety of sprayed seal surfacing design.
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of a variety of sprayed seal surfacing designs, including evidence of:
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes.
 - That design options proposed by the individual are viable and that the design option selected by the

individual are those that best meet the required outcomes.

- First hand testimonial and documentary evidence of appropriate and successful:
 - Consultation by the individual in undertaking and completing the design.
 - Consistent timely completion of a variety of sprayed seal surfacing designs,
 - Consistent finalisation of detailed a variety of sprayed seal surfacing design processes,
 - Appropriate support of the detailed a variety of sprayed seal surfacing design, and
 - Meaningful contribution to the review and validation of a variety of sprayed seal surfacing designs.
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC525A Select pavement surfacing

Unit Descriptor

This unit covers the completion of the selection and documentation of pavement surfacing. It includes the preparation and planning for the selection, undertaking of the selection, finalisation of the selection processes and supporting the application of the selection.

This unit requires the identification of selection inputs, production of calculations, drawings, selection options and solutions and specifications required for the completion of pavement surfacing works, it does not include the certification of the selection.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.

- | | |
|--|---|
| 1. Plan for the selection of pavement surfacing | <p>1.1 Access, interpret and clarify relevant <i>legislative, organisational and manufacturer's requirements and procedures</i> required for preparation of the selection of <i>pavement surfacing</i>.</p> <p>1.2 Identify and <i>confirm</i> the pavement surfacing <i>project requirements and information</i> for the completion of the selection in accordance with the relevant <i>organisational and client requirements and procedures</i>.</p> <p>1.3 Prepare a <i>selection plan</i> which makes best use of the available resources and meets the selection requirements in accordance with the relevant <i>organisational, client requirements and procedures</i>.</p> |
| 2. Undertake the selection of pavement surfacing | 2.1 Interpret and analyse the relevant data and identify the available viable options for the selection of pavement surfacing in accordance with the relevant <i>legislative, organisational, client and manufacturers' requirements and procedures</i> . |

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.
- 2.3 Complete the ***selection*** of the pavement surfacing that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the selected pavement surfacing in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***
- 2.5 Participate in the review the pavement surfacing selection with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the pavement surfacing selection in accordance with the relevant ***organisational and client requirements and procedures***
- 2.7 Monitor and coordinate the progress of other team members involved in the selection process to ensure the effective and efficient completion of the selection in accordance with the relevant ***organisational and client requirements and procedures***
- 2.8 Gain selection approval in accordance with the relevant ***organisational and client requirements and procedures***
3. Finalise selection processes of pavement surfacing
 - 3.1 Ensure filing of selection records is completed in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.2 Complete and submit selection cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.3 Participate in performance review of the selection process in accordance with the relevant ***organisational and the client requirements and procedures***
 - 3.4 Seek client feedback and contribute to the verification of the selection in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***

- | | | | |
|----|---|-----|---|
| 4. | Support and review the application of the selection of pavement surfacing | 4.1 | Provide clarification and advice to those applying the selection in accordance with the relevant <i>organisational and client requirements and procedures</i> |
| | | 4.2 | Review the application of the selection and recommend changes for the continuous improvements of pavement surfacing selections, in accordance with the relevant <i>organisational and client requirements and procedures.</i> |
| | | 4.3 | Contribute to the validation of the selection in accordance with the relevant <i>organisational and client requirements and procedures.</i> |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carryout the following as applicable for the selection and construction of pavement surfacing:

- Interpret plans and drawings
- Interpret specifications
- Interpret selection briefs
- Interpreting Australian and other appropriate standards
- Interpret engineering survey information
- Interpret hydrological data
- Interpret geotechnical information
- Interpreting pavement surfacing materials and product test results
- Interpret meteorological data
- Interpret cultural and heritage data
- Carry out risk assessments
- Interpret pavement surfacing selection data
- Determining pavement surfacing loadings and capacity requirements
- Selecting of pavement surfacing options
- Determining traffic category to be used in pavement surfacing selection and design
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying selection plans

- Applying computer aided design technology
- Applying industry or government standard selection software
- Applying engineering graphical presentation techniques
- Calculating of areas, volumes, density, mass, grades, loads and stresses
- Maintaining selection cost records
- Maintain selection records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the selection, construction and maintenance of pavement surfacing:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Road safety issues, requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Community expectations
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational selection procedures and practice
- Pavement surfacing options and their characteristics
- Potential hazards, constraints and conditions that may effect pavement surfacing selection and construction
- Current industry best practice in pavement surfacing selection and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of pavement surfacing construction tasks
- Pavement surfacing construction plant and equipment capabilities
- Cost estimation techniques
- Selection review principles and procedures

- Documentation requirements
- Reporting requirements and procedures
- Selection approval requirements and procedures
- Selection records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Existing pavement assessment requirements and procedures

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 in the Performance Criteria is detailed below.

Pavement surfacing may include:

- Sprayed sealing
- Asphalt
- Cold mix
- Slurry and micro-surfacing

Pavement surfacing may include its application on:

- New pavement construction
- Existing pavement maintenance and rehabilitation
- Motorways, rural and urban roads
- Bridges
- Car parks
- Industrial hardstands
- Airfields
- Recreational facilities
- Urban and rural pathways

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development

- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including;
 - Known and potential hazards, constraints and conditions
 - Pavement condition
 - Pavement strength
 - Pavement surface characteristics
 - Cultural and heritage data
 - Geological data
 - Geotechnical data

Project requirements and information may include:

- Hydrological data
- Survey data
- Metrological data
- Project specifications
- ***Performance criteria***
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Selection plan may include:

- Human resource requirements
- Selection hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Selection process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the selection, and
 - Maintainability of the completed works

Pavement surfacing Selection includes:

- Calculations, including:
 - Pavement loading
 - Pavement stresses
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings

- Risk assessment of:
 - The existing conditions
 - The application of the selection, and
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Selection notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking pavement surfacing selection.
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of pavement surfacing selections
 - Selection plans which reflect the requirements of the task and are capable of achieving their required pavement surfacing selection outcomes.
 - The identification of viable options and the selection of options that best meet the required pavement surfacing performance outcomes.
 - Working with other to undertake and complete the pavement surfacing selection.
 - Consistent timely completion of pavement surfacing selections.
 - Consistent finalisation of pavement surfacing selection processes.

- Clear, timely and appropriate support of the application of pavement surfacing selections, and
- Meaningful contribution to the review and validation of pavement surfacing selections.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking pavement surfacing selection.
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of pavement surfacing selections, including evidence of:
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Selection plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required selection outcomes.
 - That selection options proposed by the individual are viable and that the selection option selected by the individual are those that best meet the required outcomes.

- First hand testimonial and documentary evidence of appropriate and successful:
 - Consultation by the individual in undertaking and completing the selection.
 - Consistent timely completion of pavement surfacing selections,
 - Consistent finalisation of pavement surfacing selection processes,
 - Appropriate support of the pavement surfacing selection, and
 - Meaningful contribution to the review and validation of pavement surfacing selections.
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC526A Prepare detailed traffic analysis

Unit Descriptor

This unit covers the completion of the detailed traffic analysis and documentation of that analysis. It includes the preparation and planning for the detailed analysis, undertaking of the detailed analysis, finalisation of the detailed analysis processes and supporting the application of the detailed analysis.

This unit requires the identification of analysis inputs, production of calculations, drawings, analysis options and solutions and specifications required for the completion of works associated with the analysis, it does not include the certification of the analysis.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed traffic analysis
2. Undertake the detailed traffic analysis

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed traffic analysis.
- 1.2 Identify and *confirm* the traffic analysis *project requirements and information* for the completion of the detailed analysis in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare an *analysis plan* which makes best use of the available resources and meets the analysis requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed traffic analysis in accordance with the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed traffic analysis*** that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Participate in the review the traffic analysis with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.5 Complete the documentation of the traffic analysis in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Monitor and coordinate the progress of other team members involved in the analysis process to ensure the effective and efficient completion of the analysis in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Gain analysis approval in accordance with the relevant ***organisational and client requirements and procedures***.
- 3. Finalise detailed traffic analysis processes
 - 3.1 Ensure filing of analysis records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit analysis cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the analysis process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the analysis in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.
- 4. Support and review the application of the traffic analysis
 - 4.1 Provide clarification and advice to those applying the analysis in accordance with the relevant ***organisational and client requirements and procedures***.

- 4.2 Review the application of the analysis and recommend changes for the continuous improvements of traffic detailed analysis, in accordance with the relevant *organisational and client requirements and procedures*.
- 4.3 Contribute to the validation of the analysis in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the detailed analysis of traffic:

- Interpreting plans and drawings
- Interpreting analysis briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting meteorological data
- Carrying out risk assessments
- Interpreting traffic analysis data
- Determining traffic capacity requirements
- Providing leadership and coordination
- Choosing appropriate analysis techniques
- Developing and applying analysis plans
- Applying computer based analysis technology
- Applying industry or government standard analysis software
- Applying engineering graphical presentation techniques
- Calculating of flow rates, level of service, capacities and percentages
- Maintaining analysis cost records
- Maintaining analysis records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in traffic analysis:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Quality management requirements and procedures
- Cultural and heritage requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational analysis procedures and practice
- Current industry best practice
- Traffic analysis options
- Potential hazards, constraints and conditions that may effect traffic analysis
- Current industry best practice in traffic analysis
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of traffic construction tasks
- Traffic analysis review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Traffic analysis approval requirements and procedures
- Traffic analysis records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Traffic analysis may include its application for:

- Roads

Legislative requirements may include:

- Car parks
- Industrial hardstands
- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation

- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards they may effect the data collection process
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Existing traffic data
 - Current traffic data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project analysis and data
- Australian or other relevant standards

Analysis plan may include:

- Human resource requirements
- Analysis hardware and software
- Coordination requirements
- Data collection requirements
- Scheduling
- Review requirements
- Analysis process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the analysis
 - Maintainability of the completed works

Detailed analysis includes:

- Calculations, including:
 - Level of service
 - Capacity
- Drawings (or sketches)
- Risk assessment of:
 - The existing conditions, and
 - The conduct of the analysis
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Analysis notes
 - Supplementary drawings
 - Outcomes and recommendations

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking traffic detailed analysis.
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of traffic detailed analysis
 - Analysis plans which reflect the requirements of the task and are capable of achieving all of their required traffic analysis outcomes.
 - The identification of viable detailed analysis options and the selection of detailed analysis options that best meet the required traffic analysis outcomes.
 - Working with other to undertake and complete the traffic detailed analysis.
 - Consistent timely completion of traffic detailed analysis.

- Consistent finalisation of traffic detailed analysis processes.
- Clear, timely and appropriate support of the application of traffic detailed analysis
- Meaningful contribution to the review and validation of traffic analysis.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking traffic detailed analysis.
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of traffic detailed analysis, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - analysis plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required analysis outcomes.
 - that detailed analysis options proposed by the individual are viable and that the detailed analysis

option selected by the individual are those that best meet the required outcomes

- First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed analysis.
 - consistent timely completion of traffic detailed analysis,
 - consistent finalisation of detailed traffic analysis processes,
 - appropriate support of the detailed traffic analysis
 - meaningful contribution to the review and validation of traffic analysis.
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC527A Prepare detailed design of traffic signals

Unit Descriptor

This unit covers the completion of the detailed design and documentation of traffic signals. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of traffic signals works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of traffic signals

2. Undertake the detailed design of traffic signals

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed design of *traffic signals*.
- 1.2 Identify and *confirm* the traffic signals *project requirements and information* for the completion of the detailed design in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare a *design plan* which makes best use of the available resources and meets the design requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of traffic signals in accordance with the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the traffic signals that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed traffic signals in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the traffic signals design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the traffic signals design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of traffic signals
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

4. Support and review the application of the design of traffic signals
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.2 Review the application of the design and recommend changes for the continuous improvements of traffic signals detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of traffic signals:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting traffic signals selection data
- Interpreting traffic management systems
- Determining traffic signals traffic capacity requirements
- Selecting traffic signals options
- Sizing traffic signals components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating of flow rates, level of service, capacities and percentages
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of traffic signals:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Traffic signals options
- Traffic signals geometric requirements
- Potential hazards, constraints and conditions that may effect traffic signals design and construction
- Current industry best practice in traffic signals design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of traffic signals construction tasks
- Traffic signals construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures

- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Traffic signals may include their application for:

- Roads
- Car parks
- Industrial hardstands
- The layout of the traffic signals but does not include detailed design of the following:
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing

- Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site traffic data and analysis

- Project site traffic management system
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Level of service
 - Capacity
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:

- Design notes
- Construction notes
- Supplementary drawings
- Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking traffic signals detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of traffic signals detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required traffic signals design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required traffic signals outcomes.
 - Working with other to undertake and complete the traffic signals detailed design
 - Consistent timely completion of traffic signals detailed designs
 - Consistent finalisation of traffic signals detailed design processes
 - Clear, timely and appropriate support of the application of traffic signals detailed designs
 - Meaningful contribution to the review and validation of traffic signals designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered

using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking traffic signals detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of traffic signals detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of traffic signals detailed designs
 - consistent finalisation of detailed traffic signals design processes

- appropriate support of the detailed traffic signals design
- meaningful contribution to the review and validation of traffic signals designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC528A Prepare detailed design of traffic management systems

Unit Descriptor

This unit covers the completion of the detailed design and documentation of traffic management systems. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of traffic management systems works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of traffic management systems

2. Undertake the detailed design of traffic management systems

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***traffic management systems***.
- 1.2 Identify and ***confirm*** the traffic management systems ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of traffic management systems in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the traffic management systems that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed traffic management systems in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the traffic management systems design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the traffic management systems design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of traffic management systems
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

- | | | | |
|----|--|-----|---|
| 4. | Support and review the application of the design of traffic management systems | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.2 | Review the application of the design and recommend changes for the continuous improvements of traffic management systems detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and implementation of traffic management systems:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting traffic analysis data
- Determining traffic management systems capacity requirements
- Selecting traffic management systems options
- Sizing traffic management systems components
- Providing leadership and coordination
- Choosing appropriate implementation techniques
- Developing and applying design plans
- Applying computer based design technology
- Applying industry or government standard design software

- Applying engineering graphical presentation techniques
- Calculating of flow rates, level of service, capacities and percentages
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied. This includes knowledge of the following as applied in the design, implementation and maintenance of traffic management systems:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Principles of road user behaviour
- Current industry best practice
- Traffic management systems options
- Traffic management systems geometric requirements
- Potential hazards, constraints and conditions that may effect traffic management systems design and implementation
- Current industry best practice in traffic management systems design and implementation
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of traffic management systems implementation tasks
- Traffic management systems implementation structures capabilities
- Cost estimation techniques
- Design review principles and procedures

- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Traffic management systems may include their application for:

- Roads
- Car parks
- Industrial hardstands
- The layout of the traffic management systems but does not include detailed design of the following:
 - Pavement
 - Surface treatment
 - Traffic signals
 - Sub-surface drainage
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development

- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site traffic analysis
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Level of service
 - Capacity
 - Construction materials and services quantities
 - Construction cost estimates
- Selection and specification of traffic management structures and systems, including:
 - Roundabouts
 - Mediums

- Entry and exit lanes
- Merging lanes
- Traffic barriers
- Line marking requirements
- Traffic speed limits
- Traffic signals
- Warning signs
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Implementation notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking traffic management systems detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of traffic management systems detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required traffic management systems design outcomes

- The identification of viable detailed design options and the selection of detailed design options that best meet the required traffic management systems outcomes.
- Working with other to undertake and complete the traffic management systems detailed design
- Consistent timely completion of traffic management systems detailed designs
- Consistent finalisation of traffic management systems detailed design processes
- Clear, timely and appropriate support of the application of traffic management systems detailed designs
- Meaningful contribution to the review and validation of traffic management systems designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances
- Where applicable, physical resources should include equipment modified for people with disabilities
- Access must be provided to appropriate learning and/or assessment support when required

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking traffic management systems detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of traffic management systems detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of traffic management systems detailed designs
 - consistent finalisation of detailed traffic management systems design processes
 - appropriate support of the detailed traffic management systems design
 - meaningful contribution to the review and validation of traffic management systems designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge

- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC529A Prepare detailed design of underground services

Unit Descriptor

This unit covers the completion of the detailed design and documentation of underground services. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of underground services works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of underground services
2. Undertake the detailed design of underground services

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***underground services***.
- 1.2 Identify and ***confirm*** the underground services ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of underground services in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the *preferred option* that best meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
- 2.3 Complete the *detailed design* of the underground services that safely, effectively and efficiently meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
- 2.4 Prepare a cost estimate of the execution of the designed underground services in accordance with the accuracy required by the relevant *organisational and client requirements and procedures*.
- 2.5 Participate in the review the underground services design with peers and stakeholders in accordance with the relevant *organisational and client requirements and procedures*.
- 2.6 Complete the documentation of the underground services design in accordance with the relevant *organisational and client requirements and procedures*.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant *organisational and client requirements and procedures*.
- 2.8 Gain design approval in accordance with the relevant *organisational and client requirements and procedures*.
3. Finalise design processes of underground services
 - 3.1 Ensure filing of design records is completed in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.3 Participate in performance review of the design process in accordance with the relevant *organisational and the client requirements and procedures*.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.5 Close out all systems in accordance with the relevant *organisational, client requirements and procedures*.

- | | | | |
|----|--|-----|---|
| 4. | Support and review the application of the design of underground services | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.2 | Review the application of the design and recommend changes for the continuous improvements of underground services detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of underground services:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting underground services construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting underground services options selection data
- Determining underground services capacity requirements
- Selecting underground services options
- Sizing underground services components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of underground services:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Underground services options
- Underground services geometric requirements
- Underground services surfacing requirements
- Potential hazards, constraints and conditions that may effect underground services design and construction
- Trench and pit shoring requirements
- Current industry best practice in underground services design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of underground services construction tasks

- Underground services construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Underground services may include:

- The layout of the following:
 - Water mains pipelines
 - Gas pipelines
 - Other conduits, for services such as:
 - Telecommunication cables
 - Data cables
 - Power cables
- But does not include detailed design of the following sub-surface drainage works:
 - Stormwater
 - Sewerage

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development

- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site geotechnical data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works

- Health, safety and environmental requirements, including pit and trench shoring requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking underground services detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of underground services detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required underground services design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required underground services outcomes.
 - Working with other to undertake and complete the underground services detailed design
 - Consistent timely completion of underground services detailed designs
 - Consistent finalisation of underground services detailed design processes
 - Clear, timely and appropriate support of the application of underground services detailed designs

- Meaningful contribution to the review and validation of underground services designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking underground services detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of underground services detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:

- consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of underground services detailed designs
 - consistent finalisation of detailed underground services design processes
 - appropriate support of the detailed underground services design
 - meaningful contribution to the review and validation of underground services designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC530A Prepare detailed design of surface drainage

Unit Descriptor

This unit covers the completion of the detailed design and documentation of surface drainage. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of surface drainage works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of surface drainage
2. Undertake the detailed design of surface drainage

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***surface drainage***.
- 1.2 Identify and ***confirm*** the surface drainage ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of surface drainage in accordance with the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the surface drainage that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed surface drainage in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***
- 2.5 Participate in the review the surface drainage design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the surface drainage design in accordance with the relevant ***organisational and client requirements and procedures***
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***
3. Finalise design processes of surface drainage
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***

4. Support and review the application of the design of surface drainage
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*
 - 4.2 Review the application of the design and recommend changes for the continuous improvements of surface drainage detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of surface drainage:

- Interpret plans and drawings
- Interpret specifications
- Interpret design briefs
- Interpreting Australian and other appropriate standards
- Interpret engineering survey information
- Interpret hydrological data
- Interpret meteorological data
- Interpret geotechnical information
- Interpret cultural and heritage data
- Carry out risk assessments
- Interpret surface drainage design data
- Identify and analyse catchments
- Interpret and apply rainfall and runoff data
- Estimate surface drainage design flows
- Solve channel flow problems
- Selecting of surface drainage options
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer based design technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating of areas, volumes, flow rates, capacities, densities, mass and grades
- Maintaining design cost records
- Maintain design records
- Providing clarification and advice
- Applying client feedback techniques;

Required Knowledge

Specific knowledge is required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of surface drainage:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Surface drainage options
- Surface drainage geometric requirements
- Surface drainage surfacing requirements
- Potential hazards, constraints and conditions that may effect surface drainage design and construction
- Current industry best practice in surface drainage design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of surface drainage construction tasks
- Surface drainage construction plant and equipment capabilities
- Cost estimation techniques

- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Surface drainage

may include:

- Graded surfaces
- Open channels, surfaced with:
 - Natural materials
 - Wear resistant materials
- Kerb and guttering
- Erosion control structures

Legislative requirements

may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures

may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures

- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including;
 - Known and potential hazards, constraints and conditions
 - Catchment details
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geotechnical data
- Project site geological data
- Project site hydrological data

- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design, and
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Catchment areas
 - Flow rates
 - Channel capacities
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design, and
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes

- Construction notes
- Supplementary drawings
- Input to the specifications

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking surface drainage detailed design.
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of surface drainage detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required surface drainage design outcomes.
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required surface drainage outcomes.
 - Working with other to undertake and complete the surface drainage detailed design.
 - Consistent timely completion of surface drainage detailed designs.
 - Consistent finalisation of surface drainage detailed design processes.
 - Clear, timely and appropriate support of the application of surface drainage detailed designs, and
 - Meaningful contribution to the review and validation of surface drainage designs.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking surface drainage detailed design.
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of surface drainage detailed designs, including evidence of:
 - consistent application of applicable health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of surface drainage detailed designs
 - consistent finalisation of detailed surface drainage design processes

- appropriate support of the detailed surface drainage design
- meaningful contribution to the review and validation of surface drainage designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.
- Assessment should also reinforce the integration of the Employability Skills

RIICC531A Prepare detailed design of subsurface drainage

Unit Descriptor

This unit covers the completion of the detailed design and documentation of subsurface drainage. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of subsurface drainage works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of subsurface drainage
2. Undertake the detailed design of subsurface drainage

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed design of *subsurface drainage*.
- 1.2 Identify and *confirm* the subsurface drainage *project requirements and information* for the completion of the detailed design in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare a *design plan* which makes best use of the available resources and meets the design requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of subsurface drainage in accordance with the relevant *legislative, organisational, client and manufacturers' requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the subsurface drainage that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed subsurface drainage in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***
- 2.5 Participate in the review the subsurface drainage design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the subsurface drainage design in accordance with the relevant ***organisational and client requirements and procedures***
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***
- 3. Finalise design processes of subsurface drainage
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***

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|----|---|-----|--|
| 4. | Support and review the application of the design of subsurface drainage | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> |
| | | 4.2 | Review the application of the design and recommend changes for the continuous improvements of subsurface drainage detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of subsurface drainage:

- Interpret plans and drawings
- Interpret specifications
- Interpret design briefs
- Interpreting Australian and other appropriate standards
- Interpret engineering survey information
- Interpret hydrological data
- Interpret geotechnical information
- Interpret meteorological data
- Interpret cultural and heritage data
- Carry out risk assessments
- Interpret subsurface drainage design data
- Identify and analyse catchments
- Interpret and apply rainfall and runoff data
- Estimate subsurface drainage design flows
- Solve pipe flow problems and sizing of subsurface drainage components
- Design storm water and sewerage drainage systems
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer based design technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating of areas, volumes, flow rates, capacities, densities, mass and grades
- Maintaining design cost records
- Maintain design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of subsurface drainage:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Subsurface drainage options
- Subsurface drainage geometric requirements
- Subsurface drainage surfacing requirements
- Potential hazards, constraints and conditions that may effect subsurface drainage design and construction
- Trench and pit shoring requirements
- Current industry best practice in subsurface drainage design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of subsurface drainage construction tasks
- Subsurface drainage construction plant and equipment capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Subsurface drainage may include:

- The layout and sizing of:
 - Culverts
 - Drainage pits
 - Stormwater drainage systems
 - Sewerage drainage systems
 - Subsoil drainage systems
- But does not include detailed design of associated civil structures

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets

- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including;
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data

- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design, and
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Catchment areas
 - Flow rates
 - Subsurface component capacity
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design, and
 - Maintainability of the works
- Health, safety and environmental requirements, including pit and trench shoring requirements
- Contribution to ancillary documentation, which may include:

- Design notes
- Construction notes
- Supplementary drawings
- Input to the specifications

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking subsurface drainage detailed design.
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of subsurface drainage detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required subsurface drainage design outcomes.
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required subsurface drainage outcomes.
 - Working with other to undertake and complete the subsurface drainage detailed design.
 - Consistent timely completion of subsurface drainage detailed designs.
 - Consistent finalisation of subsurface drainage detailed design processes.
 - Clear, timely and appropriate support of the application of subsurface drainage detailed designs, and
 - Meaningful contribution to the review and validation of subsurface drainage designs.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered

using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking subsurface drainage detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of subsurface drainage detailed designs, including evidence of:
 - consistent application of applicable health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of subsurface drainage detailed designs

- consistent finalisation of detailed subsurface drainage design processes
 - appropriate support of the detailed subsurface drainage design
 - meaningful contribution to the review and validation of subsurface drainage designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC532A Prepare detailed design of tunnels

Unit Descriptor

This unit covers the completion of the detailed design and documentation of tunnels. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of tunnels works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of tunnels
2. Undertake the detailed design of tunnels

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***tunnels***.
- 1.2 Identify and ***confirm*** the tunnels ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of tunnels in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.3 Complete the *detailed design* of the tunnels that safely, effectively and efficiently meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
- 2.4 Prepare a cost estimate of the execution of the designed tunnels in accordance with the accuracy required by the relevant *organisational and client requirements and procedures*.
- 2.5 Participate in the review the tunnel design with peers and stakeholders in accordance with the relevant *organisational and client requirements and procedures*.
- 2.6 Complete the documentation of the tunnel design in accordance with the relevant *organisational and client requirements and procedures*.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant *organisational and client requirements and procedures*.
- 2.8 Gain design approval in accordance with the relevant *organisational and client requirements and procedures*.
- 3. Finalise design processes of tunnels
 - 3.1 Ensure filing of design records is completed in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.3 Participate in performance review of the design process in accordance with the relevant *organisational and the client requirements and procedures*.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.5 Close out all systems in accordance with the relevant *organisational, client requirements and procedures*.
- 4. Support and review the application of the design of tunnels
 - 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*.

- 4.2 Review the application of the design and recommend changes for the continuous improvements of tunnel detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
- 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of tunnels:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting tunnels construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting tunnels option selection data
- Determining tunnels loadings and capacity requirements
- Selecting tunnels options
- Sizing tunnels components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software

- Applying engineering graphical presentation techniques
- Calculating areas, volumes, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of tunnels:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Tunnels options
- Tunnels geometric requirements
- Potential hazards, constraints and conditions that may effect tunnels design and construction
- Trench and pit shoring requirements
- Current industry best practice in tunnels design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of tunnels construction tasks
- Tunnels construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements

- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Tunnel design may include its application for:

- The layout of:
 - Road tunnels
 - Rail tunnels
 - Pedestrian tunnels
 - Underground services tunnels
- But it does not include detailed design of the following:
 - Pavement
 - Pavement surface treatment
 - Sub-surface drainage
 - Traffic management systems
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls
 - Landscaping

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity

- Disability Discrimination
- Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data

Project requirements and information may include:

- Survey data
- Metrological data
- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design

- Maintainability of the works
- Health, safety and environmental requirements, including shoring requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking detailed design of tunnels.
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of detailed designs of tunnels
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required tunnel design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required tunnel outcomes.
 - Working with other to undertake and complete the detailed design of tunnels.
 - Consistent timely completion of detailed designs of tunnels.
 - Consistent finalisation of detailed tunnel design processes
 - Clear, timely and appropriate support of the application of detailed designs of tunnels

- Meaningful contribution to the review and validation of tunnel designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking detailed design of tunnels.
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of detailed designs of tunnels, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes

- First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of detailed designs of tunnels
 - consistent finalisation of detailed tunnels design processes
 - appropriate support of the detailed tunnel design
 - meaningful contribution to the review and validation of tunnel designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC533A Prepare detailed design of civil concrete structures

Unit Descriptor

This unit covers the completion of the detailed design and documentation of civil concrete structures. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of civil concrete structures works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of civil concrete structures
2. Undertake the detailed design of civil concrete structures

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed design of *civil concrete structures*.
- 1.2 Identify and *confirm* the civil concrete structures *project requirements and information* for the completion of the detailed design in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare a *design plan* which makes best use of the available resources and meets the design requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of civil concrete structures in accordance with the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the civil concrete structures that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed civil concrete structures in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the civil concrete structures design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the civil concrete structures design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of civil concrete structures
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.

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|--|-----|--|
| | 3.5 | Close out all systems in accordance with the relevant <i>organisational, client requirements and procedures</i> . |
| 4. Support and review the application of the design of civil concrete structures | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.2 | Review the application of the design and recommend changes for the continuous improvements of civil concrete structures detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of civil concrete structures:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting civil concrete structures components selection data
- Selecting civil concrete structures component options
- Calculating of loads, shear forces, bending moments, stresses, areas, volumes and mass
- Sizing civil concrete structures components
- Providing leadership and coordination
- Choosing appropriate construction techniques

- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of civil concrete structures:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Civil concrete structures design principles
- Civil concrete structures options
- Civil concrete structures geometric requirements
- Potential hazards, constraints and conditions that may effect civil concrete structures design and construction
- Current industry best practice in civil concrete structures design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of civil concrete structures construction tasks
- Civil concrete structures materials characteristics

- Civil concrete structures construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Civil concrete structures may include:

- Bridges, including their:
 - Foundations
 - Abutments
 - Piers
 - Beams
 - Decks
 - Pre-cast and in-situ elements
 - Normally reinforced and prestressed elements
- Retaining walls
- Water storage tanks and small dams
- Noise barriers
- Culverts
- Safety barriers

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity

- Disability Discrimination
- Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data

Project requirements and information may include:

- Survey data
- Metrological data
- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Loads
 - Sheer forces
 - Bending moments
 - Stresses
 - Construction materials and services quantities
 - Construction cost estimates
- Recommended sizing of components

- Recommended concrete strength
- Recommended reinforcement sizing and location
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking civil concrete structures detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of civil concrete structures detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required civil concrete structures design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required civil concrete structures outcomes.
 - Working with other to undertake and complete the civil concrete structures detailed design

- Consistent timely completion of civil concrete structures detailed designs
- Consistent finalisation of civil concrete structures detailed design processes
- Clear, timely and appropriate support of the application of civil concrete structures detailed designs
- Meaningful contribution to the review and validation of civil concrete structures designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking civil concrete structures detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of civil concrete structures detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures

- design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
- that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
- First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of civil concrete structures detailed designs
 - consistent finalisation of detailed civil concrete structures design processes
 - appropriate support of the detailed civil concrete structures design
 - meaningful contribution to the review and validation of civil concrete structures designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC534A Prepare detailed design of civil steel structures

Unit Descriptor

This unit covers the completion of the detailed design and documentation of civil steel structures. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of civil steel structures works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of civil steel structures
2. Undertake the detailed design of civil steel structures

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***civil steel structures***.
- 1.2 Identify and ***confirm*** the civil steel structures ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of civil steel structures in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the civil steel structures that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed civil steel structures in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the civil steel structures design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the civil steel structures design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of civil steel structures
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

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| 4. | Support and review the application of the design of civil steel structures | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.2 | Review the application of the design and recommend changes for the continuous improvements of civil steel structures detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of civil steel structures:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting civil steel structures component selection data
- Selecting civil steel structures component options
- Calculating of loads, shear forces, bending moments, stresses, areas, volumes and mass
- Sizing civil steel structures components
- Selecting civil steel structure joint and fastening options
- Providing leadership and coordination
- Choosing appropriate construction techniques

- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of civil steel structures:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Civil steel structures design principles
- Civil steel structures options
- Civil steel structures geometric requirements
- Civil steel structures surface treatment requirements
- Potential hazards, constraints and conditions that may effect civil steel structures design and construction
- Current industry best practice in civil steel structures design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of civil steel structures construction tasks

- Civil steel structures construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Civil steel structures
may include:

- Bridges
- Sign gantries
- Vertical sign supports
- Noise barrier supports
- Guardrails

Legislative requirements
may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures

- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data

Design plan may include:

- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards
- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Loads
 - Sheer forces
 - Bending moments
 - Stresses
 - Construction materials and services quantities
 - Construction cost estimates
- Recommended sizing of components
- Recommended steel grade
- Recommended joints and fastening
- Recommended surface treatment
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works

- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking civil steel structures detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of civil steel structures detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required civil steel structures design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required civil steel structures outcomes
 - Working with other to undertake and complete the civil steel structures detailed design
 - Consistent timely completion of civil steel structures detailed designs
 - Consistent finalisation of civil steel structures detailed design processes
 - Clear, timely and appropriate support of the application of civil steel structures detailed designs
 - Meaningful contribution to the review and validation of civil steel structures designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking civil steel structures detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of civil steel structures detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design

- consistent timely completion of civil steel structures detailed designs
 - consistent finalisation of detailed civil steel structures design processes
 - appropriate support of the detailed civil steel structures design
 - meaningful contribution to the review and validation of civil steel structures designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC535A Prepare detailed design of civil timber structures

Unit Descriptor

This unit covers the completion of the detailed design and documentation of civil timber structures. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of civil timber structures works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of civil timber structures

2. Undertake the detailed design of civil timber structures

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***civil timber structures***.

1.2 Identify and ***confirm*** the civil timber structures ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.

1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.

2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of civil timber structures in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the civil timber structures that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed civil timber structures in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the civil timber structures design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the civil timber structures design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of civil timber structures
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.

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| | 3.5 | Close out all systems in accordance with the relevant <i>organisational, client requirements and procedures</i> . |
| 4. Support and review the application of the design of civil timber structures | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.2 | Review the application of the design and recommend changes for the continuous improvements of civil timber structures detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of civil timber structures:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting meteorological data
- Interpreting civil timber structures construction materials test results
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting civil timber structures components selection data
- Selecting civil timber structures options
- Calculating of loads, shear forces, bending moments, stresses, areas, volumes and mass
- Sizing civil timber structures components
- Selecting civil timber structure joint and fastening options

- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of civil timber structures:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Civil timber structures options
- Civil timber structures geometric requirements
- Civil timber structures surface treatment requirements
- Potential hazards, constraints and conditions that may effect civil timber structures design and construction
- Current industry best practice in civil timber structures design and construction
- Techniques for choosing preferred options
- Team leadership techniques

- Operational techniques required for the execution of civil timber structures construction tasks
- Civil timber structures construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Civil timber structures
may include:

- Bridges, jetties and wharves
- Retaining walls
- Noise barriers

Legislative requirements
may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures

- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data

Design plan may include:

- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards
- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Loads
 - Sheer forces
 - Bending moments
 - Stresses
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Recommended sizing of components
- Recommended timber grade
- Recommended joints and fastening
- Recommended surface treatment
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works

- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking civil timber structures detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of civil timber structures detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required civil timber structures design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required civil timber structures outcomes.
 - Working with other to undertake and complete the civil timber structures detailed design
 - Consistent timely completion of civil timber structures detailed designs
 - Consistent finalisation of civil timber structures detailed design processes
 - Clear, timely and appropriate support of the application of civil timber structures detailed designs

- Meaningful contribution to the review and validation of civil timber structures designs
- Context of and specific resources for assessment**
- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
 - The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
 - Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
 - Where applicable, physical resources should include equipment modified for people with disabilities.
 - Access must be provided to appropriate learning and/or assessment support when required.
- Methods of assessment**
- This unit maybe assessed in a holistic way with other units of competency
 - The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking civil timber structures detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of civil timber structures detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes

- First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of civil timber structures detailed designs
 - consistent finalisation of detailed civil timber structures design processes
 - appropriate support of the detailed civil timber structures design
 - meaningful contribution to the review and validation of civil timber structures designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC536A Prepare detailed design of civil masonry, crib and gabion structures

Unit Descriptor

This unit covers the completion of the detailed design and documentation of civil masonry, crib and gabion structures. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of civil masonry, crib and gabion structures works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of civil masonry, crib and gabion structures
2. Undertake the detailed design of civil masonry, crib and gabion structures

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed design of *civil masonry, crib and gabion structures*.
- 1.2 Identify and *confirm* the civil masonry, crib and gabion structures *project requirements and information* for the completion of the detailed design in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare a *design plan* which makes best use of the available resources and meets the design requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of civil masonry, crib and gabion structures in accordance with the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the civil masonry, crib and gabion structures that safely, effectively and efficiently meet the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed civil masonry, crib and gabion structures in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the civil masonry, crib and gabion structures design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the civil masonry, crib and gabion structures design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of civil masonry, crib and gabion structures
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.

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| | 3.5 | Close out all systems in accordance with the relevant <i>organisational, client requirements and procedures</i> . |
| 4. Support and review the application of the design of civil masonry, crib and gabion structures | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.2 | Review the application of the design and recommend changes for the continuous improvements of civil masonry, crib and gabion structures detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of civil masonry, crib and gabion structures:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting masonry, crib and gabion structures construction materials test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting civil masonry, crib and gabion structures options selection data
- Selecting civil masonry, crib and gabion structures options
- Calculating areas, volumes, loads, pressures, mass and grades
- Sizing civil masonry, crib and gabion structures components
- Providing leadership and coordination

- Choosing appropriate construction techniques
- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of civil masonry, crib and gabion structures:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Civil masonry, crib and gabion structures options
- Civil masonry, crib and gabion structures geometric requirements
- Civil masonry, crib and gabion structures surfacing requirements
- Potential hazards, constraints and conditions that may effect civil masonry, crib and gabion structures design and construction
- Current industry best practice in civil masonry, crib and gabion structures design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of civil masonry, crib and gabion structures construction tasks

- Civil masonry, crib and gabion structures construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Civil masonry, crib and gabion structures may include:

- Masonry walls
- Crib walls
- Gabion walls
- Foundations for these walls

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets

- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data

- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Loads
 - Pressures
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Recommended sizing of wall and footings components
- Recommended footings concrete strength
- Recommended footings reinforcement sizing and location
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements

- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking civil masonry, crib and gabion structures detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of civil masonry, crib and gabion structures detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required civil masonry, crib and gabion structures design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required civil masonry, crib and gabion structures outcomes.
 - Working with other to undertake and complete the civil masonry, crib and gabion structures detailed design
 - Consistent timely completion of civil masonry, crib and gabion structures detailed designs
 - Consistent finalisation of civil masonry, crib and gabion structures detailed design processes
 - Clear, timely and appropriate support of the application of civil masonry, crib and gabion structures detailed designs
 - Meaningful contribution to the review and validation of civil masonry, crib and gabion structures designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking civil masonry, crib and gabion structures detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of civil masonry, crib and gabion structures detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design

- consistent timely completion of civil masonry, crib and gabion structures detailed designs
 - consistent finalisation of detailed civil masonry, crib and gabion structures design processes
 - appropriate support of the detailed civil masonry, crib and gabion structures design
 - meaningful contribution to the review and validation of civil masonry, crib and gabion structures designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC537A Prepare detailed design of marine structures civil works

Unit Descriptor

This unit covers the completion of the detailed design and documentation of marine structures civil works. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of marine structures civil works works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of marine structures civil works
2. Undertake the detailed design of marine structures civil works

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant *legislative, organisational and manufacturer's requirements and procedures* required for preparation of the detailed design of *marine structures civil works*.
- 1.2 Identify and *confirm* the marine structures civil works *project requirements and information* for the completion of the detailed design in accordance with the relevant *organisational and client requirements and procedures*.
- 1.3 Prepare a *design plan* which makes best use of the available resources and meets the design requirements in accordance with the relevant *organisational, client requirements and procedures*.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of marine structures civil works in accordance with the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the marine structures civil works that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed marine structures civil works in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the marine structures civil works design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the marine structures civil works design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
3. Finalise design processes of marine structures civil works
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.

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|----|---|-----|--|
| 4. | Support and review the application of the design of marine structures civil works | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.2 | Review the application of the design and recommend changes for the continuous improvements of marine structures civil works detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of marine structures civil works:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting marine structures civil works component selection data
- Selecting marine structures civil works component options
- Calculating of loads, sheer forces, bending moments, stresses, areas, volumes and mass
- Sizing marine structures civil works components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of marine structures civil works:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Marine structures civil works design principles
- Marine structures civil works options
- Marine structures civil works geometric requirements
- Potential hazards, constraints and conditions that may effect marine structures civil works design and construction
- Current industry best practice in marine structures civil works design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of marine structures civil works construction tasks
- Marine structures civil works materials characteristics
- Marine structures civil works construction plant and equipment capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Marine structures civil works may include:

- Jetties, wharves and mariners, including:
 - Substructure
 - Superstructure
- Concrete, steel and timber components

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures

- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings

Design plan may include:

- Australian or other relevant standards
- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Loads
 - Sheer forces
 - Bending moments
 - Stresses
 - Construction materials and services quantities
 - Construction cost estimates
- Recommended sizing of components
- Recommended materials
- Recommended joints and fastening
- Recommended surface treatment
- Drawings
- Risk assessment of the:
 - Existing conditions
 - Application of the design
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:

- Design notes
- Construction notes
- Supplementary drawings
- Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking marine structures civil works detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of marine structures civil works detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required marine structures civil works design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required marine structures civil works outcomes.
 - Working with other to undertake and complete the marine structures civil works detailed design
 - Consistent timely completion of marine structures civil works detailed designs
 - Consistent finalisation of marine structures civil works detailed design processes
 - Clear, timely and appropriate support of the application of marine structures civil works detailed designs
 - Meaningful contribution to the review and validation of marine structures civil works designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated

environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking marine structures civil works detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of marine structures civil works detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of marine structures civil works detailed designs

- consistent finalisation of detailed marine structures civil works design processes
 - appropriate support of the detailed marine structures civil works design
 - meaningful contribution to the review and validation of marine structures civil works designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC538A Prepare detailed design of foundations

Unit Descriptor

This unit covers the completion of the detailed design and documentation of foundations. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of foundations works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of foundations

2. Undertake the detailed design of foundations

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***foundations***.
- 1.2 Identify and ***confirm*** the foundations ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of foundations in accordance with the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.
- 2.3 Complete the ***detailed design*** of the foundations that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturers' requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed foundations in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***
- 2.5 Participate in the review the foundations design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the foundations design in accordance with the relevant ***organisational and client requirements and procedures***
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***
- 3. Finalise design processes of foundations
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***

4. Support and review the application of the design of foundations
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*
 - 4.2 Review the application of the design and recommend changes for the continuous improvements of foundations detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
 - 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of foundations:

- Interpret plans and drawings
- Interpret specifications
- Interpret design briefs
- Interpreting Australian and other appropriate standards
- Interpret engineering survey information
- Interpret hydrological data
- Interpret geotechnical information
- Interpret meteorological data
- Interpret cultural and heritage data
- Carry out risk assessments
- Interpret foundations options selection data
- Selecting of foundations options
- Calculating of loads, shear forces, bending moments, stresses, areas, volumes and mass
- Apply strength of materials and statics to the resolution of structural problems
- Analyse foundations and design footings
- Sizing of foundations components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Maintaining design cost records
- Maintain design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the performance criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of foundations:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Foundations design principles
- Foundations options
- Foundations geometric requirements
- Potential hazards, constraints and conditions that may effect foundations design and construction
- Trench and pit shoring requirements
- Current industry best practice in foundations design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of foundations construction tasks
- Foundations materials characteristics
- Foundations construction plant and equipment capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Foundations may include those used for:

- Bridges
- Jetties and wharves
- Sign gantries
- Vertical sign supports
- Noise barrier supports
- Processing plants
- Buildings

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets

- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including;
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data

- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design, and
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Loads
 - Sheer forces
 - Bending moments
 - Stresses
 - Construction materials and services quantities
 - Construction cost estimates
- Recommended sizing of components
- Recommended concrete strengths
- Recommended reinforcement sizing and location
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design, and
 - Maintainability of the works

- Health, safety and environmental requirements, including pit and trench shoring requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking foundations detailed design.
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of foundations detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required foundations design outcomes.
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required foundations outcomes.
 - Working with other to undertake and complete the foundations detailed design.
 - Consistent timely completion of foundations detailed designs.
 - Consistent finalisation of foundations detailed design processes.
 - Clear, timely and appropriate support of the application of foundations detailed designs
 - Meaningful contribution to the review and validation of foundations designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances
- Where applicable, physical resources should include equipment modified for people with disabilities
- Access must be provided to appropriate learning and/or assessment support when required

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking foundations detailed design.
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of foundations detailed designs, including evidence of:
 - consistent application of applicable health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes.
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes.
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design

- consistent timely completion of foundations detailed designs
 - consistent finalisation of detailed foundations design processes
 - appropriate support of the detailed foundations design
 - meaningful contribution to the review and validation of foundations designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC539A Prepare detailed design of lighting

Unit Descriptor

This unit covers the completion of the detailed design and documentation of lighting. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of lighting works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of lighting
2. Undertake the detailed design of lighting

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***lighting***.
- 1.2 Identify and ***confirm*** the lighting ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of lighting in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.2 Interpret and analyse relevant data and recommend the ***preferred option*** that best meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.3 Complete the ***detailed design*** of the lighting that safely, effectively and efficiently meets the required project outcomes and the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.
- 2.4 Prepare a cost estimate of the execution of the designed lighting in accordance with the accuracy required by the relevant ***organisational and client requirements and procedures***.
- 2.5 Participate in the review the lighting design with peers and stakeholders in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.6 Complete the documentation of the lighting design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant ***organisational and client requirements and procedures***.
- 2.8 Gain design approval in accordance with the relevant ***organisational and client requirements and procedures***.
- 3. Finalise design processes of lighting
 - 3.1 Ensure filing of design records is completed in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.3 Participate in performance review of the design process in accordance with the relevant ***organisational and the client requirements and procedures***.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant ***organisational and client requirements and procedures***.
 - 3.5 Close out all systems in accordance with the relevant ***organisational, client requirements and procedures***.
- 4. Support and review the application of the design of lighting
 - 4.1 Provide clarification and advice to those applying the design in accordance with the relevant ***organisational and client requirements and procedures***.

- 4.2 Review the application of the design and recommend changes for the continuous improvements of lighting detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
- 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of lighting:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting lighting options selection data
- Determining lighting capacity requirements
- Selecting lighting options
- Sizing lighting components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans
- Applying computer aided drafting design (CADD) and drafting technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating of lighting requirements and power demand and consumption
- Maintaining design cost records

- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of lighting:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Lighting options
- Lighting geometric requirements
- Potential hazards, constraints and conditions that may effect lighting design and construction
- Current industry best practice in lighting design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of lighting construction tasks
- Lighting equipment capabilities
- Power demand and consumption
- Lighting construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures

- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Lighting may include its use for:

- Roads,
- Bridges
- Jetties and wharves
- Car parks
- Industrial hardstands
- Tunnels
- Signage
- Intermodal facilities

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures

- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements

Factors to be considered in determining the *preferred option* include:

- Scheduling
- Review requirements
- Design process communication and reporting requirements
- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Lighting requirements
 - Power demand and consumption
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking lighting detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of lighting detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required lighting design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required lighting outcomes.
 - Working with other to undertake and complete the lighting detailed design
 - Consistent timely completion of lighting detailed designs
 - Consistent finalisation of lighting detailed design processes
 - Clear, timely and appropriate support of the application of lighting detailed designs
 - Meaningful contribution to the review and validation of lighting designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.

- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking lighting detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of lighting detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of lighting detailed designs
 - consistent finalisation of detailed lighting design processes
 - appropriate support of the detailed lighting design
 - meaningful contribution to the review and validation of lighting designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the

work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions

- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC540A Prepare detailed design of environmental controls

Unit Descriptor

This unit covers the completion of the detailed design and documentation of environmental controls. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of environmental controls works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Plan for the detailed design of environmental controls
2. Undertake the detailed design of environmental controls

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative, organisational and manufacturer's requirements and procedures*** required for preparation of the detailed design of ***environmental controls***.
- 1.2 Identify and ***confirm*** the environmental controls ***project requirements and information*** for the completion of the detailed design in accordance with the relevant ***organisational and client requirements and procedures***.
- 1.3 Prepare a ***design plan*** which makes best use of the available resources and meets the design requirements in accordance with the relevant ***organisational, client requirements and procedures***.
- 2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of environmental controls in accordance with the relevant ***legislative, organisational, client and manufacturer's requirements and procedures***.

- 2.2 Interpret and analyse relevant data and recommend the *preferred option* that best meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
- 2.3 Complete the *detailed design* of the environmental controls that safely, effectively and efficiently meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
- 2.4 Prepare a cost estimate of the execution of the designed environmental controls in accordance with the accuracy required by the relevant *organisational and client requirements and procedures*.
- 2.5 Participate in the review the environmental controls design with peers and stakeholders in accordance with the relevant *organisational and client requirements and procedures*.
- 2.6 Complete the documentation of the environmental controls design in accordance with the relevant *organisational and client requirements and procedures*.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant *organisational and client requirements and procedures*.
- 2.8 Gain design approval in accordance with the relevant *organisational and client requirements and procedures*.
3. Finalise design processes of environmental controls
 - 3.1 Ensure filing of design records is completed in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.3 Participate in performance review of the design process in accordance with the relevant *organisational and the client requirements and procedures*.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.5 Close out all systems in accordance with the relevant *organisational, client requirements and procedures*.

- | | | | |
|----|--|-----|---|
| 4. | Support and review the application of the design of environmental controls | 4.1 | Provide clarification and advice to those applying the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.2 | Review the application of the design and recommend changes for the continuous improvements of environmental controls detailed designs, in accordance with the relevant <i>organisational and client requirements and procedures</i> . |
| | | 4.3 | Contribute to the validation of the design in accordance with the relevant <i>organisational and client requirements and procedures</i> . |

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of environmental controls:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting environmental controls test results
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting environmental controls selection data
- Determining environmental controls loadings or capacity requirements
- Selecting environmental controls options
- Sizing environmental controls components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer based design technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, flow rates, capacities, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of environmental controls:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Environmental controls options
- Environmental controls geometric requirements
- Environmental controls surfacing requirements
- Potential hazards, constraints and conditions that may effect environmental controls design and construction
- Current industry best practice in environmental controls design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of environmental controls construction tasks
- Environmental controls construction plant and equipment capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Environmental controls include:

- The layout of:
 - Sediment controls
 - Noise controls
 - Dust controls
 - Visual controls
- But does not include detailed design of the associated:
 - Surface drainage
 - Dams
 - Geotechnical works
 - Civil structures

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:

- Workplace safety
- Dangerous goods
- Occupational licensing
- Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications

- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements

- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking environmental controls detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of environmental controls detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required environmental controls design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required environmental controls outcomes.
 - Working with other to undertake and complete the environmental controls detailed design
 - Consistent timely completion of environmental controls detailed designs
 - Consistent finalisation of environmental controls detailed design processes
 - Clear, timely and appropriate support of the application of environmental controls detailed designs
 - Meaningful contribution to the review and validation of environmental controls designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated

environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.

- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking environmental controls detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of environmental controls detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of environmental controls detailed designs

- consistent finalisation of detailed environmental controls design processes
 - appropriate support of the detailed environmental controls design
 - meaningful contribution to the review and validation of environmental controls designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC541A Prepare detailed design of landscaping

Unit Descriptor

This unit covers the completion of the detailed design and documentation of landscaping. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of landscaping works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- | | |
|--|---|
| <p>1. Plan for the detailed design of landscaping</p> | <p>1.1 Access, interpret and clarify relevant <i>legislative, organisational and manufacturer's requirements and procedures</i> required for preparation of the detailed design of <i>landscaping</i>.</p> <p>1.2 Identify and <i>confirm</i> the landscaping <i>project requirements and information</i> for the completion of the detailed design in accordance with the relevant <i>organisational and client requirements and procedures</i>.</p> <p>1.3 Prepare a <i>design plan</i> which makes best use of the available resources and meets the design requirements in accordance with the relevant <i>organisational, client requirements and procedures</i>.</p> |
| <p>2. Undertake the detailed design of landscaping</p> | <p>2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of landscaping in accordance with the relevant <i>legislative, organisational, client and manufacturer's requirements and procedures</i>.</p> |

- 2.2 Interpret and analyse relevant data and recommend the *preferred option* that best meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
 - 2.3 Complete the *detailed design* of the landscaping that safely, effectively and efficiently meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
 - 2.4 Prepare a cost estimate of the execution of the designed landscaping in accordance with the accuracy required by the relevant *organisational and client requirements and procedures*.
 - 2.5 Participate in the review the landscaping design with peers and stakeholders in accordance with the relevant *organisational and client requirements and procedures*.
 - 2.6 Complete the documentation of the landscaping design in accordance with the relevant *organisational and client requirements and procedures*.
 - 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 2.8 Gain design approval in accordance with the relevant *organisational and client requirements and procedures*.
3. Finalise design processes of landscaping
 - 3.1 Ensure filing of design records is completed in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.3 Participate in performance review of the design process in accordance with the relevant *organisational and the client requirements and procedures*.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant *organisational and client requirements and procedures*.

- 3.5 Close out all systems in accordance with the relevant *organisational, client requirements and procedures*.
4. Support and review the application of the design of landscaping
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant *organisational and client requirements and procedures*.
- 4.2 Review the application of the design and recommend changes for the continuous improvements of landscaping detailed designs, in accordance with the relevant *organisational and client requirements and procedures*.
- 4.3 Contribute to the validation of the design in accordance with the relevant *organisational and client requirements and procedures*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of landscaping:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Interpreting landscaping construction materials test results
- Carrying out risk assessments
- Determining landscaping landform
- Selecting landscaping plants and ground cover
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer based design technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, flow rates, capacities, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of landscaping:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Landscaping options
- Landscaping geometric requirements
- Landscaping surfacing requirements
- Potential hazards, constraints and conditions that may effect landscaping design and construction
- Current industry best practice in landscaping design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of landscaping construction tasks

- Landscaping construction plant and equipment capabilities
- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Landscaping design includes:

- The layout of the landscaping but does not include detailed design of the following:
 - Vehicle pavements
 - Vehicle pavement surface treatment
 - Surface drainage
 - Subsurface drainage
 - Underground services
 - Civil structures
 - Lighting
 - Environmental controls

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:

- Equal Employment Opportunity
- Disability Discrimination
- Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data

- Geotechnical data
- Hydrological data
- Survey data
- Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the ***preferred option*** include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Earthworks volumes
 - Construction and landscaping materials and services quantities
 - Construction cost estimates
- Drawings

- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking landscaping detailed design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of landscaping detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required landscaping design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required landscaping outcomes.
 - Working with other to undertake and complete the landscaping detailed design
 - Consistent timely completion of landscaping detailed designs
 - Consistent finalisation of landscaping detailed design processes

- Clear, timely and appropriate support of the application of landscaping detailed designs
- Meaningful contribution to the review and validation of landscaping designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking landscaping detailed design
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of landscaping detailed designs, including evidence of:
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design

- option selected by the individual are those that best meet the required outcomes
- First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of landscaping detailed designs
 - consistent finalisation of detailed landscaping design processes
 - appropriate support of the detailed landscaping design
 - meaningful contribution to the review and validation of landscaping designs
 - Meaningful contribution to the review and improvement of civil works schedule of rates processes
 - Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
 - Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
 - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
 - Assessment should also reinforce the integration of the Employability Skills

RIICC542A Prepare detailed design of canals

Unit Descriptor

This unit covers the completion of the detailed design and documentation of canals. It includes the preparation and planning for the detailed design, undertaking of the detailed design, finalisation of the detailed design processes and supporting the application of the detailed design.

This unit requires the identification of design inputs, production of calculations, drawings, design options and solutions and specifications required for the completion of canals works, it does not include the certification of the design.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- | | |
|--|--|
| 1. Plan for the detailed design of canals | <p>1.1 Access, interpret and clarify relevant <i>legislative, organisational and manufacturer's requirements and procedures</i> required for preparation of the detailed design of canals.</p> <p>1.2 Identify and <i>confirm</i> the canal's <i>project requirements and information</i> for the completion of the detailed design in accordance with the relevant <i>organisational and client requirements and procedures</i>.</p> <p>1.3 Prepare a <i>design plan</i> which makes best use of the available resources and meets the design requirements in accordance with the relevant <i>organisational, client requirements and procedures</i>.</p> |
| 2. Undertake the detailed design of canals | <p>2.1 Interpret and analyse the relevant data and identify the available viable options for the detailed design of canals in accordance with the relevant <i>legislative, organisational, client and manufacturer's requirements and procedures</i>.</p> |

- 2.2 Interpret and analyse relevant data and recommend the *preferred option* that best meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
- 2.3 Complete the *detailed design* of the canals that safely, effectively and efficiently meets the required project outcomes and the relevant *legislative, organisational, client and manufacturer's requirements and procedures*.
- 2.4 Prepare a cost estimate of the execution of the designed canals in accordance with the accuracy required by the relevant *organisational and client requirements and procedures*.
- 2.5 Participate in the review the canal designs with peers and stakeholders in accordance with the relevant *organisational and client requirements and procedures*.
- 2.6 Complete the documentation of the canal designs in accordance with the relevant *organisational and client requirements and procedures*.
- 2.7 Monitor and coordinate the progress of other team members involved in the design process to ensure the effective and efficient completion of the design in accordance with the relevant *organisational and client requirements and procedures*.
- 2.8 Gain design approval in accordance with the relevant *organisational and client requirements and procedures*.
3. Finalise design processes of canals
 - 3.1 Ensure filing of design records is completed in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.2 Complete and submit design cost and other reporting in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.3 Participate in performance review of the design process in accordance with the relevant *organisational and the client requirements and procedures*.
 - 3.4 Seek client feedback and contribute to the verification of the design in accordance with the relevant *organisational and client requirements and procedures*.
 - 3.5 Close out all systems in accordance with the relevant *organisational, client requirements and procedures*.

4. Support and review the application of the design of canals
- 4.1 Provide clarification and advice to those applying the design in accordance with the relevant ***organisational and client requirements and procedures.***
 - 4.2 Review the application of the design and recommend changes for the continuous improvements of canal detailed designs, in accordance with the relevant ***organisational and client requirements and procedures.***
 - 4.3 Contribute to the validation of the design in accordance with the relevant ***organisational and client requirements and procedures.***

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following as applicable for the design and construction of canals:

- Interpreting plans and drawings
- Interpreting specifications
- Interpreting design briefs
- Interpreting Australian and other appropriate standards
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting geotechnical information
- Interpreting meteorological data
- Interpreting cultural and heritage data
- Carrying out risk assessments
- Interpreting canal design option selection data
- Determining canal capacity requirements
- Selecting canal design options
- Sizing canal components
- Providing leadership and coordination
- Choosing appropriate construction techniques
- Developing and applying design plans

- Applying computer based design technology
- Applying industry or government standard design software
- Applying engineering graphical presentation techniques
- Calculating areas, volumes, flow rates, capacities, densities, mass, percentages and grades
- Maintaining design cost records
- Maintaining design records
- Providing clarification and advice
- Applying client feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following as applied in the design, construction and maintenance of canals:

- Risk assessment and management requirement and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards requirements and procedures
- Industry and organisational design procedures and practice
- Current industry best practice
- Canal design options
- Canal bank protection options
- Canal geometric requirements
- Potential hazards, constraints and conditions that may effect canals design and construction
- Current industry best practice in canals design and construction
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of canals construction tasks
- Canal construction plant and equipment capabilities

- Cost estimation techniques
- Design review principles and procedures
- Documentation requirements
- Reporting requirements and procedures
- Design approval requirements and procedures
- Design records filing requirements and procedures
- Performance review requirements and procedures
- Systems close out requirements and procedures

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 in the Performance Criteria is detailed below.

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards

- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

Confirmation
may include:

- Consultation with the client
- Consultation with others within the organisation
- Consultation with relevant authorities
- Conducting a risk assessment of the existing and potential hazards
- Obtaining further site data, including:
 - Known and potential hazards, constraints and conditions
 - Cultural and heritage data
 - Geological data
 - Geotechnical data
 - Hydrological data
 - Survey data
 - Metrological data

Project requirements and information may include:

- Project specifications
- Contractual requirements
- Client's requirements
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site cultural and heritage constraints
- Existing project design and drawings
- Australian or other relevant standards

Design plan may include:

- Human resource requirements

- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Design process communication and reporting requirements

Factors to be considered in determining the *preferred option* include:

- Cost
- Site constraints
- Available resources
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the completed works

Detailed design includes:

- Calculations, including:
 - Catchment areas
 - Flow rates
 - Earthworks volumes
 - Construction materials and services quantities
 - Construction cost estimates
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking canal detailed designs
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of canal detailed designs
 - Design plans which reflect the requirements of the task and are capable of achieving all of their required canal design outcomes
 - The identification of viable detailed design options and the selection of detailed design options that best meet the required canal's outcomes.
 - Working with other to undertake and complete the canal detailed designs
 - Consistent timely completion of canal detailed designs
 - Consistent finalisation of canal detailed design processes
 - Clear, timely and appropriate support of the application of canal detailed designs
 - Meaningful contribution to the review and validation of canal designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.

- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The recommended strategies for the assessment of this unit are:
 - Written and/or oral assessment of the knowledge required in undertaking canal detailed designs
 - Documented and testimonial evidence of the Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of canal detailed designs, including evidence of:
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - design plans prepared by the individual, which reflect the requirements of the task and are capable of achieving all of the required design outcomes
 - that detailed design options proposed by the individual are viable and that the detailed design option selected by the individual are those that best meet the required outcomes
 - First hand testimonial and documentary evidence of appropriate and successful:
 - consultation by the individual in undertaking and completing the detailed design
 - consistent timely completion of canal detailed designs
 - consistent finalisation of detailed canal design processes
 - appropriate support of the detailed canal design
 - meaningful contribution to the review and validation of canal designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes

- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC543A Implement and maintain environmental management plans

Unit Descriptor This unit covers the implementation and maintenance of environmental management plans on specific worksites. It includes the requirements to: establishing the framework of the plan, establishing the processes to support the plan; planning and implementation the plan; and monitoring, reviewing and updating the management processes.

Employability Skills The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Develop the framework for the site environmental management plan

2. Develop the processes to support the site environmental management plan

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Develop and document site ***environmental objectives in consultation with relevant personnel***, and conforming to the organisation's ***policy and system's procedures***.
- 1.2 Develop and document the structures for the application of the environmental management system, in consultation with relevant personnel, and conforming to the organisation's ***policy and system's procedures***.
- 1.3 Define, allocate and document the responsibilities for applying the environmental management plan in job descriptions and duty statement for all relevant site positions.
- 2.1 Identify existing and potential site environmental hazards and risks in accordance with legislation, codes of practice and trends identified from the record system.
- 2.2 Access, interpret and clarify the organisation's criteria for assessing and treating risks.

- 2.3 Develop and document detailed site procedures and practices for the application of the environmental management system in consultation with relevant personnel, and that conform to the organisation's policy and system's procedures.
- 2.4 Identify, obtain and maintain information sources and expert advice required to support the environmental management plan.
- 3. Prepare and implement the plan
 - 3.1 Plan, schedule and document how the environmental management plan will be introduced to the entire work site.
 - 3.2 Identify, seek and/or provide *resources* for the operation of the environmental management plan, in a timely and consistent manner.
 - 3.3 Provide and explain information on the site environmental management plan in a form readily accessible to site employees.
 - 3.4 Provide/arrange appropriate development and/or training for site personnel on the environmental management plan *site procedures and practices*.
 - 3.5 Make available information on known and intended process changes and enhancements to *site personnel*
Provide support and encouragement to those responsible for the conduct of the plan's activities.
 - 3.6 Ensure all environmental management plan *records and reports* are produced, processed and maintained as specified by legislative and organisation's requirements
- 4. Monitor, review and update the environmental management processes.
 - 4.1 *Monitor* the environmental management plan activities and achievement targets and provide/focus *resources* to ensure the implementation plan is satisfied.
 - 4.2 Review and update the environmental management plans implementation plan periodically and when changing circumstances are anticipated/occur.
 - 4.3 Complete and retain environmental management plans documentation covering the reasons for and changes made in accordance with the organisation and relevant *legislative requirements*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following, as required for the safe, effective and efficient implementation and maintenance of environmental management plans:

- Reading, interpreting and applying legislation
- Developing and maintaining site procedures and practices
- Reading, interpreting, applying and communicating technical information, rules, procedures, regulations etc
- Documenting and facilitating management planning
- Maintaining relevant records and documents
- Monitoring and decide on changes to process
- Providing leadership and guidance for group activities
- Communicating effectively in the workplace
- Explaining complex information to superiors/subordinates
- Providing coaching and mentoring support
- Applying active listening
- Showing sensitivity to the needs and feelings of others
- Actively encourage the free exchange of information

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following, as required for the safe, effective and efficient implementation and maintenance of environmental management plans:

- The organisation's environmental policies, goals and objectives
- Relevant legislative requirements
- Roles and responsibilities of relevant personnel within the organisation
- Action planning methods
- Negotiation skill
- Written and oral communication methods

- Receptive listening skills
- Human resource management processes
- Method of identifying appropriate action based on cost, safety, and welfare issues
- Work procedure/instruction writing
- Environmental management reporting and recording procedures
- Work site operating procedures
- Environmental hazard identification processes
- Environmental risk assessment processes
- Environmental risk treatment processes
- Environmental management system documentation methods

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 in the Performance Criteria is detailed below.

Consultation with relevant personnel would typically include:

- Senior management
- Subject matter experts
- Regulatory authorities
- Tenderers
- Project managers
- Contractors
- Employees
- Community
- Customers
- Suppliers.

The policy is:

- The statement of over all intent and direction of the organisation in respect of the environmental management

The system's procedures are:

- The procedures that support and expand on the policy and set out the requirements for implementing the environmental management system on individual sites. They provide direction and guidance to those responsible for implementation of the system and in the preparation of site-specific work procedures, instruction and practices to put the system into effect.

System's procedures may include:

- Identification of hazards
- Risk identification
- Risk assessment
- Risk treatment
- Interim solutions
- Dealing with unplanned incidents and events
- Consultation
- Communication
- Monitoring
- Review
- Record keeping
- Reporting
- Training

Hazards are:

- Sources of potential harm or situations with the potential to cause loss.

Risk identification is:

- The process of determining what can happen, why and how.

Risk assessment is:

- The overall process of risk analysis and risk evaluation.

Risk analysis is:

- A systematic use of available information to determine how often specified events may occur and the magnitude of their likely consequences.

Risk evaluation is:

- The process used to determine risk management priorities by comparing the level of risk against predetermined standards, target risk levels or other criteria.

Risk treatment is:

- The selection and implementation of appropriate options for dealing with risk.

Risk treatment should:

- Considered using options in sequence from eliminating the hazard, substitution, engineering controls, administrative controls, and finally PPE.

Site procedures and practices may include:

- Standard operating procedures
- Safe operating procedures
- Work instructions
- Emergency procedures

- Allocation of responsibilities
- Permit requirements
- Sampling, testing and worksite inspection requirements
- Documentation and reporting requirements

Resources may include:

- People
- Finance
- Equipment
- Buildings/facilities
- Technology
- Information.

Site personnel may include:

- Employees
- Contractors

Records and reports may include

- Results
- Recommendations
- Assessment forms
- Action planning documents

Monitor is to:

- Check, supervise, observe critically, or record the progress of an activity, action or system on a regular basis in order to identify change.

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety

- Dangerous goods
- Occupational licensing
- Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking environmental management plan implementation and maintenance.
 - Implementation of procedures and techniques for the safe, effective and efficient completion of environmental management plan implementation and maintenances
 - Working with others, including the client, to undertake and complete the environmental

management plan implementation and maintenance that meets all of the required outcomes

- Consistent timely completion of environmental management plan implementation and maintenances that safely, effectively and efficiently meets the required outcomes
- Consistent finalisation of environmental management plan implementation and maintenance processes
- Clear, timely required support and advice on the environmental management plan implementation and maintenance.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The suggested strategies for the assessment of this unit are:
 - Written and/or oral assessment of the candidate's required knowledge to undertake environmental management plan implementation and maintenance

- Observed, documented and/or first hand testimonial evidence of the candidate's:
 - Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of environmental management plan implementation and maintenances
- First hand testimonial and documentary evidence of the candidate's:
 - working with others to undertake and complete the environmental management plan implementation and maintenance that meets all of the required outcomes
 - consistent timely completion of environmental management plan implementation and maintenances that safely, effectively and efficiently meets the required outcomes
 - consistent finalisation of environmental management plan implementation and maintenance processes
 - clear, timely required support and advice on the environmental management plan implementation and maintenance
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC544A Implement and maintain quality management plans

Unit Descriptor

This unit covers the implementation and maintenance of quality management plans on specific worksites. It includes the requirements to: establishing the framework of the plan, establishing the processes to support the plan; planning and implementation the plan; and monitoring, reviewing and updating the management processes.

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Develop the framework for the site quality management plan
2. Develop the processes to support the site quality management plan

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Develop and document site ***quality objectives*** in ***consultation with relevant personnel***, and conforming to the organisation's ***policy*** and ***system's procedures***.
- 1.2 Develop and document the structures for the application of the quality management system, in consultation with relevant personnel, and conforming to the organisation's ***policy*** and ***system's procedures***.
- 1.3 Define, allocate and document the responsibilities for applying the quality management plan in job descriptions and duty statement for all relevant site positions.
- 2.1 Identify existing and potential site quality issues in accordance with relevant legislative, organisational, client and manufacturer's requirements and trends identified from the record system.
- 2.2 Access, interpret and clarify the organisation's criteria for resolving quality issues.

- 2.3 Develop and document detailed *site procedures and practices* for the application of the quality management system in consultation with relevant personnel, and that conform to the organisation's quality policy and system's procedures.
- 2.4 Identify, obtain and maintain information sources and expert advice required to support the quality management plan.
3. Prepare and implement the plan
 - 3.7 Plan, schedule and document how the quality management plan will be introduced to the entire work site.
 - 3.8 Identify, seek and/or provide *resources* for the operation of the quality management plan, in a timely and consistent manner.
 - 3.9 Provide and explain information on the site quality management plan in a form readily accessible to site employees.
 - 3.10 Provide/arrange appropriate development and/or training for site personnel on the quality management plan *site procedures and practices*.
 - 3.11 Make available information on known and intended process changes and enhancements to *site personnel*
Provide support and encouragement to those responsible for the conduct of the plan's activities.
 - 3.12 Ensure all quality management plan *records and reports are* produced, processed and maintained as specified by legislative, organisation, client and manufacturer's requirements
4. Monitor, review and update the quality management processes.
 - 4.1 **Monitor** the quality management plan activities and achievement targets and provide/focus *resources* to ensure the implementation plan is satisfied.
 - 4.2 Review and update the quality management plan's implementation periodically and when changing in work site circumstances are anticipated/occur.
 - 4.3 Complete and retain quality management plans documentation covering the reasons for and changes made in accordance with the organisation and relevant *legislative requirements*.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following, as required for the safe, effective and efficient implementation and maintenance of quality management plans:

- Reading, interpreting and applying legislation, client, organisational and manufacturer's quality requirements and procedures
- Developing and maintaining site procedures and practices
- Reading, interpreting, applying and communicating technical information, rules, procedures, regulations etc
- Documenting and facilitating management planning
- Maintaining relevant records and documents
- Monitoring and decide on changes to process
- Providing leadership and guidance for group activities
- Communicating effectively in the workplace
- Explaining complex information to superiors/subordinates
- Providing coaching and mentoring support
- Applying active listening
- Showing sensitivity to the needs and feelings of others
- Actively encouraging the free exchange of information

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following, as required for the safe, effective and efficient implementation and maintenance of quality management plans:

- The organisation's quality policies, goals and objectives
- Relevant legislative, client and manufacturer's quality requirements
- Roles and responsibilities of relevant personnel within the organisation
- Action planning methods
- Negotiation skills
- Written and oral communication methods

- Receptive listening skills
- Human resource management processes
- Method of identifying appropriate action based on cost, health, safety, and quality issues
- Work procedure/instruction writing
- Quality management reporting and recording procedures
- Work site operating procedures
- Quality issues identification processes
- Quality issues assessment processes
- Quality issues resolution processes
- Quality management system documentation methods

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 in the Performance Criteria is detailed below.

Consultation with relevant personnel would typically include:

- Senior management
- Subject matter experts
- Regulatory authorities
- Tenderers
- Project managers
- Contractors
- Employees
- Community
- Customers
- Suppliers

The policy is:

- The statement of over all intent and direction of the organisation in respect of the quality management

The system's procedures are:

- The procedures that support and expand on the policy and set out the requirements for implementing the quality management system on individual sites. They provide direction and guidance to those responsible for implementation of the system and in the preparation of site-specific work procedures, instruction and practices to put the system into effect.

System's procedures may include:

- Identification of quality issues

Site procedures and practices may include:

- Assessment of quality issues
- Resolving quality issues
- Interim solutions
- Dealing with unplanned incidents and events
- Consultation
- Communication
- Monitoring
- Review
- Record keeping
- Reporting
- Training
- Standard operating procedures
- Safe operating procedures
- Work instructions
- Emergency procedures
- Allocation of responsibilities
- Permit requirements
- Sampling, testing and worksite inspection requirements
- Documentation and reporting requirements

Resources may include:

- People
- Finance
- Equipment
- Buildings/facilities
- Technology
- Information.

Site personnel may include:

- Employees
- Contractors

Records and reports may include

- Results
- Recommendations
- Assessment forms
- Action planning documents

Monitor is to:

- Check, supervise, observe critically, or record the progress of an activity, action or system on a regular basis in order to identify change.

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking quality management plan implementation and maintenance.
 - Implementation of procedures and techniques for the safe, effective and efficient completion of quality management plan implementation and maintenances
 - Working with others, including the client, to undertake and complete the quality management plan implementation and maintenance that meets all of the required outcomes
 - Consistent timely completion of quality management plan implementation and maintenances that safely, effectively and efficiently meets the required outcomes
 - Consistent finalisation of quality management plan implementation and maintenance processes
 - Clear, timely required support and advice on the quality management plan implementation and maintenance.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of

assessment should not be greater than those required on the job.

- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The suggested strategies for the assessment of this unit are:
 - Written and/or oral assessment of the candidate's required knowledge to undertake quality management plan implementation and maintenance.
 - Observed, documented and/or first hand testimonial evidence of the candidate's:
 - implementation of appropriate procedures and techniques for the safe, effective and efficient completion of quality management plan implementation and maintenances.
 - First hand testimonial and documentary evidence of the candidate's:
 - working with others to undertake and complete the quality management plan implementation and maintenance that meets all of the required outcomes.
 - consistent timely completion of quality management plan implementation and maintenances that safely, effectively and efficiently meets the required outcomes
 - consistent finalisation of quality management plan implementation and maintenance processes
 - clear, timely required support and advice on the quality management plan implementation and maintenance

- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC601A Manage the civil works design process

Unit Descriptor	This unit covers management of the civil works design process. It includes the requirements to interpret and scope design requirements; identify project design options and determine the preferred design option; initiate, monitor and support, the design process; prepare and maintain documentation during the design process; review design to achieve acceptance; and support the application of designs
Employability Skills	The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Interpreting and scope civil works design requirements

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative and organisational requirements and procedures*** required for design of civil works.
- 1.2 Access, interpret and clarify the client's requirements for the design of civil works in accordance with the relevant ***organisational and manufacturer's requirements and procedures***.
- 1.3 Advise the client on the implications for sustainability and options for an improved environmental outcome in the project in accordance with the relevant ***legislative and organisational requirements and procedures***.
- 1.4 Analyse the client requirements for the design criteria to ensure all appropriate specifications are included in the design requirements in accordance with the relevant ***organisational and manufacturer's requirements and procedures***
- 1.5 ***Confirm*** that all ***development and implementation factors*** are accounted for in the design requirements in accordance with the relevant ***legislative and organisational requirements and procedures***.

- 1.6 Prepare functional specifications applying engineering standards and the design specifications in accordance with the relevant ***organisational and manufacturer's requirements and procedures***.
- 1.7 Document and obtain the clients agreement on the criteria for the design in accordance with the relevant ***organisational and manufacturer's requirements and procedures***.
2. Identity civil works project design options and determine the preferred design option
 - 2.1 Identify innovative approaches to the development of the possible design concept in accordance with the relevant ***organisational and manufacturer's requirements and procedures***
 - 2.2 Investigate and analyse the possible design concepts capable of achieving the design requirements in accordance with the relevant ***organisational and manufacturer's requirements and procedures***.
 - 2.3 Seek advice from appropriate personnel and sources where the concept proposal has non standard engineering requirements or where new technology may apply in accordance with the relevant ***organisational and manufacturer's requirements and procedures***
 - 2.4 Collaborate with the client to adapt the design concept to improve the outcomes and overcome problems in accordance with the relevant ***legislative, organisational and manufacturer's requirements and procedures***.
 - 2.5 Advise the client of the likely impacts on the community in accordance with the relevant ***legislative and organisational requirements and procedures***
3. Initiate, monitor and support, the design of civil works
 - 3.1 Analyse and select resources, processes and systems to develop the ***design*** in accordance with the relevant ***legislative and organisational requirements and procedures***
 - 3.2 ***Arrange design tasks*** to meet the agreed outcomes and cost structure in accordance with the relevant ***organisational requirements and procedures***
 - 3.3 Develop and check the design solution using the engineering specification in accordance with the relevant ***organisational and manufacturer's requirements and procedures***

- 3.4 Create (when appropriate) a demonstration model of the *design* in accordance with the relevant *organisational and manufacturer's requirements and procedures*
- 4. Prepare and maintain documentation during the civil works design process
 - 4.1 Establish the documentation management process in accordance with the relevant *legislative and organisational requirements and procedures*
 - 4.2 Ensure that the supporting documentation required to implement the *design* is accurate, concise, complete and clear in accordance with the relevant *legislative and organisational requirements and procedures*
 - 4.3 Ensure that the designed item is identified by agreed *design* documentation and records in accordance with the relevant *legislative and organisational requirements and procedures*
 - 4.4 Apply the agreed documentation control process when making changes to *design* in accordance with the relevant *legislative and organisational requirements and procedures*
 - 4.5 Ensure that the documentation for the *design* remains accurate and current during the design development in accordance with the relevant *legislative and organisational requirements and procedures*
- 5. Review civil works design to achieve acceptance
 - 5.1 Review the *design* to ensure that the client's requirements are met in accordance with the relevant *legislative and organisational requirements and procedures*
 - 5.2 Inform the user of the likely impact on the user's lifestyle in accordance with the relevant *legislative and organisational requirements and procedures*
 - 5.3 Incorporate corrections and make improvements to the *design* ensuring social responsibilities, such as sustainability are met in accordance with the relevant *legislative and organisational requirements and procedures*
 - 5.4 Review the *design* with the client to gain documented acceptance in accordance with the relevant *legislative and organisational requirements and procedures*

6. Support the application of civil works designs
- 6.1 Prepare and implement plans to verify that completed physical work meets client's requirements in accordance with the relevant *legislative and organisational requirements and procedures*
 - 6.2 Develop periodic test schedules to monitor performance and enable others to take any corrective action necessary in accordance with the relevant *legislative, organisational and manufacturer's requirements and procedures*
 - 6.3 Seek feedback from the commissioning process to facilitate corrective actions or improvements in accordance with the relevant *legislative and organisational requirements and procedures*
 - 6.4 Evaluate the performance of the *design* outcomes in the user's environment using appropriate tools in accordance with the relevant *legislative, organisational and manufacturer's requirements and procedures*
 - 6.5 Evaluate community reaction to the *design* outcome in accordance with the relevant *legislative and organisational requirements and procedures*

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following, as required for the safe, effective and efficient completion of the detailed design of civil works:

- Interpreting legislative requirements
- Interpreting organisational requirements
- Interpreting project plans and drawings
- Interpreting project specifications
- Interpreting project design briefs
- Interpreting Australian and other appropriate standards
- Interpreting project engineering survey information
- Interpreting project hydrological data
- Interpreting meteorological data

- Interpreting project geotechnical data
- Interpret cultural and heritage data
- Carrying out risk assessments
- Providing team leadership and coordination
- Applying innovative solutions and new technology
- Applying consultative processes
- Choosing appropriate operational techniques
- Developing and applying design plans
- Preparing civil works functional specifications
- Applying computer aided design (CAD) technology
- Applying engineering graphical presentation techniques
- Calculating of design costs
- Maintaining design cost records
- Providing clarification and advice
- Applying negotiation techniques
- Applying client feedback techniques
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Civil works may include:

- Land clearing
- Bulk earthworks
- Surface drainage works
- Water storage dams construction
- Tailings dams construction
- Topsoil management
- Rehabilitation works
- Road works preparation (including the sub grade)
- Pavement construction, including:
 - Flexible pavements, including:
 - natural pavement materials
 - manufactured pavement materials

- asphalt placement
- spray seal application
- stabilisation
- Rigid pavement construction
- Underground services construction
- Construction of civil structures
- Tunnelling
- Dredging

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations
- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods
 - Occupational licensing
 - Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures

Legislative, organisational, client and manufacturers requirements and procedures may include:

Confirmation of information may include:

- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures
- Consultation with the client
- Consultation with others within the organisation
- Obtaining further site data, including:
 - Geological data
 - Survey data
 - Hydrological data

Development and implementation factors may include:

- Project specifications
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Existing project drawings
- Relevant Australian or other standards

Arranging the design tasks may include:

- Human resource requirements
- Design hardware and software
- Coordination requirements
- Scheduling
- Review requirements
- Communication and reporting requirements

Design may include:

- Calculations, which may include:
 - Loads
 - Sheer forces
 - Bending moments
 - Stresses
 - Construction materials and services quantities
 - Construction cost estimates
- Recommended sizing of components
- Recommended materials

- Recommended reinforcement sizing and location
- Drawings
- Risk assessment of:
 - The existing conditions
 - The application of the design
 - Maintainability of the works
- Health, safety and environmental requirements
- Contribution to ancillary documentation, which may include:
 - Design notes
 - Construction notes
 - Supplementary drawings
 - Input to the specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking civil works design
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of civil works designs
 - Arranging of the design tasks in a manner that reflects the requirements of the task and is capable of achieving all of their required outcomes
 - The identification of viable and where appropriate innovative, design options and the selection of design options that best meet the required civil works outcomes
 - Working with others, including the client, to undertake and complete the civil works design that meets all of the required outcomes

- Consistent timely achievement of client agreement on the design concept and the final design
- Consistent timely completion of civil works designs that safely, effectively and efficiently meets the required outcomes
- Consistent finalisation of civil works design processes
- Clear, timely required support and advice on the civil works design
- Meaningful contribution to the review and validation of civil concrete structures designs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The suggested strategies for the assessment of this unit are:
 - Written and/or oral assessment of the candidate's required knowledge to undertake civil works design
 - Observed, documented and/or first hand testimonial evidence of the candidate's:
 - Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of civil works designs

- consistent application of appropriate health, safety and environmental requirements and procedures
 - arranging of the design tasks in a manner that reflects the requirements of the task and is capable of achieving all of their required outcomes.
 - The identification of viable and where appropriate innovative, design options and the selection of design options that best meet the required civil works outcomes
- First hand testimonial and documentary evidence of the candidate's:
 - working with others, including the client, to undertake and complete the civil works design that meets all of the required outcomes.
 - consistent timely achievement of client agreement on the design concept and the final design
 - consistent timely completion of civil works designs that safely, effectively and efficiently meets the required outcomes
 - consistent finalisation of civil works design processes
 - clear, timely required support and advice on the civil works design
 - meaningful contribution to the review and validation of civil concrete structures designs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge
- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons

- Assessment should also reinforce the integration of the Employability Skills

RIICC602A Establish civil construction plans

Unit Descriptor

This unit covers the establishing of civil construction plans. It includes the requirements to interpret and scope civil construction plan requirements; identify project construction plan options and determine the preferred construction plan option; initiate, monitor and support, the construction planning process; prepare and maintain documentation during the construction planning process; review construction plan and achieve acceptance; and support the application of construction plans

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Prepare for establishing civil construction plans
2. Conduct the civil construction planning process

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative and organisational requirements and procedures*** required for construction of civil works.
- 1.2 Access, interpret and clarify the client's requirements for the construction of civil works in accordance with the relevant ***organisational and manufacturer's requirements and procedures***.
- 1.3 ***Confirm*** the availability and accuracy of the ***project information*** required for completion of the plan in accordance with the relevant ***organisational and manufacturer's requirements and procedures***.
- 1.4 Prepare the scope of work required for the safe effective and efficient completion of the project in accordance with relevant ***organisational requirements and procedures***.
- 2.1 Identify the viable available options for the construction program in accordance with the relevant ***organisational and manufacturer's requirements and procedures***

- 2.2 Select the preferred option and draft the construction program in consultation with relevant team members, which makes best use of the available resources and meets the project requirements.
- 2.3 Identify contingency requirements to be allowed for in the execution of the program in accordance with the relevant ***organisational requirements and procedures***
- 2.4 Monitor and coordinate the progress of other team members involved in the planning process to ensure the effective and efficient completion of the plan in accordance with the relevant ***organisational requirements and procedures***
- 2.5 Identify and schedule the resources required for the execution of the construction program in accordance with the relevant ***organisational requirements and procedures***
- 2.6 Identify the key performance indicators to be used in the monitoring and assessment of the project performance, in accordance with the relevant ***legislative and organisational requirements and procedures***
- 2.7 Gain client agreement on construction milestones in accordance with the client's requirements and relevant ***organisational requirements and procedures***.
- 2.8 Prepare an accurate estimate of the cost of execution of the plan in consultation with relevant team members and in accordance with relevant ***organisational requirements and procedures***.
- 2.9 Gain approval of the civil construction plan in accordance with the contractual requirements and the relevant ***organisational requirements and procedures***
- 2.10 Document the civil construction plan in accordance with the contractual requirements and the relevant ***legislative and organisational requirements and procedures***

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3. Initiate civil construction plans
- 3.1 Acquire and make available the necessary **resources** for the safe, effective and efficient conduct of the plan, in accordance with the relevant **legislative, organisational and manufacturer's requirements and procedures** and the **specific task information and requirements**.
- 3.2 Issue clear and timely **instructions** to team members and others involved, for the safe, effective and efficient conduct of the plan, to meet the **specific task requirements** and the relevant **legislative, organisational and manufacturer's requirements and procedures**.
4. Monitor, adjust and report on the execution of civil construction plans
- 4.1 Ensure the safe, effective and efficient execution of the plan in accordance with the relevant **legislative, organisational and manufacturer's requirements and procedures and the task requirements**.
- 4.2 **Monitor** the **civil construction plan** performance to ensure it achieves the **required outcomes**.
- 4.3 Initiate adjustments to **civil construction plan** to ensure achievement of **required outcomes**.
- 4.4 Provide ongoing clarification and advice to those applying the plan to ensure the successful completion of the project.
- 4.5 Ensure reports are complete and submit as required by **relevant legislative, organisational and task requirements**.
- 4.6 Conduct performance review the **construction plan** in accordance with the relevant **organisational requirements and procedures**
- 4.7 Recommend changes to improve the safety, efficiency and effectiveness of civil construction planning process in accordance with the relevant **organisational requirements and procedures**.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following, as required for the safe, effective and efficient completion of the detailed construction of civil works:

- Interpreting legislative requirements
- Interpreting organisational requirements
- Interpreting project plans and drawings
- Interpreting project specifications
- Interpreting project construction briefs
- Interpreting project engineering survey information
- Interpreting project hydrological data
- Interpreting meteorological data
- Interpreting project geotechnical data
- Providing team leadership and coordination
- Applying innovative solutions and new technology
- Applying consultative processes
- Choosing appropriate operational techniques
- Developing and applying construction plans
- Applying project scheduling and resource management technology
- Calculating of construction resource quantities and project costs
- Maintaining construction cost records
- Providing clarification and advice
- Applying negotiation techniques
- Applying feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes knowledge of the following, as required for the safe, effective and efficient completion of the construction of civil works:

- Risk management requirement and procedures
- Statutory compliance requirements and procedures
- Construction plan development and implementation requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards
- Industry and organisational construction procedures and practice
- Civil construction works options
- Sources of information on innovation and new technology
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of civil works projects
- Civil construction plant and equipment capabilities
- Cost estimation techniques
- Construction plan review principles and procedures
- Construction plan documentation requirements
- Construction plan reporting requirements and procedures
- Construction plan approval requirements and procedures
- Construction plan records filing requirements and procedures
- Performance review requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Civil construction projects may include:

- Land clearing
- Bulk earthworks
- Surface drainage works
- Water storage dams construction
- Tailings dams construction
- Topsoil management
- Rehabilitation works
- Road works preparation (including the sub grade)
- Pavement construction, including:
 - Flexible pavements, including:
 - natural pavement materials
 - manufactured pavement materials
 - asphalt placement
 - spray seal application
 - stabilisation
 - Rigid pavement construction
- Underground services construction
- Construction of civil structures
- Tunnelling
- Dredging

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods

- Occupational licensing
- Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures
- Consultation with the client
- Consultation with others within the organisation
- Obtaining further site data, including:
 - Geological data
 - Survey data
 - Hydrological data
 - Meteorological data

Confirmation of information may include:

Project information may include:

- Project designs
- Project specifications
- Project site geological data
- Project site hydrological data
- Project site engineering survey data
- Project site meteorological data
- Project site environmental requirements
- Community considerations
- Heritage issues

- Impact assessment information
- Available resources
- Existing project drawings
- Relevant Australian or other standards

Instructions may include:

- Project plans
- Briefings
- Handovers
- Work orders
- Toolbox meetings
- Site meetings

Monitor may include:

- Engineering survey
- Sampling and testing
- Recording and observation of construction practice
- General supervision

Civil construction plans may include:

- Risk management requirements and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Quality requirements and procedures
- Inspection and testing requirements and procedures
- Communication and consultation requirements and procedures
- Community relations requirements and procedures
- Traffic management requirements and procedures
- Training requirements and procedures
- Allocation of responsibilities
- Position descriptions
- Administration requirements and procedures, including records and reporting
- Operational techniques required for the execution of civil works projects
- Cost management requirements and procedures

- Client liaison requirements and procedures
- Construction plan review requirements and procedures
- Construction plan documentation requirements and procedures
- Construction plan reporting requirements and procedures
- Implementation plan approval requirements and procedures
- Construction plan records filing requirements and procedures
- Performance review requirements and procedures
- Scheduling requirements and procedures
- Resource requirements and procedures
- Production rates requirements and procedures
- Coordination requirements and procedures
- Review requirements
- Communication and reporting requirements
- Drawings
- Ancillary documentation, which may include:
 - Construction notes
 - Construction notes
 - Supplementary drawings
 - Specifications

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in undertaking civil construction planning and works.

- Consistent application of applicable health, safety and environmental requirements and procedures
- Implementation of procedures and techniques for the safe, effective and efficient completion of civil constructions planning
- The identification of the relevant information and scope of the work required to meet the required outcomes of the project.
- The identification of viable construction program options and the selection of construction programs that best meet the required civil works outcomes
- Working with others to undertake and complete the civil works construction plan that meets all of the required outcomes
- Consistent and timely completion of civil construction plans that safely, effectively and efficiently meets the required outcomes
- Consistent and timely gaining of approval of civil construction plans
- Clear, timely required support and advice on the implementation of civil construction plans.

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency
- The suggested strategies for the assessment of this unit are:
 - Written and/or oral assessment of the candidate's required knowledge to undertake civil construction planning and works.
 - Observed, documented and/or first hand testimonial evidence of the candidate's:
 - implementation of appropriate procedures and techniques for the safe, effective and efficient completion of civil constructions plans.
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - identification of the relevant information and scope of the work required to meet the required outcomes of the project.
 - identification of viable construction program options and the selection of construction programs that best meet the required civil works outcomes
 - First hand testimonial and documentary evidence of the candidate's:
 - working with others to undertake and complete the civil construction plans that meet all of the required outcomes
 - consistent and timely completion of civil construction plans that safely, effectively and efficiently meets the required outcomes
 - consistent and timely gaining of approval of civil construction plans
 - clear, timely required support and advice on the implementation of civil construction plans
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge

- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills

RIICC603A Establish civil works maintenance programs

Unit Descriptor

This unit covers the establishing of civil works maintenance programs. It includes the requirements to prepare, analyse and plan for; initiate, monitor, adjust and report on the execution of civil works maintenance programs

Employability Skills

The required outcomes described in this Unit of Competency contain applicable facets of employability skills. The Employability Skills Qualification Summary for the qualification in which this Unit of Competency is packaged will assist in identifying employability skill requirements.

ELEMENT

Elements describe the essential outcomes of a Unit of Competency

1. Prepare for establishing civil works maintenance programs

2. Plan civil works maintenance program

PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the Required Skills and Knowledge and/or the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

- 1.1 Access, interpret and clarify relevant ***legislative and organisational requirements and procedures*** required for the conduct of a civil works maintenance program.
- 1.2 Access, interpret and clarify the client's requirements for a civil works maintenance program, in accordance with the relevant in accordance with the relevant ***contractual and organisational requirements and procedures***.
- 1.4 Schedule, initiate and ensure the completion of inspections of assets to classify their serviceability, in accordance with the relevant ***contractual, organisational requirements and procedures***.
- 2.1 ***Classify*** the condition of assets in terms of their serviceability in accordance with the relevant ***contractual and organisational requirements and procedures***.
- 2.2 Prioritise maintenance works in accordance with relevant ***contractual and organisational requirements and procedures***.
- 2.3 Identify the viable available options for the maintenance program in accordance with the relevant ***contractual and organisational requirements and procedures***

- 2.4 Select the preferred options and draft the maintenance program in consultation with relevant team members, which makes best use of the available resources and meets the project requirements in accordance with the relevant ***contractual and organisational requirements and procedures***.
- 2.5 Identify contingency requirements to be allowed for in the execution of the program in accordance with the relevant in accordance with the relevant ***contractual and organisational requirements and procedures***
- 2.6 Monitor and coordinate the progress of other team members involved in the programming process to ensure the effective and efficient completion of the program in accordance with the relevant ***organisational requirements and procedures***
- 2.7 Identify and schedule the resources required for the execution of the maintenance program in accordance with the relevant in accordance with the relevant ***contractual and organisational requirements and procedures***
- 2.8 Identify the key performance indicators to be used in the monitoring and assessment of the project performance, in accordance with the relevant in accordance with the relevant ***contractual and organisational requirements and procedures***
- 2.9 Gain client agreement on maintenance milestones in accordance with the client's requirements and relevant in accordance with the relevant ***contractual and organisational requirements and procedures***.
- 2.10 Prepare an accurate estimate of the cost of execution of the program in consultation with relevant team members and in accordance with relevant in accordance with the relevant ***contractual and organisational requirements and procedures***
- 2.11 Gain approval of the civil works maintenance program in accordance with the contractual requirements and the relevant in accordance with the relevant ***contractual and organisational requirements and procedures***

- 2.12 Document the civil works maintenance program in accordance with the contractual requirements and the relevant in accordance with the relevant ***contractual and organisational requirements and procedures***
3. Initiate civil works maintenance programs
- 3.1 Acquire and make available the necessary ***resources*** for the safe, effective and efficient conduct of the program, in accordance with the relevant in accordance with the relevant ***contractual and organisational requirements and procedures***.
- 3.2 Issue clear and timely ***instructions*** to team members and others involved, for the safe, effective and efficient conduct of the program, to meet the ***specific task requirements*** and the relevant in accordance with the relevant ***contractual and organisational requirements and procedures***.
4. Monitor, adjust and report on the execution of civil works maintenance programs
- 4.1 Ensure the safe, effective and efficient execution of the program in accordance with the relevant ***legislative, contractual and organisational requirements and procedures***.
- 4.2 ***Monitor*** the ***civil works maintenance program*** performance to ensure it achieves the ***required outcomes***.
- 4.3 Initiate adjustments to ***civil works maintenance program*** to ensure achievement of ***required outcomes***.
- 4.4 Provide ongoing clarification and advice to those applying the program to ensure the successful completion of the project.
- 4.5 Ensure reports are complete and submit as required by ***relevant contractual and organisational requirements and procedures***
- 4.6 Conduct performance review the ***works maintenance program*** in accordance with the relevant ***contractual and organisational requirements and procedures***.
- 4.7 Recommend changes to improve the safety, efficiency and effectiveness of civil works maintenance programming process in accordance with the relevant ***contractual and organisational requirements and procedures***.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied.

This includes the ability to carry out the following, as required for the safe, effective and efficient completion of civil works maintenance programs:

- Interpreting legislative requirements
- Interpreting organisational requirements
- Interpreting asset plans and drawings
- Interpreting maintenance program specifications
- Interpreting maintenance program briefs and contracts
- Interpreting engineering survey information
- Interpreting hydrological data
- Interpreting meteorological data
- Interpreting geotechnical data
- Scheduling of inspection programs
- Interpreting of inspection data
- Classifying the levels of the serviceability of assets
- Prioritising maintenance works
- Providing team leadership and coordination
- Applying innovative solutions and new technology
- Applying consultative processes
- Choosing appropriate maintenance operational techniques
- Developing and applying works maintenance programs
- Applying project scheduling and resource management technology
- Calculating of maintenance resource quantities and program costs
- Maintaining maintenance program cost records
- Providing clarification and advice
- Applying negotiation techniques
- Applying feedback techniques

Required Knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for their application in the variety of circumstances in which this unit may be applied. This includes knowledge of the following, as required for the safe, effective and efficient completion of civil works maintenance programs:

- Risk management requirement and procedures
- Statutory compliance requirements and procedures
- Works maintenance program development and implementation requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental requirements and procedures
- Quality management requirements and procedures
- Communication requirements and procedures
- Australian and other relevant standards
- Inspection program scheduling requirements and procedures
- Inspection data interpreting requirements and procedures
- Asset condition classification requirements and procedures
- Maintenance works prioritisation requirements and procedures
- Industry and organisational maintenance procedures and practice
- Civil works maintenance options
- Sources of information on innovation and new technology
- Techniques for choosing preferred options
- Team leadership techniques
- Operational techniques required for the execution of civil works maintenance programs
- Civil works maintenance plant and equipment capabilities
- Cost estimation techniques
- Maintenance program review principles and procedures
- Maintenance program documentation requirements
- Maintenance program reporting requirements and procedures
- Maintenance program approval requirements and procedures
- Maintenance program records filing requirements and procedures
- Performance review requirements and procedures
- Principles of road user behaviour

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 in the Performance Criteria is detailed below.

Civil maintenance projects may include:

- Surface drainage works
- Water storage dams
- Tailings dams
- Rehabilitation works
- Pavement, including:
 - Flexible pavements, including:
 - natural pavement materials
 - manufactured pavement materials
 - asphalt placement
 - spray seal application
 - stabilisation
 - Rigid pavement
- Underground services
- Civil structures
- Tunnels
- Canals

Legislative requirements may include:

- Requirements included in both legislation and regulations
- Federal, State and Local Government legislation and regulations

Contractual, Legislative, organisational, client and manufacturers requirements and procedures may include:

- Risk assessment and management requirements and procedures
- Statutory compliance requirements and procedures, including:
 - Equal Employment Opportunity
 - Disability Discrimination
 - Planning and development
- Occupational Health and Safety requirements and procedures, including:
 - Workplace safety
 - Dangerous goods

- Occupational licensing
- Material Safety Data Sheets
- Traffic management requirements and procedures
- Environmental management requirements and procedures
- Cultural and heritage requirements and procedures
- Quality requirements and procedures
- Australian and other relevant standards
- Current industry best practice
- Communication requirements and procedures
- Procurement requirements and procedures
- Employment requirements and procedures
- Workplace relations requirements and procedures
- Contract management requirements and procedures
- Administration requirements and procedures, including records and reporting
- Maintenance, servicing, and housekeeping requirements and procedures
- Operational techniques required for the execution of civil works maintenance
- Cost estimation requirements and procedures
- Client agreement requirements and procedures
- Inspection program scheduling requirements and procedures
- Inspection data interpreting requirements and procedures
- Asset condition classification requirements and procedures
- Maintenance works prioritisation requirements and procedures
- Maintenance program review requirements and procedures
- Maintenance program documentation requirements and procedures
- Maintenance program reporting requirements and procedures

- Maintenance program approval requirements and procedures
- Maintenance program records filing requirements and procedures

Performance review requirements and procedures

Instructions may include:

- Program documents
- Briefings
- Handovers
- Work orders
- Toolbox meetings
- Site meetings

Monitor may include:

- Review of records and reports
- General supervision

Civil works maintenance programs may include:

- Risk management requirements and procedures
- Statutory compliance requirements and procedures
- Occupational Health and Safety requirements and procedures
- Environmental management requirements and procedures
- Quality requirements and procedures
- Inspection and testing requirements and procedures
- Communication and consultation requirements and procedures
- Community relations requirements and procedures
- Traffic management requirements and procedures
- Training requirements and procedures
- Allocation of responsibilities
- Position descriptions
- Administration requirements and procedures, including records and reporting
- Operational techniques required for the execution of the program
- Cost management requirements and procedures
- Client liaison requirements and procedures
- Maintenance program review requirements and procedures

- Maintenance program documentation requirements and procedures
- Maintenance program reporting requirements and procedures
- Maintenance program implementation plan approval requirements and procedures
- Maintenance program records filing requirements and procedures
- Performance review requirements and procedures
- Scheduling requirements and procedures
- Priority requirements and procedures
- Resource requirements and procedures
- Production rates requirements and procedures
- Coordination requirements and procedures
- Review requirements
- Communication and reporting requirements
- Drawings and specifications
- Ancillary documentation, which may include:
 - Maintenance notes
 - Maintenance notes
 - Supplementary drawings

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects of assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the Performance Criteria, Required Skills and Knowledge and the Range Statement of this unit and include evidence of the following:
 - Knowledge of the requirements, procedures and instructions that are to apply in preparing and undertaking civil works maintenance programs
 - Consistent application of applicable health, safety and environmental requirements and procedures
 - Implementation of procedures and techniques for the safe, effective and efficient completion of civil maintenances programs

- The identification of the relevant information and scope of the work required to meet the required outcomes of the project.
- The identification of viable maintenance program options and the selection of maintenance program options that best meet the required civil works outcomes
- Working with others to undertake and complete the civil works maintenance program planning and execution that meets all of the required outcomes
- Consistent and timely gaining of approval of civil works maintenance programs
- Consistent and timely completion of civil works maintenance programs that safely, effectively and efficiently meets the required outcomes
- Clear, timely required support and advice on the implementation of civil works maintenance programs

Context of and specific resources for assessment

- This unit should be assessed in the context of the work environment wherever possible. Where this is not possible, assessment may occur in a simulated environment. Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context.
- The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job.
- Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular work sites may differ due to site circumstances.
- Where applicable, physical resources should include equipment modified for people with disabilities.
- Access must be provided to appropriate learning and/or assessment support when required.

Methods of assessment

- This unit maybe assessed in a holistic way with other units of competency

- The suggested strategies for the assessment of this unit are:
 - Written and/or oral assessment of the candidate's required knowledge apply in undertaking civil works maintenance programming and works
 - Observed, documented and/or first hand testimonial evidence of the candidate's:
 - Implementation of appropriate procedures and techniques for the safe, effective and efficient completion of civil maintenances programs
 - consistent application of appropriate health, safety and environmental requirements and procedures
 - identification of the relevant information and scope of the work required to meet the required outcomes of the programs
 - identification of viable maintenance program options and the selection of maintenance program options that best meet the required civil works outcomes
 - First hand testimonial and documentary evidence of the candidate's:
 - working with others to undertake and complete the civil works maintenance program planning and execution that meet all of the required outcomes
 - consistent and timely gaining of approval of civil works maintenance programs
 - consistent and timely completion of civil works maintenance programs that safely, effectively and efficiently meets the required outcomes
 - clear, timely required support and advice on the implementation of civil works maintenance programs
- Meaningful contribution to the review and improvement of civil works schedule of rates processes
- Where practical assessment is used it will be combined with targeted questioning to assess the required knowledge

- Questioning should be appropriate to the oracy, language and literacy levels of the applicant being assessed and should reflect the requirements of the competency and the work being performed. Assessors should be aware of any cultural issues that may affect responses to the questions
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons
- Assessment should also reinforce the integration of the Employability Skills