Guide to Best Practice for Safer Construction: Principles

ENGINEERS AUSTRALIA

CRC Construction Innovation
BUILDING OUR FUTURE

Guide to Best Practice for Safer Construction: Principles

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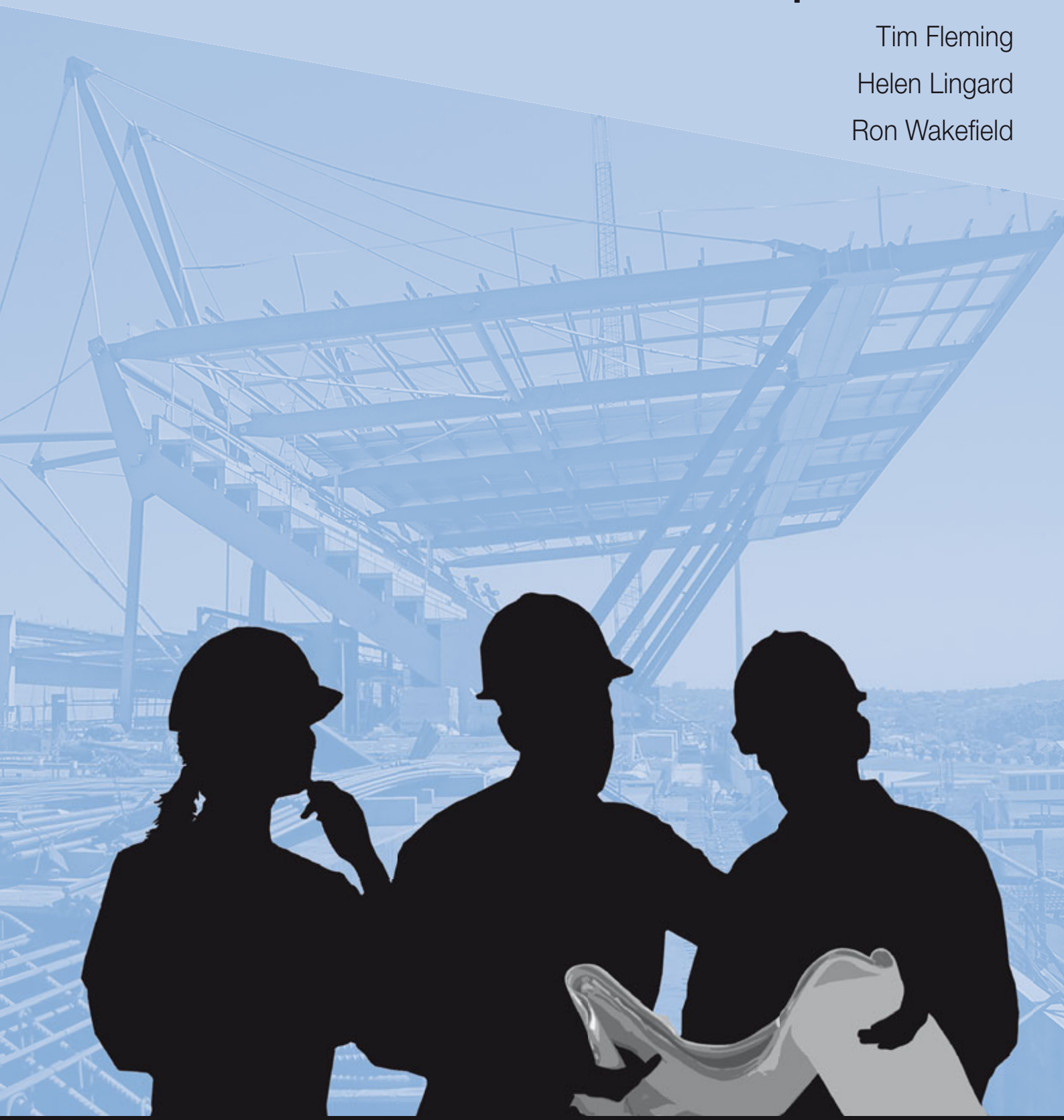

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DISCLAIMER

The major industry associations representing clients, constructors and designers support this aspirational guide. These associations recognise that many best practices suggested by The Guide exceed OHS legal obligations. Support for The Guide does not infer support for incorporation of suggested best practices in OHS legislation, which should continue to be based on minimum standards.

The best practices outlined in this guide are proposed to improve safety outcomes, but the value of the suggested methodologies, including the examples provided, is not proven. Therefore, support by these associations is not an endorsement of any part of this guide as an accepted standard by which the professional behaviour of individual practitioners may be judged.

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Foreword

I became truly conscious of the vital importance of safety in construction at the signing of the John Holland Group's first contract with the Snowy Mountains Authority – then under the leadership of the great Australian engineer, Sir William Hudson. The year was 1964.

In the early days, due to rock falls and the steep slopes of the surrounding terrain, the safety record of the Snowy Mountains Authority was anything but favourable, and I recall with clarity the most impressive attitude of the Authority in implementing measures to improve construction safety performance in the field.

Indeed, so concerned was Sir William to redress the situation, and to create a greater awareness of this national problem, that every Monday morning he convened and chaired a meeting of all Project Managers, at which all the Authority's projects safety performances and statistics for the previous week would be discussed. This action was remarkably effective and produced outstanding results, out of which many new safety initiatives were born.

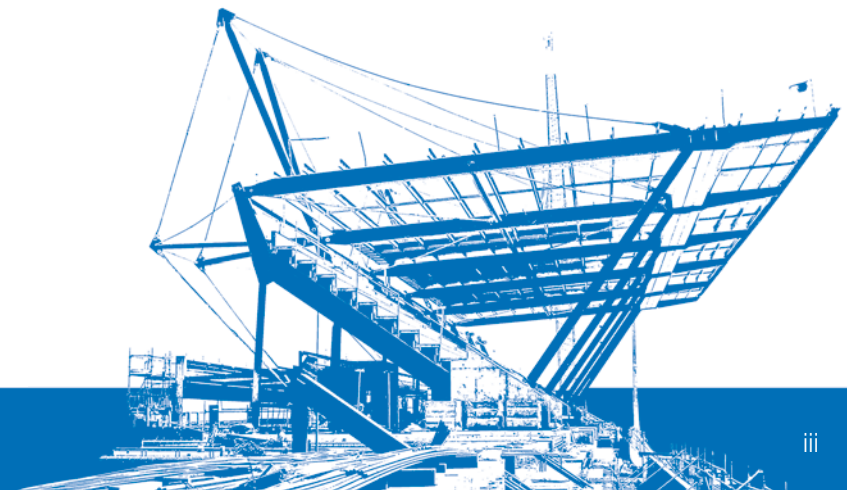
I remember Sir William's words to me just after the signing of our contract – not a large one in terms of the Snowy Mountains scheme as a whole: "If the company performs well and safely – it will be well looked after. You have a great responsibility to your staff and the rest of the workforce to ensure best practices are observed."

Sir William Hudson's enthusiasm and actions on this aspect of construction were inspiring, and had a most desirable influence on me personally, and on the entire Snowy Mountains scheme. It was leadership of the highest order which achieved the result it so richly deserved.

The John Holland Group ever afterwards made safety on construction sites the number one issue. We also endeavoured to show leadership to others in the field of safety practice. It worked well.

Sir John Holland AC

Flinders, Victoria
Australia
7 August 2007



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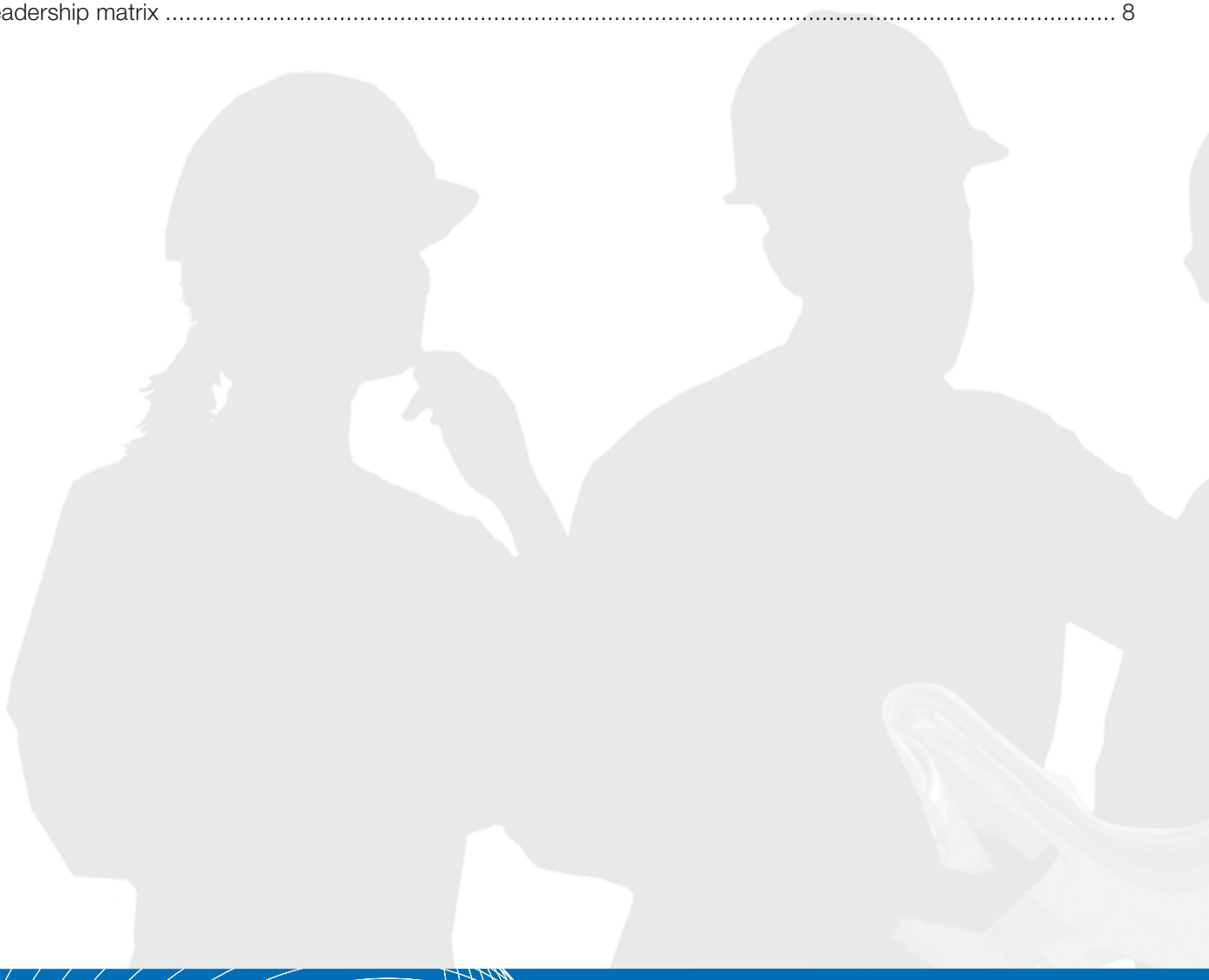


Preface

The Cooperative Research Centre (CRC) for *Construction Innovation* is committed to leading the Australian property, design, construction and facility management industry in collaboration and innovation. Our CRC works with business and government to improve productivity through innovation and best practice programs. We have created an unprecedented alliance of industry, government and researchers who are committed to saving lives and preventing injuries on Australia's construction sites.

The Federal Safety Commissioner commends the building and construction industry's commitment to safety as reflected through the development of this Guide to Best Practice and encourages those within the industry to use the document as a guide and a useful tool for improving occupational health and safety.

The *Guide to Best Practice for Safer Construction* has been developed following a detailed review of Australian and international best practice initiatives.

The Guide suggests a framework to improve safety performance on construction projects and covers all stages of a project: planning, design, construction and post-construction. Its overarching objective is to reduce the number of accidents and deaths on construction sites and to improve the ability of the industry as a whole to deliver safer construction projects and healthier employees.

The three primary stakeholder groups of the construction industry – clients, designers and constructors – have worked together to create a methodology which integrates occupational health and safety into strategic and operational decision-making at all stages of the project.

The Guide is the culmination of over two years' work on one of our key research and implementation projects, *Safer Construction* – industry-led by Tim Fleming, Operations Safety Manager, NSW/ACT Region, John Holland Group, with a team comprising Verena Marshall and Kerry Pedigo (Curtin University of Technology), Greg Fraser (WA Department of Housing and Works), Kerry Brown, Michael Charles, Janet Pillay, Neal Ryan and Rachel Ryan (QUT), and Nick Blismas, Helen Lingard and Ron Wakefield (RMIT).

The *Guide to Best Practice for Safer Construction* was instigated by Engineers Australia, who established the Engineers Australia Taskforce for Construction Safety, chaired by Bill Wild, Chief Operating Officer, Leighton Holdings. The Taskforce comprised industry representatives from all sectors of the construction industry – clients, designers and constructors. Thanks go to Paul Dougas (Association of Consulting Engineers Australia), Murray Coleman and Tom McFadyen (Australian Constructors Association), Jane Montgomery-Hribar (Australian Procurement and Construction Council), Peter Scuderi (CRC for *Construction Innovation),* Peter Godfrey (Engineers Australia), Stephen Sasse (John Holland Group), Richard Calver (Master Builders Australia), Marton Marosszeky (National Committee for Construction Engineering), Wayne Artuso – observer (Office of the Federal Safety Commissioner), Peter Verwer (Property Council of Australia), and Bill Barlow (The Royal Australian Institute of Architects).

The Guide is intended to be an aspirational document that leads discussion and industry change, as well as a practical tool which can be used across the industry by clients, designers and constructors and by large firms and small and medium-sized enterprises.

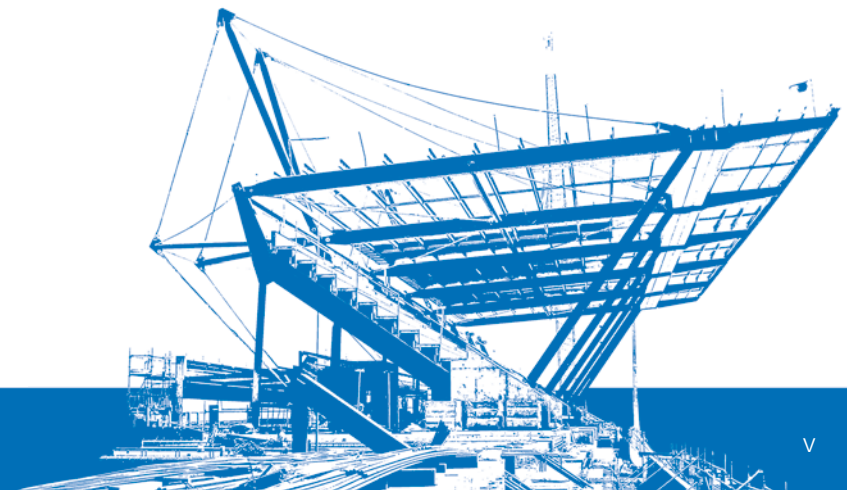
We look forward to continuing our work with you to improve safety on construction sites, and enhance the future of the Australian construction industry.

John McCarthy

Chair
CRC for *Construction Innovation*

Dr Keith Hampson

Chief Executive Officer
CRC for *Construction Innovation*



Preamble

I am delighted to present the *Guide to Best Practice for Safer Construction*.

Safety performance in the construction industry is a challenge to all of us who work in the industry. The rate of injury and death is unacceptably high, and significant improvement has been elusive. It is distressing that this is particularly so in terms of the number and frequency of fatalities.

The fact is that in spite of considerable effort by, and even successes in, some sections of the industry, the Australian construction industry's performance overall is a long way short of best practice.

It has become increasingly clear that sustained safety improvements will not be achieved without significant cultural and behavioural change in how the whole industry manages safety.

It has been the view of many that such change will not be achieved by heavy handed legislation, but rather that it requires the active cooperation of all sectors of the industry. It is no coincidence that the best performances of the industry have been achieved where there is a high degree of leadership and commitment shown by each of the main participants: the clients, the designers and the constructors.

Engineers Australia recognised that engineers play a substantial role in the industry and that, uniquely, engineers are prominent in the firms that comprise those main participants in the construction process – the clients, the designers and the constructors.

The Engineers Australia Taskforce for Construction Safety was established and embarked on its Safer Construction Project with a determination to make a real difference. I believe that the *Guide to Best Practice for Safer Construction* will do just that.

I offer my congratulations and thanks to everyone involved in the development of The Guide. In particular I would like to thank the CRC for *Construction Innovation* for its research leadership and for its role in funding and managing the development of The Guide. I also thank the other participating member organisations and those who provided additional financial support.

I hope and trust that The Guide will be embraced by the whole industry as a useful and practical tool that will help drive the much needed improvement to our safety performance.

Bill Wild

Chair
Engineers Australia Taskforce for Construction Safety

Acknowledgments

The *Safer Construction Project* was commissioned by Engineers Australia. The CRC for *Construction Innovation* provided the industry research leadership and coordinated the development and funding of the *Guide to Best Practice for Safer Construction* and associated kit materials.

The major funding for the project was provided by the CRC.

The *Safer Construction* project team members are:

Project leader: Tim Fleming – Operations Safety Manager, NSW/ACT Region, John Holland Group

Greg Fraser – Western Australian Department of Housing and Works

Nick Blismas, Helen Lingard and Ron Wakefield – RMIT

Kerry Brown, Michael Charles, Janet Pillay, Neal Ryan and Rachel Ryan – QUT

Verena Marshall and Kerry Pedigo – Curtin University of Technology

Engineers Australia Taskforce for Construction Safety

Chair: Bill Wild – Chief Operating Officer, Leighton Holdings

Bill Barlow – The Royal Australian Institute of Architects

Richard Calver – Master Builders Australia

Murray Coleman and Tom McFadyen – Australian Constructors Association

Paul Dougas – Association of Consulting Engineers Australia

Peter Godfrey – Engineers Australia

Marton Marosszeky – National Committee for Construction Engineering

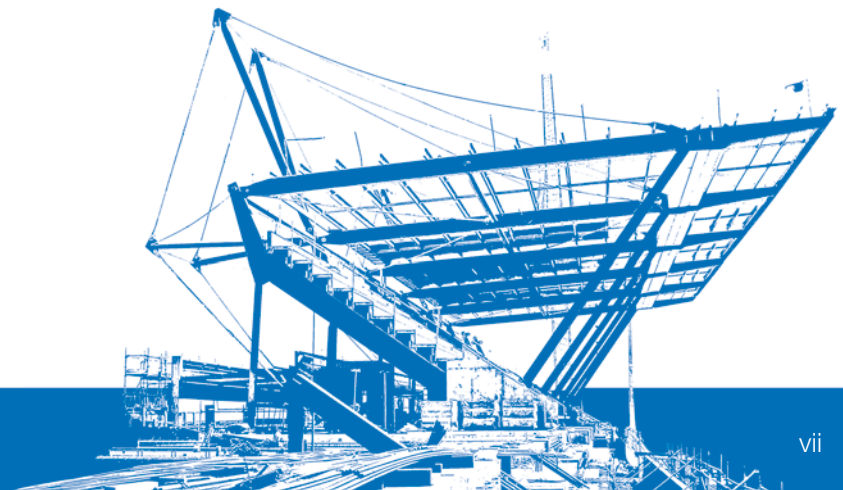
Jane Montgomery-Hribar – Australian Procurement and Construction Council

Stephen Sasse – John Holland Group

Peter Scuderi – CRC for *Construction Innovation*

Peter Verwer – Property Council of Australia

Wayne Artuso – Office of the Federal Safety Commissioner (observer)



The following project partners undertook the research, industry consultation and developed the content provided in the *Guide to Best Practice for Safer Construction*:

The project partners

Industry

John Holland

Bovis Lend Lease

Government

Department of Housing and Works

Research

Curtin University of Technology

QUT

RMIT UNIVERSITY

Vital to the success of this project has been the involvement and consultation with the major industry stakeholders:

Australian Constructors Association

Property Council of Australia

The Royal Australian Institute of Architects

ACEA Association of Consulting Engineers Australia

Australian Procurement and Construction Council

Australian Government
Department of Employment and Workplace Relations
Office of the Federal Safety Commissioner

Master Builders Australia also provided valuable input to this project.

The *Safer Construction* project participants would like to thank and acknowledge Mel Kettle (Mel Kettle Consulting) and Colleen Foelz (Communication and publications, CRC for *Construction Innovation*) for their highly professional management of the communication and publication elements of this project.

Glossary

A **client** is a person or organisation who commissions the design and construction of a construction project.* It includes any agent appointed to manage the works on behalf of the client.

Construction, for the purposes of this document, covers all work carried out on a work site. It includes:

- the construction, alteration, extension, restoration, repair, demolition or dismantling of buildings, facilities/structures or works that form, or are to form, part of land, whether or not the buildings, facilities/structures or works are permanent
- the construction, alteration, extension, restoration, repair, demolition or dismantling of railways (not including rolling stock) or docks
- the installation in any building, facility/structure or works of fittings forming, or to form, part of land, including heating, lighting, airconditioning, ventilation, power supply, drainage, sanitation, water supply, fire protection, security and communications systems
- any operation that is part of, preparatory to, or for rendering complete, work covered by the activities above, for example —
  - site clearance, earthmoving, excavation, tunnelling and boring
  - the laying of foundations
  - the erection, maintenance or dismantling of scaffolding
  - the prefabrication of made-to-order components to form part of any building, facility/structure or works, whether carried out on-site or off-site
  - site restoration, landscaping and the provision of roadways and other access works.

A **construction project** is a project involving construction work, and includes design, preparation and planning.*

A **constructor** is a person or organisation who is responsible to a client for controlling the work of construction.

Design, in relation to any facility/structure, means any drawing, design detail, scope of works document or specification relating to the facility/structure.*

A **designer** is a person or organisation whose profession, trade or business involves them in:

- preparing designs for facilities/structures, including variations or changes to a facility/structure

or

- arranging for people under their control to prepare designs for facilities/structures.*

A **facility/structure** is any building, steel or reinforced concrete construction, railway line or siding, tramway line, dock, ship, submarine, harbour, inland navigation channel, tunnel, shaft, bridge, viaduct, waterworks, reservoir, pipe or pipeline (whatever it contains or is intended to contain), structural cable, aqueduct, sewer, sewerage works, gasholder, road, airfield, sea defence works, river works, drainage works, earthworks, constructed lagoon, dam, wall, mast, tower, pylon, underground tank, earth-retaining construction, fixed plant, construction designed to preserve or alter any natural feature, and any other similar construction.*

A **hazard** is any thing or situation with the potential to cause harm to people.

The **project risk register** is a repository for project risk information.

The **project safety charter** is a document publicly and explicitly stating the commitment of the client to achieving the highest level of safety performance in the project.

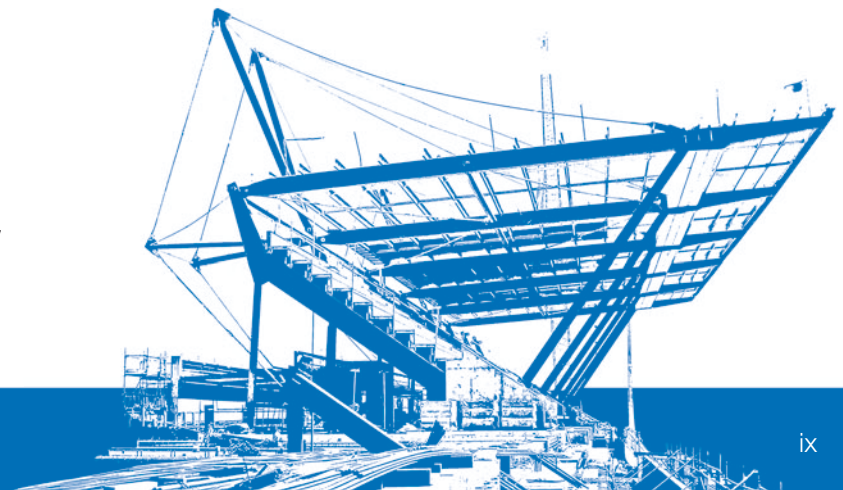
The **project safety master plan** is a plan developed in the planning stage of the project, outlining the overarching safety goals and objectives of the project, establishing performance criteria against which the attainment of these goals and objectives will be evaluated, and outlining ways in which these safety goals and objectives will be met.

Residual risk is the outstanding risk remaining after a risk control measure has been implemented.

Risk, in relation to any potential injury or harm, is the likelihood and consequence of that injury or harm occurring.

Risk control measure is an action recommended or taken to either eliminate or reduce the risk of death, injury, illness or other harm.

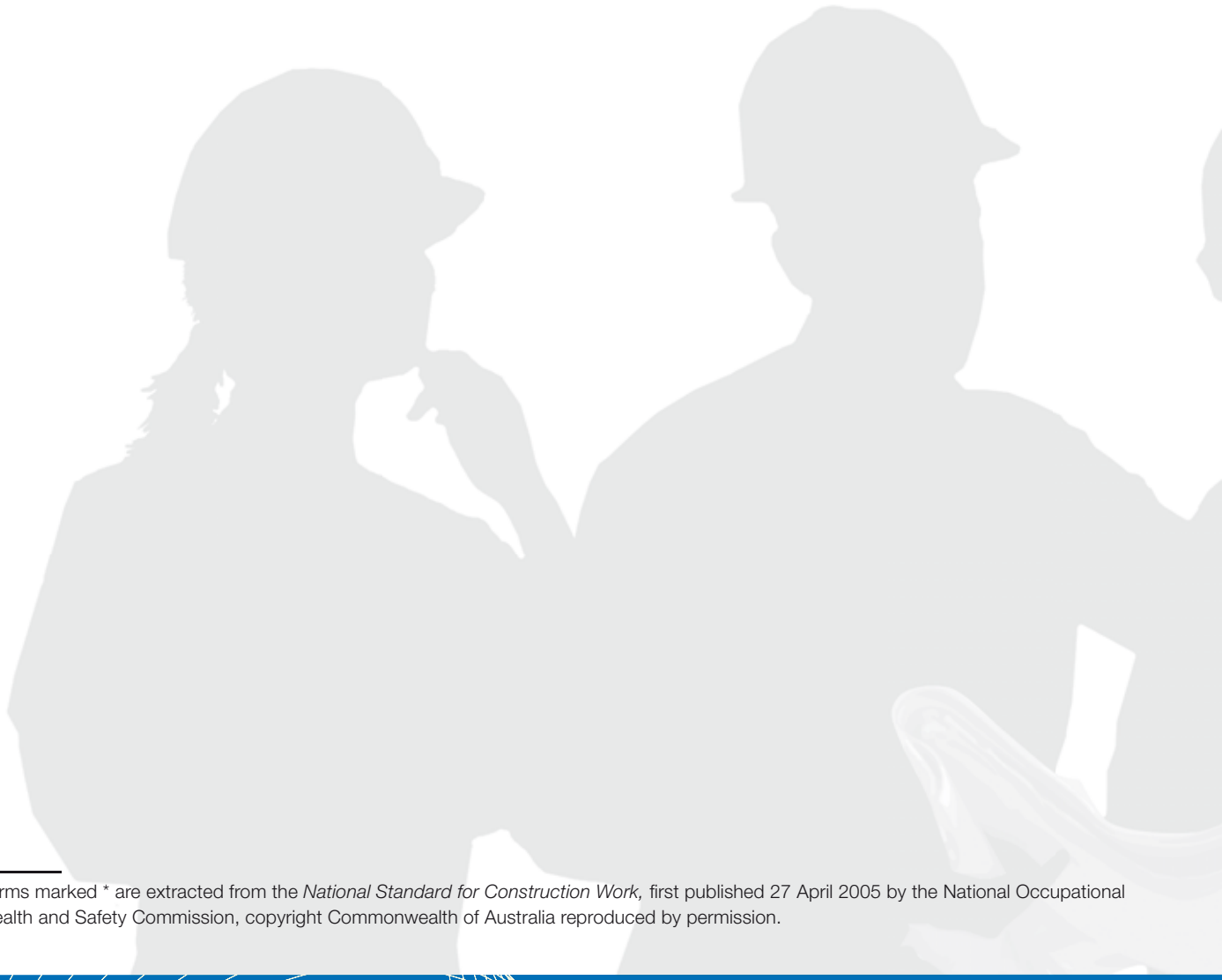
A **safety champion** is a person who will lead the safety effort from the outset of the project.



Stage review is a gateway separating project stages that reviews preceding tasks to ensure that they have been satisfactorily undertaken before moving on to the next stage.

A **subcontractor** is a person or organisation engaged by the constructor to undertake services necessary for the performance of a construction contract.

A **supplier** is a person or organisation engaged by the constructor to supply plant, equipment or materials necessary for the performance of a construction contract.



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Introduction

Scope

The *Guide to Best Practice for Safer Construction* is intended to suggest 'best practice' in the management of safety on construction sites. It is a 'guide' and is not intended to replace or supersede any mandatory state, territory or Commonwealth law, or an instrument made under such a law, relating to construction safety. Rather, it is an aspirational document to guide the building and construction industry towards best practices to improve safety performance.

Project stakeholders should therefore refer to the occupational health and safety legislation relevant to the jurisdiction in which they are conducting construction work for information on mandatory requirements.

The Guide aims to improve safety during construction work as defined in the Glossary. It does not include best practice for managing safety during the post-occupancy operation, use, maintenance or cleaning of a facility/structure.

Clearly, all projects are unique and project stakeholders should determine the appropriateness and degree of applicability of the suggested tasks and procedures to their particular project, commensurate to the risk profile of that project. It is not envisaged that the methodologies, tasks and procedures suggested in this guide would be applicable to individually constructed domestic dwellings or domestic renovations.

The term 'safety' throughout The Guide is intended to include occupational health. The responsibilities apply to the reduction of risk of work-related illness, as well as to injury reduction.

The Guide does not specify all requirements that need to be satisfied to safely perform construction work, which are addressed in legislation, regulations, codes of practice, guidance notes and standards. The Guide intends to articulate management actions for key stakeholders in a project, and provide the framework for an appropriate allocation of responsibility for safety in construction projects.

Reasonably practicable

An obligation to comply with a provision of The Guide is an obligation to comply as far as is reasonably practicable. When determining what is reasonably practicable, the following factors should be considered:

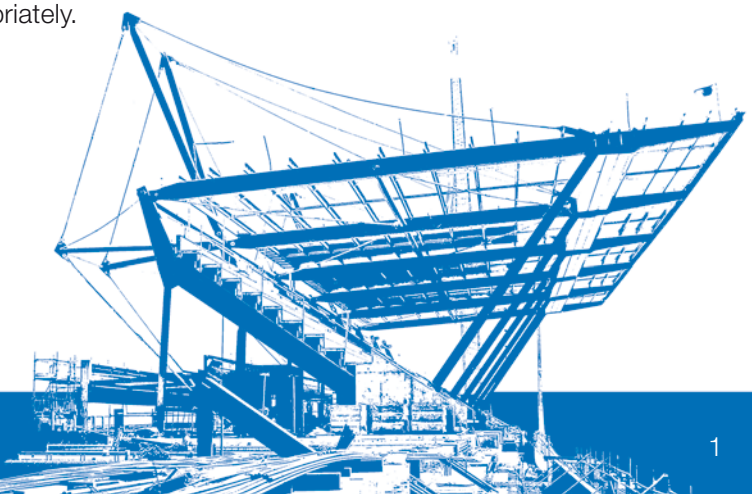
- the likelihood of the hazard or risk concerned eventuating
- the degree of harm that would result if the hazard or risk eventuated
- what the person concerned knows, or ought reasonably to know, about the hazard or risk, and any ways of eliminating or reducing the hazard or risk
- the availability and suitability of ways to eliminate or reduce the hazard or risk.

Project stakeholders

The major stakeholders in any project are the client, the designer and the constructor. However, these stakeholders may appoint agents or representatives to act on their behalf through any stage of the life of the project. For example, a client may appoint a specialist project manager to undertake the planning of a project on its behalf, and a constructor may appoint subcontractors to carry out specialist tasks during construction. Likewise, a designer may appoint organisations or individuals to undertake specialist tasks such as geotechnical design, building services and traffic management. Where The Guide refers to one of the project stakeholders, it is intended that all agents and subcontractors of that stakeholder should also be included.

Project delivery methods

The Guide refers to the three project delivery models of 'traditional' (where design and construction are separate), 'design and construct' (where both functions are the responsibility of one entity) and 'collaborative' (where the client forms an alliance with others to plan, design and construct a facility/structure). These cover all the processes necessary to plan, design and construct a facility/structure through financing arrangements such as BOT, BOOT and public–private partnerships. The Guide is based on the traditional model, but it can also be applied to design and construct and collaborative models by combining management actions appropriately.



Participants' control

For each project, consideration needs to be given to the degree of control that the various participants have. This may be determined by an examination of all the circumstances of the project, including the contractual relationships between the parties, or by the initial brief. The party with control of a construction project is usually the person appointed by the client to manage or undertake the project, and is usually defined as the principal contractor, head contractor, builder or constructor. Various participants may have control over different aspects of a project, and these may overlap.

The role of the designer

The designer's role in safety management of a project usually does not extend beyond the design process itself — except to review any design changes proposed by the constructor.

The designer's primary design consideration and expertise is the safety of the facility/structure for its intended use once constructed. The designer does not normally specify 'how' a facility/structure will be constructed. However, the designer can also contribute to the safety of the construction activity arising from the design decisions that are made. In some states, this is a legal requirement.

Not all design functions relating to site safety are undertaken by the designer of the facility/structure. There are other design activities that relate to construction safety, such as the design of the construction site layout and access, the design of temporary protection scaffolding, or the planning of work processes. These design functions are almost never carried out by the designer of the facility/structure, and are usually undertaken by the constructor or its agents.

Often the designer of the facility/structure is also appointed by the client to provide other services during the construction phase, such as the administration of the construction contract. In this regard, the designer is acting as an agent of the client, rather than as the designer. The Guide reflects this role in the construction stage by referring to the designer's involvement as 'the client's agent, if so engaged'.

When the client also appoints the designer as an agent to administer a traditional construction contract, The Guide defines the advisory role of the designer in project safety initiatives, using the designer's professional expertise and experience, during the construction and post-construction stages.[1] These activities as the client's agent include participation in the project safety leadership team and project safety meetings, management walks, stage reviews and post-project reviews. The aim is to provide the best possible resources to manage safety during the most critical stage of a project — the construction stage. The designer can make a valuable contribution at this stage, not only by the provision of additional professional expertise, but also by offering the constructor a more detached, independent review of safety initiatives.[2]

However, the role to be played by the designer will have to be determined by the client and clearly articulated in the contractual arrangements with the designer.[3] The Guide is predicated on the basis that the designer will have an ongoing role as the client's agent during the construction and post-construction stages. If the client chooses not to engage the designer to carry out the continuous role set out in The Guide, then the references to the designer in that role should be ignored.

Maintenance

The Guide deals with safety management up to the post-construction stage of a project, when the facility/structure is handed over to the client. The Guide does not attempt to deal with operability and maintenance issues; however, a number of the suggested actions may also involve downstream operation and maintenance considerations.

1 This does not apply for design and construct contracts where the designer is normally employed by the constructor, or in collaborative contracts where the designer is an integral partner in the project, with a continuous role in contributing to safety management over the life of the project.

2 The designer's role in the construction and post-construction stage of a traditional project delivery model is an advisory role only, and does not negate in any way the constructor's responsibility to provide a safe workplace and environment in accordance with the relevant laws of the jurisdiction in which the facility/structure is being built.

3 Clients need to be aware that they cannot contract out of their legal OHS obligations.

Guide to Best Practice for Safer Construction: Principles

Construction is Australia's third most dangerous industry, with an average of 49 workers killed at work each year since 1998. In 2002–03, the incidence of workplace fatalities in the Australian construction industry was nearly three times higher than the national average for all industries. It is clear that there is still significant room for improvement in this aspect of Australia's construction industry.

The Guide provides a framework for improving safety on construction projects. It covers all stages of a project — from planning and design, through construction, to post-construction (i.e. commissioning). Safety best practices are identified within each stage.

Creating a robust safety culture

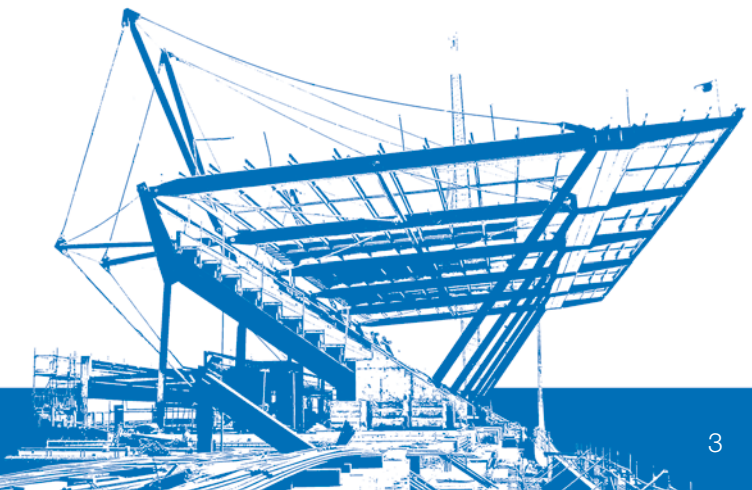
There is an obligation on all providers of goods or services — whether businesses or individuals — to exercise due diligence and act with a certain standard of care. The construction industry has an obligation to provide safety for subcontractors, suppliers, the public and the operators of the completed facility/structure. Establishing and applying effective safety management programs and systems will assist in fulfilling this obligation. Whether a business is a construction client, designer or constructor, consistent and effective operation of safety management systems throughout the business is assisted by a strong safety culture among senior management and board members overseeing its operations.

Safer construction practices are driven by the overarching aim of creating a strong safety culture among all project stakeholders. They demonstrate to stakeholders the importance of safety as an integral part of project management, and that safety objectives are considered alongside other project objectives such as quality, cost and program. They also demonstrate the importance of collaboration and teamwork between all stakeholders. In the past, traditional safety efforts focused on technical and engineering aspects, but this guide suggests that a strong and positive safety culture is essential to the improvement of safety in the construction industry.

What is a project safety culture? A project safety culture describes a shared set of organisational values, assumptions and beliefs. It is characterised by high levels of communication, confidence and trust between the project stakeholders. One threat to the development of positive safety cultures is a lack of inter- and intra-organisational understanding of the importance of safety. It is critical that senior managers of all project participants actively demonstrate their commitment to safety through participation in their own organisation's safety management processes and the allocation of safety responsibilities from senior management to the work face level.

A major aim of The Guide is to encourage project stakeholders (i.e. client, designer and constructor) to work collaboratively and continuously throughout the project to achieve the highest possible standards of project safety management. The designer and constructor should be engaged as early as possible so that they can provide their inputs into the project safety master plan. They, in turn, should include their subcontractors and suppliers as early as possible in planning for safety. Within projects, clients should drive strong and positive safety cultures through their procurement processes. All efforts should be made to ensure that the major stakeholders work constructively to allocate responsibility for safety appropriately, and to integrate safety considerations into all project decision-making. Case studies researched during the preparation of The Guide indicate that, in those cases where safety best practice was identified, a high level of integration and participation was a key factor in improving safety outcomes.

Project safety should not be a 'blame game'. An incident that could have been avoided on a construction site reflects poorly on all project stakeholders, and it is important that a just and fair allocation of responsibility for eliminating or reducing safety risks exists within construction project teams.



The principles of a safety culture

The framework for The Guide suggests six best practice principles for creating a strong safety culture.[1] These principles are intended to operate at an industry level as broad values for adoption at both corporate and project levels.

The best practice principles are:

Principle 1: Demonstrate safety leadership

Principle 2: Promote design for safety

Principle 3: Communicate safety information

Principle 4: Manage safety risks

Principle 5: Continuously improve safety performance

Principle 6: Entrench safety practices.

Each of these principles is described below.

Principle 1: Demonstrate safety leadership

Safety leadership involves communicating the importance of safety in all interactions with subordinates, subcontractors, suppliers and other project stakeholders throughout all processes within the life of the construction project.

In any construction project there are many competing objectives, such as quality, cost, time and production. The various stakeholders also have their own objectives. In the context of these pressures, safety messages can become mixed, and organisations do not always do what they commit to in formal policy statements and safety plans.

For this reason, it is critical that strong safety leadership is demonstrated from top management down to front-line supervisors. Safety should be enshrined in corporate goals, with strategic objectives and plans for achievement as for other corporate directions.

There is a strong behavioural component to safety leadership. It is important that senior managers, such as chief executive officers, managing directors and board members, lead by example and are consistent in the way they behave in relation to safety. Safety leadership is as much about what is not discussed as what is. When senior managers constantly talk about cost or production and say little about safety, this creates the impression that safety is less important than these other project goals.

Safety leadership also includes the recognition and reward of good safety management and performance, as well as the constructive correction of substandard safety management or performance. Senior managers should 'walk' construction sites and collaborate with site project managers and workforce members alike, to reinforce the corporate commitment to safety and to ensure that all resources are provided to support safety best practices.

Within the construction supply chain, safety leadership should also be demonstrated. Clients should demonstrate leadership through establishing clear safety objectives for the projects they procure, and by appointing safety champions for the project. Prime contractors should also establish safety leadership in the way that they manage subcontractors and suppliers.

[1] These principles were adapted from, and are consistent with, the Federal Safety Commissioner's Safety Principles and Guidance released in September 2006.

Principle 2: Promote design for safety

Effective safety management at the design stage can minimise risks to the health and safety of people who subsequently construct, occupy and maintain a facility/structure.

Consequently, the client should ensure that a designer is engaged who has a demonstrated understanding and awareness of safety risk management or other suitable credentials of safety in design, appropriate to the risks of the project. Often during the design stage, a number of organisations or individuals contribute to the final design, with their contributions being coordinated by a prime design manager — usually a principal designer acting for the client (the designer), or the client itself. In such cases, all organisations and individuals should participate in appropriate risk assessments and safety management decisions appropriate to their sphere of control.

Comprehensive and systematic design safety reviews should be conducted at appropriate intervals during the design process. These reviews should be based on appropriate risk management methods. Design safety reviews should be collaborative in nature where possible. Safety risks arising as a result of the design should be eliminated wherever possible or practicable. Where elimination is not possible, efforts to reduce safety risk through design modification should be made.

Residual risk, i.e. the identified risks remaining following the design safety risk management process, should be documented and clearly communicated to relevant stakeholders — including the client, the constructor, and the owner/occupier — where they would not, or may not, be readily apparent to 'downstream' stakeholders in their own risk assessment.

Principle 3: Communicate safety information

Communication and consultation are essential to the management of safety. Within construction projects, safety information should be exchanged between the different stakeholders.

Open and honest dialogue regarding safety issues between the client, the designer and the constructor (including subcontractors) should be maintained throughout the life of the project. This may be verbal or non-verbal, formal or informal.

It is very important that safety communication and consultation start as early as possible in the project. Wherever possible, potential constructors should be consulted during the planning and design stages, and given the opportunity to comment on project definition and design.

Throughout construction, safety risk information should be communicated to relevant stakeholders, including (but not limited to) subcontractors, suppliers, workers, trade unions, regulators and members of the public. Within stakeholder organisations, safety expectations and procedures should be clearly communicated to the workforce.

It is also vital that bottom-up communication of safety issues occurs. Consultative processes should be established to enable timely worker participation in the making of decisions that impact on safety. The views of people engaged to perform construction work in relation

to a project, or their representatives, must be properly considered.

A project safety communication strategy should be formalised and documented as a critical component of the project safety master plan.

Principle 4: Manage safety risks

The systematic management of safety risks through the elimination or reduction of risks is a requisite for improved safety performance within the construction industry.

At all stages in the project process decisions should be made on the basis of careful consideration of the safety implications of available options. Decisions made about project options, design of the permanent facility/ structure, design of the construction process, choice of plant, equipment, materials and construction methods, and project organisational arrangements should be made following an assessment of safety risks, using an appropriate and recognised risk assessment method.

Wherever possible, safety risks should be eliminated through design or engineering solutions to create a safe workplace. Where workplace risks cannot be physically removed, they should be reduced as far as possible or practicable. It is always better to make the workplace safer than rely on behavioural controls, because people are fallible and will always make mistakes.

When a risk cannot be eliminated, risk control measures must be considered in the following order:

- substitute the hazard giving rise to the risk with a 'less risky' hazard
- isolate the hazard from people whose safety could be at risk
- minimise the risk by engineering
- apply administrative measures, e.g. the adoption of safe systems of work
- use personal protective equipment.

Even when a work site has been made as safe as possible, there is an opportunity to reduce the likelihood of incidents further by ensuring that safe work procedures are understood by everyone and consistently followed. Providing people with equipment that is fit for purpose, and ensuring that they possess the knowledge, skills and abilities they need to work safely, are critical aspects of good safety management.

Safety risk information relating to the project should be recorded and made available to those who must manage or work with a risk, in accordance with the project safety communication strategy. All project decision-making that could have an impact upon safety risk should involve input from those parties that could be affected by that risk.

Principle 5: Continuously improve safety performance

Safety management should strive for continuous improvement by regularly reviewing safety performance, seeking feedback from project stakeholders, and using the lessons learned to improve performance and to share and promote best practices in the construction industry.

In order for the industry to maintain sustained improvement in safety, clear targets and appropriate key performance indicators (KPIs) should be established for safety at an industry, organisation and project level, and safety performance must be rigorously monitored and measured.

This measurement should incorporate traditional 'lagging', as well as proactive 'leading' indicators of safety performance. The continuous improvement of safety also requires industry-wide collaboration in the form of benchmarking and information sharing.

Regular reviews of safety management performance should be undertaken through all stages of the project life cycle. These should be conducted collaboratively between all project stakeholders, including subcontractors.

On completion of construction projects, a post-project review of safety performance and processes of clients, designers and constructors should be undertaken. This review should also evaluate the extent to which these parties have worked cooperatively to ensure safety in the project. Lessons from these post-project safety reviews should be captured and shared within and between organisations in the industry.

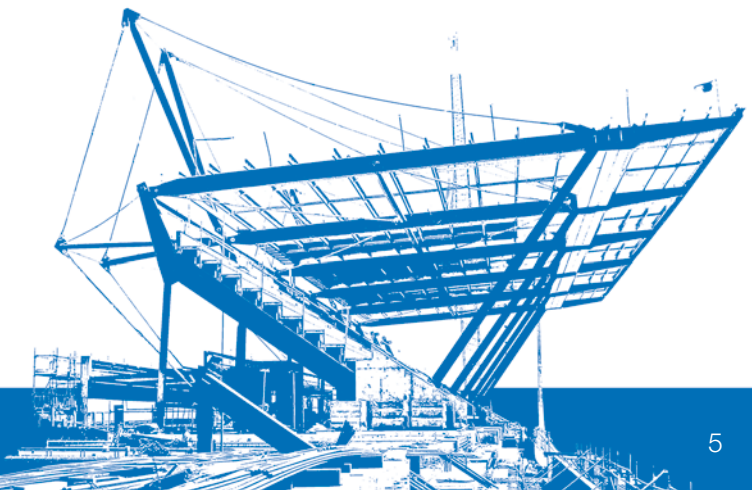
Principle 6: Entrench safety practices

Through the diligent application of the preceding principles, best safety practices should be entrenched as an integral part of an industry-wide safety culture.

The vast majority of firms operating in the construction industry are small to medium-sized enterprises (SMEs). It is essential that larger construction organisations work to disseminate safety knowledge and best practice among the SMEs with whom they do business.

This dissemination can be facilitated by the establishment of clear safety requirements in the selection of SME subcontractors or suppliers, and the inclusion of safety requirements in subcontracts. Construction organisations can also support the development of safety capability in SME firms through the establishment of long-term relationships with subcontractors and suppliers (perhaps through preferred provider schemes), and the implementation of safety mentoring schemes for SME subcontractors and suppliers.

Construction organisations should also require SME subcontractors to participate fully in project safety management programs, including safety planning, training, monitoring and reporting.



How to use The Guide

In addition to the best practice principles, the key parts to The Guide are the:

- Implementation table: Creating a strong safety culture (page 7)
- Example leadership matrix (page 9)
- Safety best practices (published as a separate document in this kit, full title *Guide to Best Practice for Safer Construction: Tasks*).

These are described below.

Implementation table: Creating a strong safety culture

This section identifies how the six best practice principles previously described are applied through the four stages of a project's life cycle — planning, design, construction and post-construction. The principles are shown in descending order down the page, while the project stages are shown across the page. Within each principle and at each stage of the project, best practice tasks are identified. They are numbered according to the project stage.

Although stages 1–4 imply a time-scale across the page, in reality, tasks may overlap, depending on the project delivery method.

Project stages are separated by stage reviews. The purpose of these stage reviews is to ensure that all tasks have been completed prior to moving to the next project stage. In this way, stage reviews act as 'gateways' in the project process. Before progressing to the next stage of the project, each of the participants can check whether all safety practices from the preceding stage have been completed. Stage reviews also provide an opportunity for project participants to reflect on the safety processes and outcomes of the preceding stage, and feed safety information forward for use in subsequent stages of the project.

During a stage review, safety information arising in one project stage should be collated and communicated to parties involved in subsequent stages of the project to ensure that they are fully informed about project safety matters. It is also an opportunity for the project safety leadership team to ensure that any new stakeholders (such as suppliers, subcontractors and technical service providers) joining in the succeeding stages are identified, fully informed and incorporated into the collaborative project safety processes.

Stage reviews are intended to be collaborative, providing an opportunity for the client, designer and constructor to reflect on their own safety practices and those of other parties to the project, share information about safety initiatives or identified risks, and resolve any safety issues that might become apparent in the course of the stage review.

Participation in stage reviews will depend, in part, on the project delivery method selected by the client. In a traditional delivery method, only the client and the designer would participate in the first stage review, because the constructor would not yet have been appointed. However, in a collaborative delivery method, such as an alliance, the client, designer and constructor would all participate in every stage review.

Example leadership matrix

The Example leadership matrix identifies the leadership responsibilities of project stakeholders — the client, the designer and the constructor — in relation to best practice tasks identified in the Implementation table on page 7. The Example leadership matrix shows the possible roles of the three principal stakeholders in a project for each of the following project delivery models:

- **traditional** — where the client undertakes the planning and engages a designer to carry out the design and a constructor to build the facility/structure
- **design and construct** — where the client undertakes the planning and engages a constructor to both design and build the facility/structure. The constructor may separately engage a designer or may use in-house resources
- **collaborative** — where the client forms an alliance with the designer and the constructor to plan, design and build the facility/structure.

The degrees of responsibility are shown for each major stakeholder as an example, but these will need to be considered and defined for each project to suit its own situation.

Safety best practices

Safety best practices are described for each stage of a project, and are grouped by the best practice principle which they serve, as a reminder of this relationship.

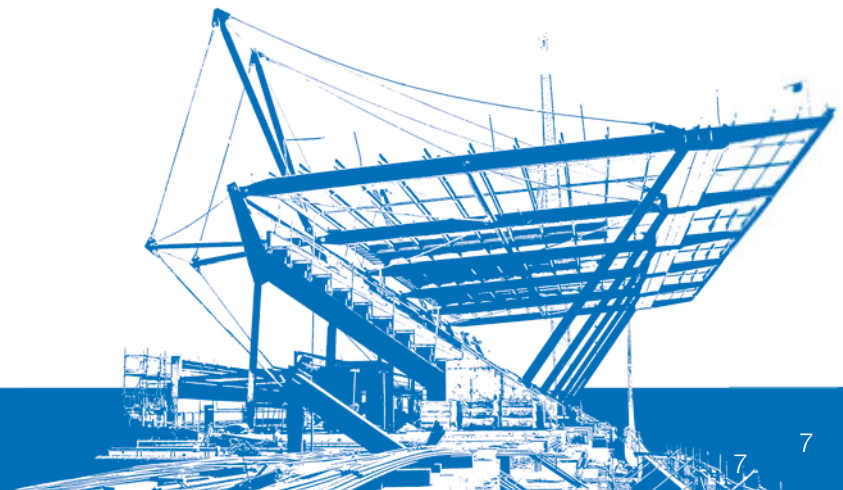
Each safety best practice task is numbered relative to its project stage, and includes a brief description of the best practice, followed by:

- **action** — the task to be carried out
- **description** — a short description of the safety best practice, an explanation of the importance of the action, and some suggested strategies for consideration
- **key benefits** — the benefits to be achieved by implementing the safety best practice
- **desirable outcomes** — the behavioural and procedural changes effected by the implementation of the safety best practice
- **performance measures** — the outputs that can be measured and recorded as evidence that the safety best practice has been carried out
- **leadership** — the stakeholder with prime responsibility for implementing the action.

Throughout The Guide, case examples are provided to illustrate implementation of safety best practices in the Australian construction industry.

For further details refer to 'Using the implementation kit' provided in the kit

Implementation table: Creating a strong safety culture



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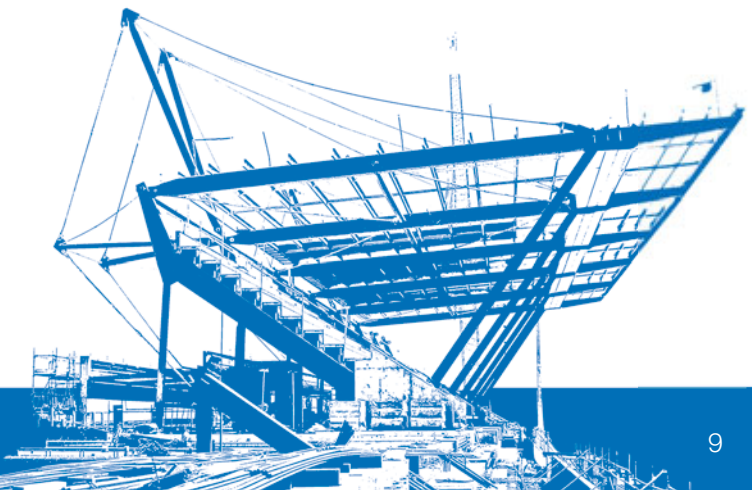
IMPLEMENTATION TABLE: Creating a strong safety culture

STAGE 1: Planning	STAGE 2: Design	STAGE 3: Construction	STAGE 4: Post-construction
Principle 1 – Demonstrate safety leadership			
1.1 Establish a project safety management framework **1.2** Identify safety champions for appointment to the project safety leadership team **1.3** Appoint a project safety leadership team **1.4** Develop project safety charter **1.5** Develop project safety master plan	**2.1** Develop design safety plan **2.2** Specify how safety is to be addressed in tenders for construction **2.3** Include safety requirements in construction contract documents **2.4** Establish assessment criteria for prospective constructors **2.5** Evaluate tenders against safety criteria **2.6** Select qualified constructor	**3.1** Develop construction safety plan **3.2** Demonstrate management commitment to safety processes at all levels **3.3** Implement senior management-led ‘safety walks’ **3.4** Conduct regular site inspections **3.5** Consultation and talking safety	**4.1** Develop a commissioning safety plan **4.2** Perform post-construction review **4.3** Evaluate project performance **4.4** Recognise and reward good safety management and leadership
Principle 2 – Promote design for safety			
1.6 Specify safety requirements in project brief **1.7** Include safe design requirements in design consultant contracts **1.8** Select qualified designer **1.9** Establish requirements for safety in design	**2.7** Conduct design reviews to eliminate/reduce risks at concept and detailed design stages **2.8** Consider constructability in design safety reviews	**3.6** Design safe construction processes **3.7** Review safety risk in design changes	**4.5** Evaluate effectiveness of design safety review **4.6** Record effective design solutions for future projects
Principle 3 – Communicate safety information			
1.10 Communicate safety commitments to prospective stakeholders **1.11** Communicate project safety risk information to relevant stakeholders	**2.9** Include safety information in design documentation **2.10** Communicate relevant project safety risk information to constructors via the project risk register	**3.8** Communicate safety risk information to relevant stakeholders **3.9** Provide regular safety performance feedback to project personnel	**4.7** Communicate safety knowledge to all project participants
Principle 4 – Manage safety risks			
1.12 Conduct risk analysis of project options **1.13** Undertake technical feasibility studies of viable options **1.14** Select preferred project option based on robust risk assessment **1.15** Record safety information in a project risk register	**2.11** Record residual safety risk information in the project risk register	**3.10** Implement systematic risk management processes **3.11** Identify and rectify safety deficiencies **3.12** Record risk information	**4.8** Conduct appropriate testing of plant/equipment prior to commissioning **4.9** Record safety information relevant to facility operation
Principle 5 – Continuously improve safety performance			
1.16 Establish key performance indicators (KPIs) for safety	**2.12** Review key performance indicators (KPIs) for safety	**3.13** Undertake regular measurement of project safety performance using leading indicators, climate surveys and lagging indicators **3.14** Regularly analyse project safety performance data	**4.10** Undertake collaborative post-project review of safety performance **4.11** Capture and record lessons learned for future projects
Principle 6 – Entrench safety practices			
1.17 Continuously develop safety capabilities **1.18** Develop long-term relationships within supply chain	**2.13** Continuously develop safety capabilities **2.14** Provide mentoring schemes for SME designers	**3.15** Continuously develop safety capabilities **3.16** Promote safety management practices within SME subcontractors **3.17** Implement safety mentoring system for SME subcontractors	**4.12** Review long-term relationships with SMEs **4.13** Future interface between prime contractors and sub-contractors

This table is adapted from a best practice model developed by the School of Property, Construction and Project Management, RMIT University.

Example leadership matrix

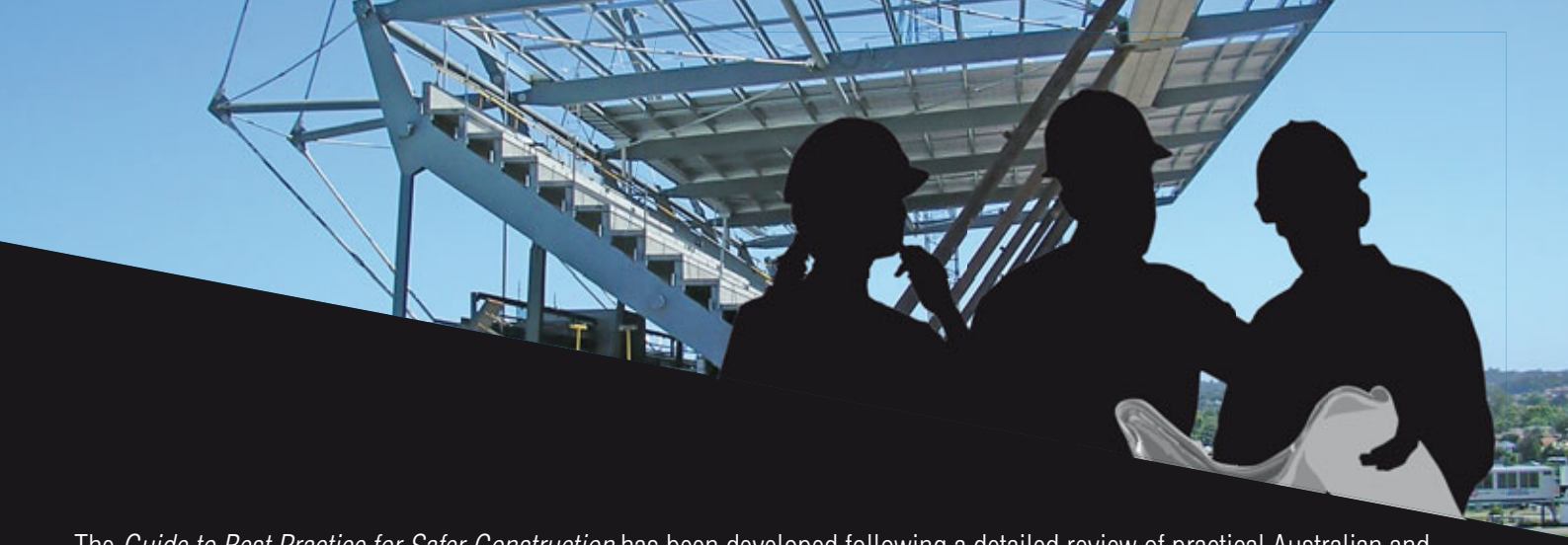


Example leadership matrix

BEST PRACTICES

				Traditional type contract				Design and construct contract				Collaborative contract			
					Client	Designer	Constructor		Client	Designer	Constructor		Client	Designer	Constructor
STAGE 1: Planning	Task 1.1	Establish a project safety management framework	STAGE 1: Planning	1.1	L	C	C	1.1	L	C	C	1.1	L	P	P
	Task 1.2	Identify safety champions for appointment to the project safety leadership team		1.2	L	C	C	1.2	L	C	C	1.2	L	P	P
	Task 1.3	Appoint a project safety leadership team		1.3	L	C	C	1.3	L	C	C	1.3	L	P	P
	Task 1.4	Develop project safety charter		1.4	L	C	C	1.4	L	C	C	1.4	L	P	P
	Task 1.5	Develop project safety master plan		1.5	L	C	C	1.5	L	C	C	1.5	L	P	P
	Task 1.6	Specify safety requirements in project brief		1.6	L	C	C	1.6	L	C	C	1.6	L	P	P
	Task 1.7	Include safe design requirements in design consultant contracts		1.7	L	C	C	1.7	L	C	C	1.7	L	P	P
	Task 1.8	Select qualified designer		1.8	L	C	C	1.8	L	C	C	1.8	L	P	P
	Task 1.9	Establish requirements for safety in design		1.9	L	C	C	1.9	L	C	C	1.9	L	P	P
	Task 1.10	Communicate safety commitments to prospective stakeholders		1.10	L	C	C	1.10	L	C	C	1.10	L	P	P
	Task 1.11	Communicate project safety risk information to relevant stakeholders		1.11	L	C	C	1.11	L	C	C	1.11	L	P	P
	Task 1.12	Conduct risk analysis of project options		1.12	L	C	C	1.12	L	C	C	1.12	L	P	P
	Task 1.13	Undertake technical feasibility studies of viable options		1.13	L	C	C	1.13	L	C	C	1.13	L	P	P
	Task 1.14	Select preferred project option based on robust risk assessment		1.14	L	C	C	1.14	L	C	C	1.14	L	P	P
	Task 1.15	Record safety information in a project risk register		1.15	L	C	C	1.15	L	C	C	1.15	L	P	P
	Task 1.16	Establish key performance indicators (KPIs) for safety		1.16	L	C	C	1.16	L	C	C	1.16	L	P	P
	Task 1.17	Continuously develop safety capabilities		1.17	L	C	C	1.17	L	C	C	1.17	L	P	P
	Task 1.18	Develop long-term relationships within supply chain		1.18	L	C	C	1.18	L	C	C	1.18	L	P	P
STAGE 2: Design	Task 2.1	Develop design safety plan	STAGE 2: Design	2.1	P	L	C	2.1	P	L	P	2.1	P	L	P
	Task 2.2	Specify how safety is to be addressed in tenders for construction		2.2	L	P	C	2.2	L	C	C	2.2	L	C	C
	Task 2.3	Include safety requirements in construction contract documents		2.3	L	P	C	2.3	L	C	C	2.3	L	P	P
	Task 2.4	Establish assessment criteria for prospective constructors		2.4	L	P	C	2.4	L	C	C	2.4	L	P	P
	Task 2.5	Evaluate tenders against safety criteria		2.5	L	P	C	2.5	L	C	C	2.5	L	C	C
	Task 2.6	Select qualified constructor		2.6	L	P	C	2.6	L	C	C	2.6	L	C	C
	Task 2.7	Conduct design reviews to eliminate/reduce risk at concept and detailed design stages		2.7	P	L	C	2.7	P	L	L	2.7	P	L	P
	Task 2.8	Consider constructability in design safety reviews		2.8	P	L	C	2.8	P	L	L	2.8	P	L	P
	Task 2.9	Include safety information in design documentation		2.9	C	L	C	2.9	C	L	L	2.9	P	L	P
	Task 2.10	Communicate relevant project safety risk information to constructors via the project risk register		2.10	L	P	C	2.10	L	P	P	2.10	L	P	P
	Task 2.11	Record residual safety risk information in the project risk register		2.11	L	P	C	2.11	L	P	P	2.11	P	L	P
	Task 2.12	Review key performance indicators (KPIs) for safety		2.12	L	P	P	2.12	L	P	P	2.12	L	L	L
	Task 2.13	Continuously develop safety capabilities		2.13	L	P	C	2.13	L	P	P	2.13	L	L	L
	Task 2.14	Provide mentoring scheme for SME designers		2.14	L	P	C	2.14	L	P	P	2.14	L	L	L
STAGE 3: Construction	Task 3.1	Develop construction safety plan	STAGE 3: Construction	3.1	P	C	L	3.1	P	P	L	3.1	P	P	L
	Task 3.2	Demonstrate management commitment to safety processes at all levels		3.2	L	C	L	3.2	L	P	L	3.2	L	L	L
	Task 3.3	Implement senior management-led ‘safety walks’		3.3	L	C	L	3.3	L	P	L	3.3	L	L	L
	Task 3.4	Conduct regular site inspections		3.4	L	C	L	3.4	L	P	L	3.4	L	L	L
	Task 3.5	Consultation and talking safety		3.5	L	C	L	3.5	L	P	L	3.5	L	L	L
	Task 3.6	Design safe construction processes		3.6	C	C	L	3.6	C	L	L	3.6	L	L	L
	Task 3.7	Review safety risk in design changes		3.7	C	L	P	3.7	C	L	P	3.7	L	L	L
	Task 3.8	Communicate safety risk information to relevant stakeholders		3.8	P	C	L	3.8	P	P	L	3.8	L	L	L
	Task 3.9	Provide regular safety performance feedback to project personnel		3.9	P	C	L	3.9	P	P	L	3.9	L	L	L
	Task 3.10	Implement systematic risk management processes		3.10	P	P	L	3.10	P	P	L	3.10	L	L	L
	Task 3.11	Identify and rectify safety deficiencies		3.11	C	P	L	3.11	P	P	L	3.11	L	L	L
	Task 3.12	Record risk information		3.12	C	C	L	3.12	P	P	L	3.12	L	L	L
	Task 3.13	Undertake regular measurement of project safety performance using leading indicators, climate surveys and lagging indicators		3.13	C	C	L	3.13	P	P	L	3.13	L	L	L
	Task 3.14	Regularly analyse project safety performance data		3.14	C	C	L	3.14	L	P	L	3.14	L	L	L
	Task 3.15	Continuously develop safety capabilities		3.15	L	P	L	3.15	P	L	L	3.15	L	L	L
	Task 3.16	Promote safety management practices within SME subcontractors		3.16	C	C	L	3.16	P	P	L	3.16	L	L	L
	Task 3.17	Implement safety mentoring system for SME subcontractors		3.17	C	C	L	3.17	P	P	L	3.17	L	L	L
STAGE 4: Post-construction	Task 4.1	Develop a commissioning safety plan	STAGE 4: Post-construction	4.1	P	L	P	4.1	P	L	P	4.1	P	L	P
	Task 4.2	Perform post-construction review		4.2	L	P	P	4.2	L	P	P	4.2	L	P	P
	Task 4.3	Evaluate project performance		4.3	L	P	P	4.3	L	P	P	4.3	L	L	L
	Task 4.4	Recognise and reward good safety management and leadership		4.4	L	L	L	4.4	L	L	L	4.4	L	L	L
	Task 4.5	Evaluate effectiveness of design safety reviews		4.5	P	L	L	4.5	P	L	L	4.5	L	L	L
	Task 4.6	Record effective design solutions for future projects		4.6	P	L	P	4.6	P	L	L	4.6	L	L	L
	Task 4.7	Communicate safety knowledge to all project participants		4.7	L	P	P	4.7	L	P	P	4.7	L	L	L
	Task 4.8	Conduct appropriate testing of plant/equipment prior to commissioning		4.8	C	P	L	4.8	C	L	L	4.8	L	L	L
	Task 4.9	Record safety information relevant to facility operation		4.9	C	L	L	4.9	C	L	L	4.9	L	L	L
	Task 4.10	Undertake collaborative post-project review of safety performance		4.10	L	P	P	4.10	L	P	P	4.10	L	L	L
	Task 4.11	Capture and record lessons learned for future projects		4.11	L	L	L	4.11	L	L	L	4.11	L	L	L
	Task 4.12	Review long-term relationships with SMEs		4.12	L	L	L	4.12	L	L	L	4.12	L	L	L
	Task 4.13	Future interface between prime contractors and subcontractors		4.13	C	C	L	4.13	C	L	L	4.13	L	L	L

L = *takes a leadership role in* **P = *participates in*** **C = *is communicated to***



The *Guide to Best Practice for Safer Construction* has been developed following a detailed review of practical Australian and international best practice initiatives.

The Guide suggests a framework to improve safety performance on construction projects and covers all stages of a project: planning, design, construction and post-construction. Its overarching objective is to reduce the number of accidents and deaths on construction sites and to improve the ability of the industry as a whole to deliver safer construction projects and healthier employees.

The three primary stakeholder groups of the construction industry – clients, designers and constructors – have worked together to create a methodology which integrates occupational health and safety into strategic and operational decision-making at all stages of the project.

The Guide is intended to be an aspirational document that leads discussion and industry change, as well as a practical tool which can be used across the industry by clients, designers and constructors and by large firms and small and medium-sized enterprises.

Guide to Best Practice for Safer Construction: Implementation kit

The *Guide to Best Practice for Safer Construction: Implementation kit* is available from www.construction-innovation.info.

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