



0001c Design Checklist - Safety

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00 Design principles

0.01 Main considerations

It is a requirement to undertake the [00 PLANNING AND DESIGN/ 0001R - DESIGN REFERENCE](#) and [GLOSSARY OF TERMS](#) information into all aspects of design, detailing and delivery when developing the content here within. Clear demonstration of adherence to these requirements is part of the services and will be called upon at key points in the project and during at the discretion of the Department of Education (DoE).

0.02 Safety (Accident Avoidance) & General Security - Introduction

The Work Health and Safety Act and the Department of Education principles of student safety and welfare mandate the avoidance of accidents through careful design of facilities.

This section lists some, but not all, of the design considerations that must be encompassed to avoid accidents in the built environment.

Two specific strategies that are appropriate to school design are:

Safety in Design

Under the new Work Health and Safety (WHS) legislation, there is a range of new legislative and regulatory requirements, supported by a suite of codes of practice clarifying how these obligations can be met. In particular, there are specific requirements and expectations of entities and persons defined as a “designer”.

The definition of “designer” in the WHS legislation not only affects the actual designer, but also places duties on all those who are connected with the design, including during construction, end use, maintenance and demolition or de-commission. The designer must ensure, so far as is reasonably practicable, that the plant, substance or structure is designed to minimise risks to the health and safety of all parties who will work on a site connected with its design as well as the end users of the facility.

An important part of the Safety in Design principle is recording the risk assessments that are conducted during the design and providing to the client, owners, any users/occupiers of the facilities and those who will be building or maintaining the facilities, details of:

- The hazards identified during the design process and the action taken by the designer to alleviate the risk.

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- Any identified risks associated with the construction or maintenance of the buildings and facilities, and
 - Any management procedures that are required to control the risks associated with construction, maintenance or operations of the design.

Crime Prevention through Environmental Design (CPTED)

is a strategy that focuses on the planning, design and structure of cities and neighbourhoods so as to reduce crime. It reduces opportunities for crime by using design and place management principles that reduce the likelihood of essential crime ingredients (law, offender, victim or target, opportunity) from intersecting in time and space.

Predatory offenders often make cost-benefit assessment of potential victims and locations before committing crime. CPTED aims to create the reality (or perception) that the costs of committing crime are greater than the likely benefits. This is achieved by creating environmental and social conditions that are not conducive to crime activities including:

- Increasing the likelihood of detection, challenge and apprehension
- Increasing the time, energy and resources required to commit crime
- Minimize the actual and perceived benefits of crime
- Removing conditions that encourage/facilitate rationalization of inappropriate behaviour CPTED utilizes the following four key strategies:
 - Territorial re-enforcement
 - Surveillance
 - Access control
 - Space /activity management

All CPTED strategies aim to create the perception or reality of capable guardianship.

0.03 General

The design of facilities should not only be inherently safe but visually and pragmatically safe and not tempt students or the general public into unsafe practice. Particular attention is required to prevent relatively easy access from surrounding surfaces to structural elements and roofs at high levels.

Circulation or active play areas should be planned to avoid situations where a head could strike low building elements such as stair landings, roof overhangs or beams etc. Depending on the space available, landscaping, walls, rails, seats or enclosures may have to be utilised if the situation is considered hazardous.

Maintenance of services and structures should be considered during the design phase to ensure that maintenance activities can be undertaken in a safe manner.

A Whole of Life approach should be used in the selection of materials, services and equipment to ensure that the safe maintenance procedures can be implemented for all building elements and services.

Refer to [00 PLANNING AND DESIGN/ 0001R - DESIGN REFERENCE](#) for details.

0.04 Standards

All materials must comply with appropriate safety standards and Australian Standards particularly standable or walkable surfaces including the roof, skylight strips, skylight domes, turbo vents, fans, etc.

0.05 Structure

Exposed accessible structural elements such as struts should be minimized and well out of reach. Typically, that is beyond 3m vertically or 2m horizontally from any standable surface.

0.06 Sunshades

Sunshade frames where within reach 3m vertically or 2m horizontally from any standable surface must be designed to prevent climbing by removing handholds, or by infilling the frame with expanded mesh or the like.

0.07 Access to Roofs

- Walkway roofs and any roof adjoining another roof or building must be positioned and designed to prevent students or the general public using them to gain access over the whole facility. Particular attention and design solutions are required when walkway roofs adjoin second storey verandas etc.
- Avoid assisting access to roofs and upper levels via low eaves, walkway roofs, porches, security fences, balustrades, overhangs, ledges, mullions, indents, down-pipes, hardware items, trees etc.
- Eaves must not be below 2100mm.
- Adjacent walls, fences, balustrades, awnings etc must be at least 2000mm clear of eaves of buildings and covered walkways.

0.08 Safe Work on Roofs and Safety Line Systems

Refer to relevant AS and the advisory documents prepared by relevant Authorities (such as WorkCover) Possible requirements to be confirmed by consultant:

- Provide anchorage points for static lines (cable) and /or for inertia reels
- Anchorage points need to withstand an imposed load of not less than that nominated in the applicable AS, or in accordance with an engineer's specification
- The span is to be supported as per the WorkCover Code of Practice or in accordance with an engineer's specification
- Safety mesh shall be installed under roofs in compliance with applicable AS

0.09 Entrapment hazards

Steel Column Placement

To minimize the potential hazard of collision with steel columns, the following is required:

- The placement of columns must be carefully considered at Design Stage, with regard to openings, circulation routes and access path desire lines.
- Where verandas, walkways or COLAs converge to create a potential profusion of columns, share columns to reduce their numbers.
- Consider other structural options to reduce their numbers (e.g. increased spans).
- Sharp edges must be avoided, use rounded and/ or chamfered edges. RHS & CHS are preferred to universal sections.
- Utilize landscaping or railings to redirect student's path of travel.
- Where a hazard is revealed and the hazard cannot be eliminated, use bands of heavy duty, brightly coloured vinyl adhesive tape at adult and child eye level around the column until the hazard can be removed.
- Columns may sometimes depart from the basic form to emphasize the main entries of core facilities.

Downpipe locations

Where downpipes are supported by cleats off columns or walls, the gap between downpipe and column or wall must be sized to avoid creating the potential for entrapment of a knee, torso or head.

Gap dimension:

- 70-85mm (preferred by KidSafe-Playground Advisory Unit)
- 124mm allows larger straight downpipes to more easily align with the sump

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- Note: If a bend is needed at the bottom of the downpipe, to reach the sump, this may pose a trip hazard in some locations
 - Bottom cleat to be less than 600mm above the ground
 - Note: 125 – 350mm at minimum 600mm above a horizontal surface is considered dangerous for entrapment because it could allow a torso to pass but might entrap the head when feet can't provide support. (advice from KidSafe)

Perforated Metal Panels

Where perforated metal panels can be accessed on balustrades, screens etc, the holes are to be <7mm dia to reduce risk of injury. Where larger holes are preferred, they must be nominally 25mm dia. This is safer for fingers and avoids creating a potential toehold.

Placement of Fire Hydrants

- The placement of hydrants and other essential services and equipment must be carefully considered at design stage with regard to circulation routes and access desire lines, to minimize the potential hazard of collision.
- Utilize landscape elements, or railings to redirect student's path of travel clear of hydrants
- Consider the visual impact of the fire hydrant location in the Entrance Zone

0.10 Safety Around Machines / Maintainable Plant

It is important to ensure that machinery and work areas are laid out in a safe and useable manner. Large-scale special area drawings are required which show:

- The machines themselves
- The space needed for pupil operators
- Circulation of other pupils and instructing teachers
- Space for occasional machine adjustment and maintenance
- Space for occasional large jobs associated with some machines Note the following:
 - Operator Positions are assumed occupied. Considered as integral part of machines these must be shown to scale on layouts. 600mm mandatory minimum safe space for operating zone
 - Operator Zones, minimum clearance to another operator zone or traffic way, i.e. no overlapping (assumed to be occupied - i.e., comparable with yellow floor lines)

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- Traffic Way Positions, frequently used. Traffic ways are required for safe access between and to all operators (e.g.: by teacher). 600mm mandatory min. safe space for traffic ways
 - Machine Zones, minimum clearance to wall or screen (without traffic way); or another machine (non-operating side); or fixture at work-plane level. Screen or wall preferred to avoid potential hazards
 - Minor Adjustment Positions: - Indicates machine parts requiring space during adjustment or maintenance (infrequently used)

If machines are located back to back they must be:

- Separated by safety screening 0.9 to 1.5m above floor
- Screens must be transparent for supervision and impact-resistant
- Screens could be fitted to machines without interfering with job clearances, thus improving both flexibility and safety
- Most machines (lathes, drills, grinders) must, where possible, be located near walls to reduce:
 - Hazards of traffic passing behind
 - Hindrance to spatial flexibility.
 - Need for special safety screening
 - Floor conduit placement problems

Any Trade names and diagrams used in the EFSG only indicate the typical machine measured, but actual specifications for machines for particular projects must be checked with the recommended equipment list current at that time.

Power Outlets are shown in the approximate preferred locations near the machine inlets.

It is important to ensure that all serviceable plant and equipment is provided with means of safe access. Requirements to be considered include:

- A minimum clearance of 600mm is to be provided around all maintainable plant and equipment
- Maintenance access must be via a platform or low-pitched roof surface. Performing maintenance from a ladder is NOT acceptable. Guardrails must be provided at platform edges in accordance with AS and Authority regulations
- All equipment is to be appropriately identified and tagged

0.11 Security

Major problems affecting schools, with enormous cost, are arson, theft and vandalism. The impact of these activities is not only measured in financial terms but also in the effect

on student learning outcomes, interruptions to operations and emotional trauma experienced by student, teachers and parents.

Security risk must be minimised for all projects. Implement appropriate preventative measures in the project design, planning and construction.

Advice is to be sought from DoE School Service Unit and the Security Unit, early in the design stage of a school, to determine the security risk of the proposed site and to determine the extent and style of the security fencing or other measures to be implemented.

Security fencing must be provided along road frontages and other site boundaries which face public areas or walkways.

The security fence is to be designed to prevent climbing.

Generally, a 2150mm high palisade type prefinished tubular steel fence would meet these criteria.

The fence will be a feature of the school and so must aesthetically enhance the school image in an unobtrusive manner, whilst not encouraging access to the site.

The height of the fence may need to be changed to suit the local conditions and characteristics of the students within the school.

Where security fencing is provided along non-road boundaries, it may be reduced in height to 1825mm weld mesh or other style to DoE approval. If enhanced security is required, the provision of a barbed wire extension to 2275mm will be confirmed by DoE Planning Review. Appropriate landscaping can also soften the appearance, provided such measures do not provide a means of scaling over the fence.

Where security fencing abuts an adjacent property fence, provide a return panel to prevent access between the security fence end post and adjacent fence.

Where no provision is made for a security fence the building fabric becomes the first physical point of protection, and this must be taken into consideration in the design.

To minimize the likelihood of break-ins and their effects, Safety in Design and Crime Prevention Through Environmental Design principles are to be implemented in the planning.

0.12 Planning

In the planning process it is important to consider and balance many differing, often opposing or conflicting issues in order to develop a safe environment. The following are safety issues that must be considered:

Site Location

School entries are generally to be located away from shopping centres, licensed premises, bottle shops and other locations identified as having an increased security risk

Controlled Public Access

The possibility that school grounds will be used as a thoroughfare must also be considered. The use of school grounds as a short cut must be discouraged by either site selection or appropriate perimeter protection. Responsible use of the school increases security, however the reverse is true of unsupervised or unorganised activities, which must be discouraged.

- Entrances to the site must be clearly defined.
- Entrances that are to be used after dark must be well lit.
- Where after-hours use of school facilities is permitted it must be possible to separate those facilities from the remainder of the school.
- Access to concealed areas such as courtyards, must be controlled by security fences or walls.
- Minimise the use of recessed doorways as this limit's natural surveillance.
- Avoid landscaping and site elements which would obstruct natural surveillance.
- Blind corners must be eliminated from pathways.
- Ensure that lighting does not produce glare or dark shadows.
- The effect of level changes and embankments on visibility must be considered.
- A clear zone must surround the buildings, especially where the site adjoins reserves with natural vegetation.

Accessibility for Security/ Fire Service

Buildings must be as compact as possible for easy access by security personnel. Site planning must not preclude the possibility of fire and security vehicles gaining access to all the buildings.

Appropriate vehicular gates must be included in at least two locations in the security fence and appropriate paved areas must be included to facilitate prompt access, to all school

buildings under all weather conditions, for security, fire and other emergency service vehicles.

0.13 Fabric Finishes

Fabric generally must be fire resistant and robust to resist illegal entry, vandalism and arson. Refer also to the Whole of Life section for principles of material selection.

Structural members must have sufficient protection from internal fire to allow time for detection, alarm, fire brigade arrival and extinction of the fire before failure can occur. The building regulations define the appropriate fire rating requirements

Roof

Roof Space is to be compartmented or otherwise designed to limit fire spread and access throughout the building

Refer to Building Code of Australia (BCA)

Roof Lights must be avoided or made inaccessible.

Floor

Under Floor Space must be securely enclosed and compartmented where possible to limit access and spread of fire.

Refer to [00 PLANNING AND DESIGN/ 0001C - FINISH](#) and [06 FINISH/065 FLOOR SURFACING](#)

0.14 Openings

Windows

Generally, it is recommended that there must be no external glazing below 900mm in schools, as glazing is susceptible to damage.

Refer [04 ENCLOSURE/0451 WINDOWS AND GLAZED DOORS](#)

Secluded or vulnerable windows must have high and steep sills and/or be protected by security grilles, etc.

Doors, Roller Shutters & Grilles

Doors or roller shutters are to be selected to suite the individual security application.

Roller shutters/grilles should be of security design, and should fit the threshold closely as for doors. Canteen server shutters should be designed to prevent their being sprung out of guides and flammables being pushed under, eg by counter step up behind, or another solid shutter used.

0.15 Installations

Security Lighting should be provided to areas to encourage natural surveillance. It should not be provided to concealed areas as this may only assist intruders.

External Light Fittings are commonly vandalised so should be robust and located out of reach.

0.16 Fixtures

External Fixtures should be of robust design to resist vandalism. Fixtures should also be considered as possible means of unintended access to upper levels.

0.17 Safety in Design Checklist against Project Phase

The following checklist outlines tasks to be undertaken by the Designer, or other project resource. Project Director to ensure completeness prior to endorsement of relevant project document.

Table 01: Project Phases, Safety in Design Activity / Consideration and Governance

Project Phase / Activity	Safety in Design Activity / Consideration	Consultation	Documents	Governance
Phase: Strategic Phase Demographic / Service Planning Strategic Investment decision: go/no go	Commence and document strategic consultation regarding SiD expectations throughout the lifecycle of the project	SINSW Project Manager		SINSW organisational committees

Project Phase / Activity	Safety in Design Activity / Consideration	Consultation	Documents	Governance
Phase 0 Project Initiation	Commence and document strategic consultation regarding SiD expectations throughout the lifecycle of the project	<i>SINSW Designer Project Manager</i>		SINSW Governance committees
Phase 1 Master Planning	<ul style="list-style-type: none"> Integrate health and safety considerations in the Functional Design Brief (FDB) Undertake a health and safety audit of the site, identify existing and potential hazards and establish a Project Risk Register Ensure Safety in Design is embedded in the design process across all design principles. Evaluate health and safety risk elimination and/or minimisation in line Safety in Design principles by updating the Project Risk Register for each Masterplan Option. <p>** Reference p16-18 NSW Code of Practice: Safe Design of Structures 2019</p> <p>Note: On complex projects this phase may not be finalised till the end of Phase 3</p>	<i>SINSW Project Manager AMU rep. WHS rep.</i>	Functional Design Brief Project Risk Register	Governance committees PCG Safety /Risk Committee

Project Phase / Activity	Safety in Design Activity / Consideration	Consultation	Documents	Governance
Phase 2 Feasibility / Concept Planning	<ul style="list-style-type: none"> Complete a SiD workshop for Concept design (workshop 1). Utilise SiD checklist within the Code of Practice. (Minutes to be included in the SiDReport for Concept Design) Update the Project Risk Register Produce and submit a detailed SiD Report for Concept Design (SiD Report 1 of 3). The SiD Report must <ul style="list-style-type: none"> demonstrate a WHS / SiD value-add methodology specify hazards relating to the design of the asset that create a risk to the health and safety of persons who are to carry out any work on/at the asset. must identify hazards throughout the stages of the life cycle of the asset when it is used as or at a workplace including construction, the use for the purpose for which it is designed, maintenance and repair, and demolition of additions and alterations at the end of the life cycle of the structure. <p>** Reference p14-20 NSW Code of Practice: Safe Design of Structures 2019</p>	SINSW Project Manager AMU rep WHS rep	Updated Project Risk Register SiD Report for Concept Design (SiD Report 1 of 3)	Governance committees PCG Safety /Risk Committee
Phase 3 Schematic Planning	<ul style="list-style-type: none"> Complete a SiD workshop for Schematic design (workshop 2). Utilise SiD checklist within the Code of Practice. (Minutes to be included in the SiD Report for Schematic Design) Update the Project Risk Register Produce and submit a detailed SiD Report for Schematic Design (SiD Report 2 of 3). See phase 2 details <p>** Reference p14-20 NSW Code of Practice: Safe Design of Structures 2019</p>	SINSW Project Manager AMU rep. WHS rep. Consultants	Updated Project Risk Register SiD Report for Schematic Design (SiD Report 2 of 3)	Governance committees PCG Safety /Risk Committee

Project Phase / Activity	Safety in Design Activity / Consideration	Consultation	Documents	Governance
Phase 4 Design Development (only once BC is Approved and project funded)	<ul style="list-style-type: none"> Complete a SiD workshop for Detailed design (workshop 3) Update the Project Risk Register Produce and submit a detailed SiD Report for Detailed Design (SiD Report 3 of 3). See phase 2 details <ul style="list-style-type: none"> This SiD Report will potentially be the final SiD Report completed, thus must be the most specific and be able to be utilised throughout the life cycle of the asset. <p>** Reference p14-22 NSW Code of Practice: Safe Design of Structures 2019</p>	SINSW Project Manager AMU rep. WHS rep, Consultants Supply Chain input	Updated Project Risk Register SiD Report for Detailed Design (SiD Report 3 of 3)	Governance committees PCG Safety /Risk Committee
Phase 5 Contract Documentation	<ul style="list-style-type: none"> Health and safety (SiD) requirements and obligations to be specified in all specifications and contract documents. Include SiD report 3 in the tender package. 	SINSW / Client		Governance committees PCG Safety /Risk Committee
Phase 6 Tender Evaluate and Award	<ul style="list-style-type: none"> Request that all Tenderers submit acknowledgement of the SiD requirements set out within the SiD Report and have factored in costs and strategies to comply with the recommendations. Tenderers that do not acknowledge the SiD requirements and have not factored in accordingly are not to be considered. 	SINSW / Client		Governance committees PCG Safety /Risk Committee

Project Phase / Activity	Safety in Design Activity / Consideration	Consultation	Documents	Governance
Phase 7 Construction	<ul style="list-style-type: none"> All SiD Reports MUST be provided to and analysed by the Principal Contractor and where relevant, the recommendations should be discussed, agreed upon and incorporated into (at minimum) the: <ul style="list-style-type: none"> Project Specific WHS Risk Register, WHS Management Plan, Project WHS training and Project Safe Work Method Statements (SWMS) Design changes during construction are to be assessed for SiD and altered accordingly. Sign off is required for any increased health and safety risk by the Client and Designers. <p>** Reference NSW Code of Practice: Safe Design of Structures 2019</p>	SINSW/ Client Project Manager Principal Contractor Designer	WHS Risk Register WHS Management Plan WHS training Safe Work Method Statements (SWMS)	Governance committees PCG Safety /Risk Committee
Phase 8 Commissioning/ handover	<ul style="list-style-type: none"> End users and asset management teams are to receive comprehensive training in the safe use, operation and maintenance of all building systems, plant and equipment. O&M manuals and training materials to highlight and demonstrate health and safety strategies for on-going use of the asset throughout its life. <p>** Reference p23 NSW Code of Practice: Safe Design of Structures 2019</p>	SINSW/ Client Project Manager Principal Contractor Designer DoE Operational WHS Advisor End Users & Asset management	Submission of Commissioning SWMS that include SiD recommendations set out within the SiD Report MUST be submitted PRIOR to commissioning commencing	Governance committees PCG Safety /Risk Committee
Phase 9 Defect, Warranty,POE	<ul style="list-style-type: none"> Repair of defects must ensure that health and safety considerations built into the system, equipment or asset are not compromised Maintenance requirements during the Warranty period are to be undertaken comprehensively and in a timely manner to ensure no undue deterioration of the asset. 			Governance committees PCG Safety /Risk Committee