



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **RIICWD534A Prepare detailed design of civil steel structures**

**Release: 1**

## **RIICWD534A Prepare detailed design of civil steel structures**

### **Modification History**

Not applicable.

### **Unit Descriptor**

This unit covers the completion of the detailed design and documentation of civil steel structures in Civil Construction. 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.

### **Application of the Unit**

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. This unit is appropriate for those working in a management role or as a technical specialist, for the completion of the detailed design and documentation of civil steel structures within:

- Civil construction

### **Licensing/Regulatory Information**

Refer to Unit Descriptor.

### **Pre-Requisites**

Not applicable.

### **Employability Skills Information**

This unit contains employability skills.

## Elements and Performance Criteria Pre-Content

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

ELEMENT	PERFORMANCE CRITERIA
1. Plan for the detailed design of civil steel structures	1.1. Access, interpret and apply <b>compliance documentation</b> relevant to the work activity 1.2. Identify and <b>confirm</b> the <b>civil steel structures project requirements and information</b> for the completion of the detailed design 1.3. Prepare a <b>design plan</b> which makes best use of the available resources and meets the design requirements
2. Undertake the detailed design of civil steel structures	2.1. Interpret and analyse the relevant data and identify the available viable options for the detailed design of civil steel structures 2.2. Interpret and analyse relevant data and recommend the <b>preferred option</b> that best meets the required project outcomes 2.3. Complete the <b>detailed design</b> of the civil steel structures that safely, effectively and efficiently meets the required project outcomes 2.4. Prepare a cost estimate of the execution of the designed civil steel structures 2.5. Participate in the review of the civil steel structures design with peers and stakeholders 2.6. Complete the documentation of the civil steel structures design 2.7. Monitor and coordinate the progress of other team members involved in the design process 2.8. Gain design approval
3. Finalise design processes of civil steel structures	3.1. Ensure filing of design records is completed 3.2. Complete and submit design cost and other reporting 3.3. Participate in performance review of the design process 3.4. Seek client feedback and contribute to the verification of the design 3.5. Close out all systems
4. Support and review the	4.1. Provide clarification and advice to those

application of the design of civil steel structures	applying the design 4.2. Review the application of the design and recommend changes for the continuous improvements of civil steel structures detailed designs 4.3. Contribute to the validation of the design
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## Required Skills and Knowledge

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

### Required skills

Specific skills are required to achieve the performance criteria in this unit, particularly for the application in the various circumstances in which this unit may be applied. This includes the ability to carry out the following as required to complete the detailed design and documentation of civil steel structures:

- apply legislative, organisation and site requirements and procedures
- interpret plans and drawings
- interpret specifications
- interpret design briefs
- interpret 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 civil steel structures component selection data
- select civil steel structures component options
- calculate of loads, sheer forces, bending moments, stresses, areas, volumes and mass
- size civil steel structures components
- select civil steel structure joint and fastening options
- provide leadership and coordination
- choose appropriate construction techniques
- develop and apply design plans
- apply computer aided drafting design (CADD) and drafting technology
- apply industry or government standard design software
- apply engineering graphical presentation techniques
- maintain design cost records
- maintain design records
- provide clarification and advice
- apply client feedback techniques

### Required knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly its application in a variety of circumstances in which the unit may be used. This includes knowledge of the following, as required to complete the detailed design and documentation 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 affect 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

## Evidence Guide

<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
<p><b>Overview of assessment</b></p>	
<p><b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b></p>	<p>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:</p> <ul style="list-style-type: none"> <li>• knowledge of the requirements, procedures and instructions for the completion of the detailed design and documentation of civil steel structures</li> <li>• implementation of procedures and techniques for the safe, effective and efficient completion of the detailed design and documentation of civil steel structures</li> <li>• the identification of the relevant information and scope of the work required to meet the required outcomes</li> <li>• the identification of viable options and the selection of the detailed design and documentation of civil steel structures that best meet the required outcomes</li> <li>• working with others to undertake and complete the detailed design and documentation of civil steel structures</li> <li>• consistent successful completion of the detailed design and documentation of civil steel structures</li> </ul>
<p><b>Context of and specific resources for assessment</b></p>	<ul style="list-style-type: none"> <li>• This unit must be assessed in the context of the work environment. Where personal safety or environmental damage are limiting factors, assessment may occur in a simulated environment provided it is realistic and sufficiently rigorous to cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills.</li> <li>• The assessment environment should not disadvantage the participant. For example,</li> </ul>



	<p>language, literacy and numeracy demands of assessment should not be greater than those required on the job. Customisation of assessment and delivery environment to sensitively accommodate cultural diversity.</p> <ul style="list-style-type: none"> <li>• Aboriginal people and other people from a non English speaking background may have second language issues.</li> <li>• Assessment of this competency requires typical resources normally used in a civil works environment. Selection and use of resources for particular worksites may differ due to site circumstances.</li> <li>• Where applicable, physical resources should include equipment modified for people with disabilities.</li> <li>• Access must be provided to appropriate learning and/or assessment support when required.</li> </ul>
<b>Method of assessment</b>	<p>This unit may be assessed in a holistic way with other units of competency. The assessment strategy for this unit must verify required knowledge and skill and practical application using more than one of the following assessment methods:</p> <ul style="list-style-type: none"> <li>• written and/or oral assessment of the candidate's required knowledge to apply in undertaking of the completion of the detailed design and documentation of civil steel structures</li> <li>• observed, documented and/or first hand testimonial evidence of the candidate's: <ul style="list-style-type: none"> <li>• implementation of appropriate procedures and techniques for the safe, effective and efficient achievement of the required outcomes</li> <li>• identification of the relevant information and scope of the work required to meet the required outcomes</li> <li>• identification of viable options and the selection of the detailed design and documentation of civil steel structures that best meet the required outcomes</li> <li>• consistently achieving the required outcomes</li> </ul> </li> </ul>

	<ul style="list-style-type: none"><li>• first hand testimonial and documentary evidence of the candidate's:<ul style="list-style-type: none"><li>• working with others to undertake and complete the detailed design and documentation of civil steel structures</li><li>• provision of clear and timely required support and advice on the completion of the detailed design and documentation of civil steel structures</li></ul></li></ul>
<b>Guidance information for assessment</b>	Consult the SkillsDMC User Guide for further information on assessment including access and equity issues.

## Range Statement

<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<p><b>Relevant compliance documentation</b> may include:</p>	<ul style="list-style-type: none"> <li>• legislative, organisational and site requirements and procedures</li> <li>• manufacturer's guidelines and specifications</li> <li>• Australian standards</li> <li>• code of practice</li> <li>• Employment and workplace relations legislation</li> <li>• Equal Employment Opportunity and Disability Discrimination legislation</li> </ul>
<p><b>Confirm</b> may include:</p>	<ul style="list-style-type: none"> <li>• consultation with the client</li> <li>• consultation with others within the organisation</li> <li>• consultation with relevant authorities</li> <li>• conducting a risk assessment of the existing and potential hazards</li> <li>• obtaining further site data, including:             <ul style="list-style-type: none"> <li>• known and potential hazards, constraints and conditions</li> <li>• cultural and heritage data</li> <li>• geological data</li> <li>• geotechnical data</li> <li>• hydrological data</li> <li>• survey data</li> <li>• meteorological data</li> </ul> </li> </ul>
<p><b>Civil steel structures</b> may include:</p>	<ul style="list-style-type: none"> <li>• bridges</li> <li>• sign gantries</li> <li>• vertical sign supports</li> <li>• noise barrier supports</li> <li>• guardrails</li> </ul>
<p><b>Project requirements and information</b> may include:</p>	<ul style="list-style-type: none"> <li>• project specifications</li> <li>• contractual requirements</li> <li>• client's requirements</li> <li>• project site geological data</li> <li>• project site hydrological data</li> </ul>

	<ul style="list-style-type: none"> <li>• project site engineering survey data</li> <li>• project site cultural and heritage constraints</li> <li>• existing project design and drawings</li> <li>• Australian or other relevant standards</li> </ul>
<p><b>Design plan</b> may include:</p>	<ul style="list-style-type: none"> <li>• human resource requirements</li> <li>• design hardware and software</li> <li>• coordination requirements</li> <li>• scheduling</li> <li>• review requirements</li> <li>• design process communication and reporting requirements</li> </ul>
<p><b>Preferred option</b> factors may include:</p>	<ul style="list-style-type: none"> <li>• cost</li> <li>• site constraints</li> <li>• available resources</li> <li>• risk assessment of: <ul style="list-style-type: none"> <li>• the existing conditions</li> <li>• the application of the design</li> <li>• maintainability of the completed works</li> </ul> </li> </ul>
<p><b>Detailed design</b> may include:</p>	<ul style="list-style-type: none"> <li>• calculations, including: <ul style="list-style-type: none"> <li>• loads</li> <li>• shear forces</li> <li>• bending moments</li> <li>• stresses</li> <li>• construction materials and services quantities</li> <li>• construction cost estimates</li> </ul> </li> <li>• recommended sizing of components</li> <li>• recommended concrete strength</li> <li>• recommended reinforcement sizing and location</li> <li>• drawings</li> <li>• risk assessment of: <ul style="list-style-type: none"> <li>• the existing conditions</li> <li>• the application of the design</li> <li>• maintainability of the completed works</li> </ul> </li> <li>• health, safety and environmental requirements</li> <li>• contribution to ancillary documentation, which may include: <ul style="list-style-type: none"> <li>• design notes</li> <li>• construction notes</li> <li>• supplementary drawings</li> </ul> </li> </ul>

	<ul style="list-style-type: none"><li>• input to the specifications</li></ul>
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## **Unit Sector(s)**

Civil Works Design

## **Competency field**

Refer to Unit Sector(s).

## **Co-requisite units**

Not applicable.