australasian health infrastructure alliance

GOVERNMENTS COLLABORATING TO DELIVER QUALITY HEALTH FACILITIES

Australasian Health Facility Guidelines

Part C - Design for Access, Mobility, Safety and Security

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Australasian Health Facility Guidelines

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The AusHFGs are an initiative of the Australasian Health Infrastructure Alliance (AHIA). AHIA membership is comprised of representatives from government health infrastructure planning and delivery entities in all jurisdictions in Australia and New Zealand.

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01 INTRODUCTION

1.1 BACKGROUND

Part C Design for Access, Mobility, Safety and Security (to be referred to as 'Part C') has been developed by the Australasian Health Infrastructure Alliance (AHIA) following an extensive industry consultation process. This review has included the specialist input of key consultants such as architects and engineers, as well as Disability Discrimination Act (DDA), Building Code Australia (BCA), safety and security specialists. This input has been supplemented by a rigorous review of recent healthcare projects to update information relating to travel & engineering, internal circulation and the method of measurement.

1.2 PURPOSE

The AusHFG comprise a series of documents that detail a range of information that assist project teams to plan and design healthcare facilities.

Part C draws together a range of issues that guide the detailed planning and physical design for healthcare facilities.

1.3 CONTENT

Part C is arranged in sections and includes:

1. Introduction
2. Physical Planning Issues
3. Amenity, Safety and Design Tolerances
4. Human Engineering
5. Wayfinding
6. Security Considerations
7. Safety Considerations

The information is presented so that it may be used as a benchmark for the designers; as information for the users involved in a project; and as a checklist for assessment of design and functionality. It is intended to support the professional skill, knowledge and judgement of experienced designers in the development of a healthcare facility and to educate those who aspire to be proficient in this complex field of endeavour. The information provided does not replace the need to consult with staff and other experts during all stages of the planning, design and construction process to ensure consideration of project specific requirements.

To avoid undue complexity, building regulation references are restricted to the Building Code of Australia (BCA/NCC). This approach has been adopted due to the similarity in approach and format between the BCA and the NZ Building Regulations in space standards and dimensions. Many of the cited Standards in the BCA are AS/NZS thus common to both jurisdictions or have a corresponding ISO or NZ Standard.

The requirement to comply with the relevant legislation, regulations, codes and policies for each jurisdiction is stated at the beginning of each section of this guideline to avoid undue repetition. This applies to any matter relating to the design, construction, use, operation and management of healthcare facilities where such compliance may be required.

In many cases a concise generic term or title has been used in the text, e.g. WHS. The correct terminologies and sources are acknowledged under references with abbreviations listed in Appendix 01 - Glossary and Abbreviations.

02 PHYSICAL PLANNING MODELS AND APPROACHES

2.1 INTRODUCTION

Planning of healthcare facilities requires an understanding of the suitable relationships between the various clinical and support services as well as an understanding of site constraints and local risks to people and property. In addition, healthcare facilities need to conform to a range of codes and guidelines.

A thorough assessment of the clinical service planning requirements for the proposed project should be made prior to commencing capital planning.

The design consultants should comply with the relevant legislation, regulations, codes and policies for each jurisdiction.

Good planning relationships can:

- promote good practice and safe health care delivery;
- reduce risk to patients, visitors and staff;
- improve privacy, dignity and comfort;
- increase the efficiency of services;
- minimise recurrent costs;
- minimise travel distances;
- allow for growth and change over time;
- maximise accessibility, safety and security; and
- incorporate environmentally sustainable design (ESD).

2.2 PLANNING MODELS

The design of healthcare facilities has evolved around a number of workable planning models. These can be seen as templates, prototypes or patterns for the design of new facilities. Typically each model will best suit a certain facility size and site condition.

None of these models overrides the need for compliance with Commonwealth, State / Territory legislation and jurisdictional policies.

It is essential that the planning team defines a clear model of operation for the facility. This should be readily described in a simple and clear flow diagram. Planning teams are encouraged to seek planning relationships that can satisfy more than one operational model rather than satisfy limited, unusual or temporary operational policies.

Appropriate staff consultation should occur at all stages of the planning process.

Access requirements and functional relationships between each service will govern the planning relationships for each facility. The need for future expansion or change of function should also be reasonably anticipated in all designs.

The following general planning models and design notes are used to promote good planning, efficiency and flexibility for the design of healthcare facilities.

2.3 PLANNING PRINCIPLES

2.3.1 Flexible Design

In healthcare, operational policies can change frequently. This may be the result of management change, government policy, and turnover of key staff or technology. By contrast, major healthcare facilities are typically designed for 30 years, but may remain in use for longer periods of time.

If a major hospital is designed very tightly around the operational policies of the day, a significant investment may be at risk of early obsolescence.

Flexible design refers to planning models that can not only adequately respond to contemporary operational policies but also have the inherent flexibility to adapt to a range of alternative, proven and forward looking policies.

Furthermore, flexible design should address future trends and changes in patient profiles, e.g. ambulatory care models.

At the macro level, many of the commonly adopted planning models have proven to be flexible in dealing with multiple operational policies.

At the micro level, designers should consider simple, well-proportioned rooms with good access to simple circulation networks. Structural grids should be modular and be vertically consistent across the facility. Columns should be designed so that they have minimal interference within rooms.

2.3.2 Separation of Flows

Ideally, main routes through hospitals should attempt to separate major public flows from other activities. These activities include transporting patients on beds or trolleys, staff movements and the movement of goods and waste. While major departments will have different entry points for ambulant and public flows, e.g. operating unit or emergency department, this separation is typically not possible, or desirable, on entry to areas such as inpatient units. Once inside a department, it is often more desirable to ensure that planning is compact so that patient and staff safety is maximised. It is usual for these units to have shared corridors for all activities.

Planning solutions and the arrangement of flows will also be dependent on the size and scale of the facilities. Many rural and remote sites manage with very few staff outside of normal business hours and additional circulation can isolate staff in these situations.

2.3.3 Rooms Shared Between Units

This concept refers to models that allow for changes in operating mode as a function of management rather than a physical building change. For example, two inpatient units can be designed back to back so that a range of rooms can be shared. The shared section may be capable of isolation from one or the other Inpatient Unit by a set of corridor held-open doors. This type of sharing is commonly referred to as ‘swing beds.’ It represents a change to the size of one Inpatient Unit without any need to expand the unit or make any physical changes and enables flexing of bed numbers within inpatient units.

Designers should consider issues such as; compatibility of use, access to utility rooms, storage, the supervision of patients when using swing beds or rooms, and in particular, the ability to switch nurse call systems to the new Staff Station.

Wherever possible, the sharing of rooms such as meeting rooms and consulting rooms should be encouraged to avoid duplication of rooms within Health Planning Units. These sets of rooms should be able to be accessed separately from each unit, and not through another unit.

2.3.4 Overflow Design

Some functions can be designed to serve as overflow for other areas that are subject to fluctuating demand. For example:

- waiting areas for different services can be collocated;
- procedure rooms can be equipped to provide capacity for emergency operating needs; and
- day and ambulatory care areas can be adapted for overnight use in emergencies such as those relating to natural disasters.

2.3.5 Staged Use

Healthcare facilities of all sizes may be subject to fluctuating demand. It is desirable to implement a staged usage policy to close off certain sections when they are not in use. This allows for savings in energy, maintenance and staff costs. It also concentrates the staff around patients and improves communication. In designing for staged usage or progressive shutdown ensure that:

- none of the requirements of these guidelines is compromised in the areas that remain open;
- the open sections comply with other statutory requirements such as fire egress;
- the open patient care areas maintain the level of clinical observation required;
- two clinical areas are not separated by an area such as administration with limited opening times thus creating a potential security risk (isolation);
- in the closed areas, lights and air conditioning can be turned off independently of other areas;
- the closed sections are not required as a thoroughfare for access to other functions;
- nurse call and other communication systems can adapt appropriately to the shutdown mode, however staff can still summon assistance should they become entrapped (accidently or through the actions of others) in a shutdown area;
- the shutdown strategy allows access to items requiring routine maintenance; and
- an area can be isolated to facilitate the management of an outbreak of infectious diseases.

2.3.6 Staging of Developments

The staging of development projects will necessitate the formulation of strategies to provide accessible access through and / or around building works. It is suggested that appropriate planning be undertaken as part of the development of the project delivery strategy to ensure the provisions of the relevant Act, Codes and Standards are addressed when undertaking staged developments.

2.3.7 Zoning for Hours of Operation

The design should collocate units with similar operating hours to allow easy shutdown of larger floor areas or even whole floors after hours. This will promote security for staff and enable efficiencies in operating costs.

2.3.8 Zoning - Security

Create and maintain safe transit routes through the facility and ensure that it is not necessary for staff to traverse closed areas after hours.

Planning teams should take particular care to avoid the isolation of staff after hours. Use of controlled access through electronic locking or proximity cards to department entry and to staff areas is encouraged to provide secure environments for staff at all times. The use of video intercom for after-hours access also promotes a safe and secure environment.

2.3.9 Open Ended Planning

Healthcare facilities should be designed to allow for future expansion in either a horizontal or vertical manner, depending on the type of structural design, clinical brief requirements and cost constraints. Regardless of the scope of the project, designers should always consider where and how a unit may expand in the future and seek to provide a strategy to accommodate this requirement.

The configuration of the circulation system, both vertical and horizontal, is critical to the success of open ended planning. Some of the concepts involved in open ended planning policies include:

- locating major corridors so that they can be extended outside the building;
- as far as possible, health planning units (HPU) to have one side exposed to the outside to permit consideration of possible expansion;
- ensuring that, where the internal location of a critical care HPU 'hard' area is unavoidable, it should be adjacent to other 'soft' areas that can be relocated, such as large stores or administration areas;
- avoid HPUs that are totally land locked between corridors;
- ensuring external shapes are not finite;
- ensuring external shapes are capable of expansion;
- ensuring stairs are not be designed to block the end of major corridors;
- the overall facility flow diagram should be capable of linear expansion while keeping all the desirable functional relationships intact; and
- ensuring fixed internal services such as plant rooms, risers, service cupboards are placed along major corridors rather than in the centre of HPUs.

Consider structural designs capable of vertical expansion where scope and budget permits. Services design should also factor in these considerations, e.g. roof top plants that can become interstitial plant room floors when built over in future vertical expansions. Structural grids of multistorey healthcare buildings are typically a minimum of 8.4m wide to allow for changes of use within a department and for future expansion.

2.3.10 Modular Design

This is the concept of planning a facility by combining well designed standard components. For example, a designer may create a range of patient bedrooms, a range of utility rooms and other common rooms that are based on a regular grid such as 300mm or 600mm. These rooms can then be combined to create larger units such as an inpatient unit. The inpatient unit can then be used as a module and repeated a number of times as required.

This approach has many benefits. Modules can be designed only once to work very well. Creating 'generic' room types with a modular grid provides a consistent approach that is both efficient in cost, operation, staffing and buildability.

Modular design should not necessarily be seen as a limitation to the designer's creativity but a tool to achieve better results. Designers are encouraged to consult with clients and user groups to agree on ideal modules and then adopt them across all HPU. The use of modular design should also be considered with the need to reduce long corridors and provide efficient designs. Modular designs are good in principle, yet should be adapted to meet the model of care of the HPU, and in some cases, refurbishment within existing structure.

Determination of materials and dimensional coordination may reduce construction material waste and may offer cost efficiencies.

2.3.11 Room Orientation and Configuration ('Handing')

The option exists to use single (same) handed or mirror-image (mirror-reverse, handed) layouts for identical rooms and room modules such as ensuites. Single handing refers to situations where the room plan is repeated, the term is also used for the layout of furniture and fittings, e.g. medical services panels.

Mirror-image, (mirror-reverse, handed) as the name implies, refers to a reversal of (inverting) the image on one axis.

Where multiples of the same room types are collocated, consideration should be given to accessibility. If possible there should be an even distribution of left and right handed facilities.

By standardising rooms, single handing may provide benefits such as enhanced patient safety, a reduced rate of errors, and more intuitive use by staff and patients. This is applicable to acute patient cubicles, recovery bays, open plan day treatment spaces, and in most cases, operating rooms. Consulting rooms also benefit from this approach, with right handed nursing principles to be applied to the location of the patient bed.

In areas requiring a high level of staff training, such as in the Operating Unit, it may be more appropriate to hand all key rooms in identical manner. This makes the task of staff training easier.

For example, a staff member entering any operating room, regardless of its location and approach from corridor, will find the service panel on the left, x- ray viewer on the right, etc.

In inpatient bedrooms, the room is typically being designed in zones. The staff zone is closest to the entry of the room, the patient zone is the patient bed space, and the carer / family zone is to the rear of the room, located near the external window. This setup is still standardised, but not single handed. Locating the services panel closest to the door, regardless of the room being mirrored, is now an accepted practice in the contemporary delivery of healthcare.

It has also been common practice in healthcare to use back to back rooms in pairs or module combinations. This use of mirror image planning can provide cost and planning efficiencies, e.g. sharing of hydraulic services and circulation spaces.

The issue of sound transmission from one room to another, e.g. back to back patient bedrooms, is usually attributed to common service penetrations or back to back recessed service panels and can be simply prevented with careful design and adequate construction methods or layout offsets.

Planning teams should consider and evaluate the benefits of single handing and mirror image design options on a case by case basis.

2.4 PLANNING POLICIES

2.4.1 Standardised Design

This concept is similar to modular design. Standardised design refers to modules, or standard components, designed to perform multiple functions by management choice.

For example, a typical single patient bedroom can be designed to suit a variety of disciplines including medical / surgical, paediatrics and maternity. Such a room can be standardised across all inpatient units. This will permit a change of use between services should the need arise.

Standardised design takes into account and allows for all requirements of compatible uses. The aim of this approach is to resist unnecessary variation between similar components, and to accommodate changes in functionality with one standard design. The opposite of this policy is to specialise the design of each component to the point of inflexibility.

Other examples of standardised design include:

- generic operating rooms which suit a range of procedures;
- patient bays in day surgery which suit both preoperative and postoperative care;

- offices that are standardised into only a limited number of types for example 9m2 and 12m2; and
- generic approaches to typical rooms including, but not limited to ensuites, utilities, emergency cubicles and treatment rooms.

Relevant jurisdictional standards require consideration when developing standardised designs. It should also be acknowledged that standardised layouts can be impacted by columns, external facade design etc.

In previous revisions of Part C the term 'universal design' was used for the principles covered by this sub-section. The term 'standardised design' has been substituted since 'universal design' has been adopted in many countries to represent 'accessible design' and the use of the term in this way is now widespread.

2.5 EFFICIENCY GUIDELINES

2.5.1 General

The concept of efficiency refers to the ratio between net functional areas and other spaces that make up a healthcare facility, including areas used for circulation and engineering services.

The ratio between net functional areas and other spaces will vary from facility to facility. The level of overall efficiency will be influenced by a number of factors including:

- the type and complexity of clinical services provided;
- the extent of shared spaces between clinical services;
- whether or not the clinical services are combined with space types that typically achieve low levels of efficiency, e.g. medical research spaces, or high levels of efficiency, e.g. open plan office areas;
- whether the facility is all new, refurbished or a mix of both, and
- the height and massing of the facility.

To assist in briefing and assessing spatial efficiency, the AusHFG provides a number of resources, including:

- Standard Component rooms, which indicate the Net Functional Area needed to satisfy the function of each room;
- schedules of accommodation within the HPU documents, which propose an appropriate mix of Net Functional Areas and intra-departmental circulation allowances;
- a summary document of intra-departmental circulation allowances for clinical areas within each of the HPUs, which are detailed in sub section 2.5.4;
- a summary document of travel and engineering rates, which are detailed in sub section 2.5.5; and
- a standard method of measurement, which is detailed below.

2.5.2 Method of Measurement

Purpose

The purpose of the AusHFG method of measurement is:

- to provide a methodology for generating robust estimates of building areas in the early stages of a project, and
- during later stages of the project, allow for verification of designed areas against:
    - briefed net functional areas

- briefed allowances for intra-departmental circulation
- travel and engineering estimates.

While the AusHFG method of measurement broadly aligns with methodologies used by quantity surveyors for the purposes of costing, it should be noted that some details differ due to the focus of the AusHFG method on demonstrating spatial efficiency. A measure prepared using the AusHFG method of measurement may therefore show minor differences to a measure prepared for costing.

Space Types

When using the AusHFG method of measurement, all spaces within the footprint of a facility will fall into one of the space categories detailed below.

Table 1: Definition of Space Types

Space Types	Definition
Net functional areas (NFA)	The sum of briefed functional spaces and rooms. When measuring the NFA of a room or space, any column or other non-useable area that sits within or adjacent to the room or space must be excluded from the NFA.
Intra-departmental circulation (IDC)	IDC represents all the remaining space that makes up the footprint of a HPU or department, in excess of the net functional areas. IDC includes: - corridors that sit within the HPU - intra-departmental stairs within the HPU - ancillary spaces within the HPU that are not briefed - inaccessible or non-usable spaces, such as columns and areas that are boxed in. IDC excludes: - fire stairs - lift shafts - engineering spaces such as risers, service cupboards, communications rooms sitting within the footprint of the HPU.
Gross departmental area (GDA)	The footprint area of a HPU or department, representing the sum of net functional areas (NFA) and intra-departmental circulation (IDC).
Travel	Travel represents all fully enclosed spaces that connect each HPU, department and engineering space within a facility. Travel includes: - inter-HPU and inter-departmental corridors - lift shafts and lift wells - all fire stairs - main and feature stairways (except those that sit wholly within an HPU or department) - inaccessible or non-usable spaces within or attached to travel spaces. Travel excludes: - external enclosed and unenclosed walkways linking buildings - external unenclosed stairways.
Engineering	Engineering represents all fully enclosed spaces used to accommodate engineering plant and equipment or used for the reticulation of engineering services. Engineering includes: - plant rooms - communications rooms

Space Types	Definition
	- lift motor rooms - services cupboards such as distribution boards, fire hose reels enclosed in cupboards - risers and shafts - substations - service tunnels - accessible spaces 2,000mm high or over used for engineering services, e.g. interstitial floors - inaccessible or non-usable spaces within or attached to engineering spaces. Engineering excludes: - central energy buildings (these should be measured separately as a project specific item).
Travel and engineering (T&E)	The sum of travel and engineering spaces.
Unenclosed covered areas (UCA)	The sum of UCA at all building levels. UCA includes: - roofed balconies and walkways (including at ground level) - porches and porticoes - roofed external stairways. UCA excludes: - eaves, sun shading and other overhangs, where they do not relate to clearly defined trafficable areas - connecting or isolated covered ways between facilities.

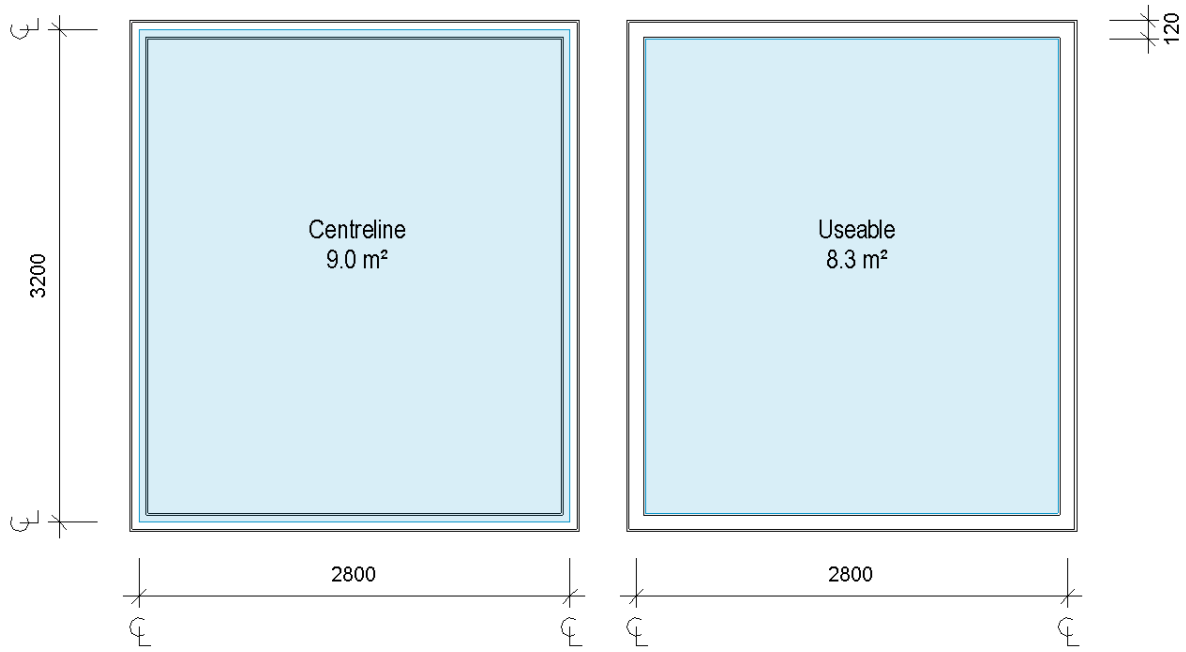
Note: non-useable spaces include any spaces of less than 2,000mm clear height.

Calculation of NFA using nominal areas

The recommended room / space areas given as NFA in the AusHFG represent a nominal area and not the actual useable room area measured between finished wall surfaces. This nominal area is based on the principle of room measurement from the centre lines of walls. The convention of using a nominal area acknowledges that the actual useable area of the room or space is proportionally less than the nominal area.

From the user's perspective a nominal 9m2 office (bounded by typical stud walls – 120mm thick) translates to a useable floor area of approximately 8.3m2, i.e. for every 1m of wall length, 0.06m2 of area should be deducted. This principle is shown in the figure below. The room shape will make no appreciable difference, but area reduction decreases proportionately as room size increases.

Figure 1: Measuring NFA (using an internally located room as a basis)



Limits to wall thicknesses when calculating NFA from centrelines

Wall thicknesses are determined by function and construction, e.g. acoustic, recessed service panels, fire or smoke construction, masonry or hollow partition, or a combination of any of these. In some cases an estimate of wall thicknesses can be made using evidentially based information, known user requirements and / or standard rooms. In other cases, wall thicknesses may be difficult to determine accurately until the detailed planning stage. An adjustment to compensate for wall thicknesses over 120mm should be made appropriate to the planning stage and information available.

For **simple walls** of thickness 120mm and over, the actual room area should be increased to maintain the area which would have been produced if 120mm thick walls had been used. For example, a 9m2 room bounded by 200mm walls will result in a useable area of 7.8m2 (difference of 0.5m2 to a room bounded by 120mm thick walls). This additional space should be added back, to give an adjusted NFA of 9.5m2 when measured to the centreline of the thicker bounding walls. Refer to the 'rule set' at the end of this section for measuring spaces bounded by walls that have the following special conditions including:

- multi-component internal walls;
- external walls; and
- walls where mass concrete thicknesses (e.g. bunkers containing linear accelerators) have been taken into account in the nominated AusHFG NFA.

Communication to users

The use of nominal areas and the measurement method set out above should be clearly communicated to user groups in the early stages of a project. Design decisions made with a clear understanding of this principle will assist in managing risk.

Furthermore, room sizes provided in HPU and standard components may require adjustment in response to current or predicted usage and for furniture, fittings and equipment (FF&E) requirements. The size of equipment for example, may change over time or for use, and this will need to be considered in determining room sizes for specific purposes, e.g. bariatric equipment.

Calculation of building areas

Building areas can be estimated during early planning stages using the following formulae. The formulae can also be used during design stages to compare measured areas and IDC / T&E rates achieved against briefed estimates.

Table 2: Calculation of building areas

Area	Calculation
GDA	**NFA x (1 + IDC percentage rate)** Example: *Facility A has an HPU with an NFA of 1,000m2 and an estimated IDC allowance of 25%. The GDA calculation is:* *1,000m2 NFA x 1.25 = 1,250m2 GDA*
Gross Building Area (GBA)	**Total GDA x (1 + T&E percentage rate)** The total GDA should include areas set aside as shell spaces and lettable commercial space. Example: *Facility A has three HPUs of 1,250m2, 1,050m2 and 700m2 GDA each. The total GDA is 3,000m2. The facility has T&E estimated at 28%. The GBA calculation is:* *3,000m2 GDA x 1.28 = 3,840m2 GBA*
UCA	UCA is to be measured separately and in addition to GBA.

Measuring atria, major lightwells and hospital streets

Many large-scale contemporary healthcare facilities incorporate architectural features such as atria, major lightwells and hospital streets to assist in wayfinding and connectivity. These features are often not able to be anticipated or estimated during the briefing stages. As a consequence, inclusion of these features in measured areas can make a designed facility appear inefficient in comparison to its briefed areas.

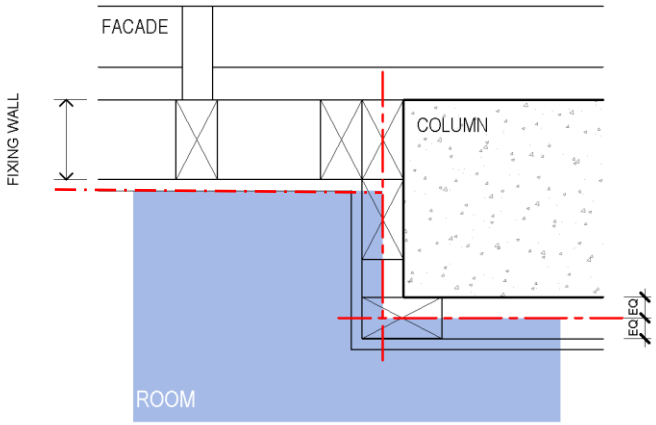
Some jurisdictions have policies on how to treat the measuring of these types of spaces. Where a policy is not in existence, the AusHFG method of measurement is as follows:

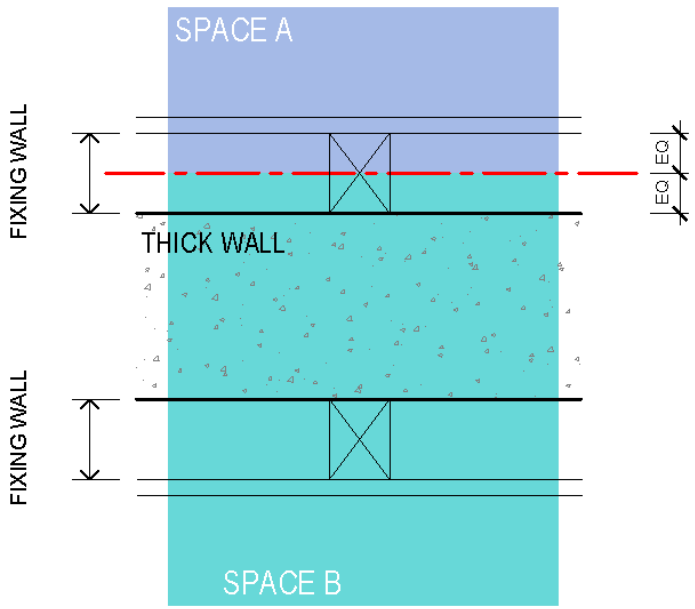
1. Identify the main pedestrian circulation routes across the atrium base, lightwell base or hospital street. Routes would include direct connections between entry points, lifts, reception desks, corridors leading away from the space and HPU entry points. Measure these routes at 2,400mm width and include in travel.
2. Measure lifts and stairways as travel.
3. Identify net lettable or briefed space within the atrium base, lightwell base or hospital to street, e.g. waiting areas, commercial tenancies. Measure these spaces as NFA.
4. Measure all remaining areas as a project-specific item.

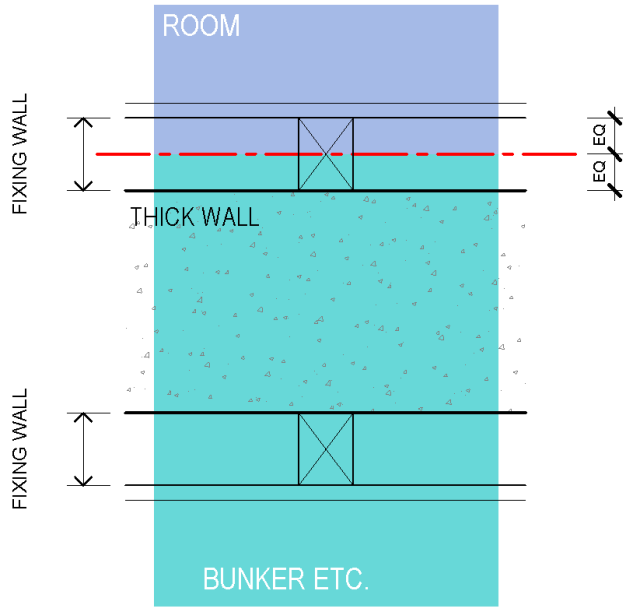
2.5.3 Rule set

Use the following rule set when measuring.

Table 3: Rule set

Situation	Measure	Diagram
Voids above an atrium base or hospital street Atrium openings, light wells, voids at floor level above hospital streets and other major architectural openings in the floor plate.	Exclude voids above the base of the atrium, lightwell or hospital street. Measure spaces abutting the void, such as inter-departmental circulation routes, to the centreline of the balustrade or other elements bounding the void.	
Atrium base Floor space at the base of an atrium, light well or other major architectural opening.	Refer previous section.	
External walls External façade systems, façade lining walls and any columns engaged with the external façade system.	Exclude. Measure spaces abutting external walls to the inside face of the external wall (where a lining wall is used, measure to the inside face of the lining wall). Where a column is engaged with the external wall, measure to the centreline of the column lining's fixings.	
Internal walls (simple) Simple walls of stud framing, block or concrete with or without linings.	Measure to the centreline of the wall in all situations.	

Situation	Measure	Diagram
Internal walls (multi-component) Multi-component walls (generally above 120mm) between different kinds of space.	Locate the measure line between spaces to the centreline of the lining wall fixings to the space uppermost in the following hierarchy: 1. NFA 2. IDC 3. Travel 4. Engineering Where NFA space types sits either side of a multi-component internal wall, measure to the centre line of the lining wall fixings on either side of the wall. The remaining wall thickness will then fall into IDC (IDC = GDA footprint - sum of NFA spaces).	 Example 1: Space A in the above diagram is NFA. Space B is Travel. The measure line between the two spaces is located to the centreline of the lining wall fixings to the NFA space. Example 2: Space A in the above diagram is Travel. Space B is Engineering. The measure line between the two spaces is located to the centreline of the lining wall fixings to the Travel space.

Situation	Measure	Diagram
Internal walls (mass concrete) Where NFA rooms have thick massed concrete bounding walls, e.g. linear accelerators.	Check description of room in the HPU or Standard Components. If the thickness of bounding walls are taken into account *within* the AusHFG room area, measure to the centreline of the lining wall to spaces abutting the room.	
Lifts Shafts, wells and motor rooms.	Measure once at each floor. Use rules above to locate the measure line.	
Risers Risers and shafts.	Measure once at each floor. Use rules above to locate the measure line.	
Stairs Accommodation stairs and fire stairs.	Measure once at each floor. Use rules above to locate the measure line.	
UCA	Measure to the edge of the paving or the edge of the cover, whichever is the lesser.	

2.5.4 Schedule of Intra-Departmental Circulation

The following IDC rates are recommended as a starting point for briefing typical HPU. A benchmarking exercise of recent projects across NSW, Victoria, Queensland and South Australia has been conducted to inform these rates. Most of the rates for circulation have changed owing to evolving approaches to planning, e.g. increase number of single bedrooms or an open plan approach to planning in units such as pathology, pharmacy and sterilizing services.

These percentages may vary as a result of the unit configuration, e.g. an inpatient unit configured as a racetrack or double-loaded corridors. Note that IDC is applied at the function grouping level (a functional grouping is a zone or cluster of like rooms within an HPU, e.g. patient areas). The recommended rates will be applied to functional groupings of a clinical nature, whereas large workplace zones within an HPU will be typically given an IDC to match the Administration Unit (25%).

The figures given are a guide only and the schedules of accommodation provided within each HPU should be consulted for more detailed and accurate allowances. The actual spatial allocation will depend on the role delineation of the service, the re-use of existing buildings and the skill of the individual designer. These circulation figures can be used as a minimum guide, and have been reviewed with minimum corridor widths for BCA and recommended corridor widths in this document (Part C Section 3) for acute frequent patient traffic.

The provision of appropriate areas for circulation requirements will be tested during the preliminary design phases.

Table 4: Recommended intra-departmental circulation rates

HPU	Percentage (%)	Remarks
Administration	25	
Ambulatory Care	32	
Birthing Unit	30	
Cardiac Catheter Labs	32	
Cardiac Investigations Unit	32	
Childcare	20	
Cardiac Care Unit	38	
Chemotherapy Unit	38	
Cleaning Services	10	
Day Surgery / Operating Unit	40	
Education and Training	15	
Emergency Unit	40 - 45	Suggest higher allowance for role delineation level 5/6 services.
Engineering and Maintenance	15	
Food services	25	Previously referred to as a catering unit.
Front of House	25	
IPU - Maternity	32-38	Allowance will vary depending on the scale of the service.
IPU – Medical / Surgical	38	
IPU - Mental Health	32	All HPUs relating to mental health including PECC. Allowance will be subject to the design approach e.g. a higher rate of up to 42% may be required for a 'courtyard' model.
IPU - Paediatrics	32-38	Allowance will vary depending on the scale and complexity of the service.
IPU - Sub Acute	38	
Intensive Care Unit / Critical Care	40	
Linen Services	10	
Medical Imaging Unit	37	
Medical Record / Health Information	12	
Mortuary	20	
Nuclear Medicine / PET	37	
Neonatal Intensive Care / Special Care Nursery	35-40	Suggest higher allowance for role delineation level 5/6 services.
Oral Health	25-35	Suggest higher allowance where a large number of chairs is provided.
Pathology	25	
Pharmacy	25	
PECC	32	
Public Amenities	10	
Radiation Oncology	30-35	Suggest higher allowance for larger and more complex services.
Renal Dialysis	38	
Staff accommodation	10	
Staff amenities	10	
Sterilizing Services Unit	16	

2.5.5 Schedule of Allowances for Travel and Engineering

The allowance for travel and engineering should be determined in conjunction with the planning team to take account of the requirements of the specific project. The allowances may differ dependant on various factors. The travel figure may vary dependent on the number of storeys and the complexity of services offered.

A benchmarking exercise of recent projects across NSW, Victoria, Queensland and South Australia has been conducted to inform these rates. Changes in rates may represent changes in the approach to planning with many projects providing solutions that result in taller buildings.

Where no other information is available the allowance for combined travel and engineering should generally be as follows:

Table 5: Recommended travel and engineering allowances

Storeys	**1-2**	**3-4**	**5-6**	**6+**
Travel	12	15	18	18
Engineering	11	13	15	18
Target rate	**23**	**28**	**33**	**36**

The target rates assume:

- buildings under six storeys are less than 25m as defined by BCA;
- target rates assume a typical acute hospital services profile. For example, a health building including a large number of wet labs may require additional engineering services; and
- target rates may need to be re-examined for very tall buildings.

2.6 REFERENCES

This Section should be read in conjunction with current versions of the following documents or web references.

AUSTRALASIAN

- Australian Institute of Quantity Surveyors 2016, Australian Standard Method of Measurement of Building Works, 6th Edition.
- National Construction Code, Australia.

INDIVIDUAL JURISDICTIONS

NSW

- NSW Health 2010, Policy Directive 2010_035: Process of Facility Planning.
- NSW Health Infrastructure, 2015, Cost Planning and Reporting Standards.

QUEENSLAND

- Queensland Department of Public Works 2009, Strategic Asset Management Guidelines, Queensland Government.
- Queensland Health 1998, Planning and Design Guidelines, Section 1, Queensland Health.

VICTORIA

- Victorian Office of Building 1996, Assessing the Condition of Constructed Assets: An Asset Management.
- Guideline for the Victorian Public Sector, Office of Building Victoria.

03 AMENITY, SAFETY AND DESIGN TOLERANCES

3.1 OVERVIEW

3.1.1 Introduction

This Section provides an outline of amenity, safety and design tolerance matters to be considered when planning a healthcare facility.

In preparing this section of the AusHFG, the preamble of each respective part includes reference to the relevant performance requirements of the National Construction Code – BCA, Volume One (BCA).

It is the responsibility of the design team to ensure that design development in accordance with these guidelines achieves compliance with the relevant performance requirements of the BCA.

3.1.2 Objective of Section

The objective of this Section is to ensure appropriate design coordination between minimum statutory requirements of the BCA and related Standards thereunder, with the operational and functional requirements of the healthcare facility.

3.1.3 Legislative Framework

For the purposes of this section, BCA includes reference to The National Construction Code Series Volume One. Acts, Codes and Standards as listed under Section A of the BCA indicate the minimum performance requirements to be achieved. The BCA Minimum mandatory compliance / performance requirement referenced in this section are referenced from Building Code of Australia 2016.

The requirements of the Acts, Codes and Standards may be exceeded to meet project specific needs. Projects will also need to consider jurisdictional requirements.

3.2 CORRIDORS

3.2.1 Performance Requirements

Refer to BCA Performance Requirements DP6

Corridor clear widths, as described in this Section, represent the recommended minimum suggested requirements to allow for the safe movement of a range of equipment, e.g. trolleys, beds, wheelchairs and other mobile equipment, and the passing of such equipment.

The term ‘clear width’ relates to clearance between handrails, wall guards and any other obstructions or protrusions along the length of the corridor.

Corridors also need to be suitably sized to facilitate emergency evacuation of a building including movement of people, beds and other associated equipment.

In addition, provision should be made for situations where oversized additional equipment such as bed extensions or bariatric beds are in use. This may be provided for in a number of ways such as by increasing corridor clear width, including passing bays etc.

3.2.2 Corridor Types

Corridors and recommended clear corridor widths are categorised below.

Interdepartmental and Public Corridors

These corridors usually accommodate high volumes of traffic and it is often necessary to mitigate risk of conflict between public / staff movement and bed transportation.

The BCA requires corridors to be not less than 1800mm clear width in treatment and inpatient unit areas. Interdepartmental corridors are often outside the treatment and inpatient unit areas, and these corridors tend to connect the treatment and inpatient unit areas.

Hence from a statutory perspective, these corridors are not regulated by BCA.

It is recommended these corridors achieve a minimum 2200mm clear width with opportunity to reduce to 1800mm clear width, with the specific design criteria dependent upon such factors as the size of the proposed facility, e.g. small rural hospitals or multipurpose services, and the likely traffic movement through the interdepartmental corridors.

Where this cannot be achieved, the provision of wider localised sections of corridor should be considered as an alternative for the passing of trolleys / beds travelling in opposite directions.

Frequent bed transportation

The BCA requires corridors to be not less than 1800mm clear width in treatment and inpatient unit areas.

It is common for corridors to be designed not less than 2000mm clear width when the doorways open onto these corridors. For example, BCA requires a door to be not less than 1200mm clear width if it opens onto a corridor less than 2200mm in clear width and if the corridor is more than 2200mm in clear width the door is required to be not less than 1070mm.

The functional and operational requirements in most patient care areas in health care facilities, such as inpatient units, operating units, birthing units and intensive care units, involves a range of bed transportation, movement of trolleys and equipment and general patient, public and staff circulation. It is recommended that 2400mm clear width corridors serving frequent bed transportation (inpatient units and treatment areas) are considered. Equipment such as inpatient beds have increased in width (often 1100mm wide) and this clear width will accommodate two standard inpatient beds passing.

Corridor clear widths may be considered at lesser dimensions when utilising an existing building or when bed and other equipment movements are less frequent, e.g. mental health inpatient units. In existing buildings, special design and planning detail should be incorporated to overcome the problems of congestion and the potential risk to patients and staff in an emergency evacuation. This scenario would also necessitate compliance with the relevant performance requirements of BCA.

No patient transportation

Areas such as back-of-house, staff-only, outpatient / ambulatory care units and community health, need not have corridor width as wide as interdepartmental or frequent bed transportation corridors.

There is unlikely to be bed transportation in these corridors, and the movement of trolleys and deliveries can be managed without compromising the safe movement of occupants.

BCA requires these corridors to be not less than 1000mm clear width. These corridors tend not to require handrails (under BCA or AS1428) unless the corridor incorporates a ramp or stairway.

In order to ensure that accessibility requirements are accommodated, it is recommended that corridors to non-patient transportation areas be designed at not less than 1500mm clear width.

Consideration is to be given to any unique or specific design requirements and accessibility requirements in this regard, noting that non-patient transportation areas may be designed greater or less than the recommended 1500mm clear width dependent upon the project facilities requirements.

In any case compliance will be required with the performance requirements of BCA including the requirements of AS1428 series in relation to accessibility.

3.3 RAMPS

3.3.1 Performance Requirements

Refer to BCA Performance Requirements DP2

Stairways and steps, apart from egress stairways, should be avoided in all patient care areas, as well as staff areas, to accommodate those with mobility restrictions.

Ramps may be required as part of general facility circulation. Ramps for access by people with a disability are frequently used for general access and for moving beds, ambulance trolleys and other equipment between different levels.

Where there is a requirement for bed or patient trolley circulation, provide ramps with the required slope, clear width and turning circles, based on the size and weight of an occupied bed including a bed mover. Consider larger turning circles and lower gradients than those needed for wheelchairs. As a guide, a slope not steeper than 1:20, with rise of 750mm maximum between landings and 2500mm landing length is more suitable.

Meet all WHS requirements for the movement of beds and equipment through risk analysis in consultation with end users.

The slip-resistance rating for materials used on slopes and ramps may vary from those used on horizontal surfaces, and should be selected for the incline and specific conditions of use. Refer to BCA and relevant Standards for requirements.

3.4 CEILING HEIGHTS

3.4.1 Performance Requirements

Refer to BCA Performance Requirements DP6 and FP3.1

Ceiling height requirements will vary dependent upon the functional and operational requirements of the respective spaces and areas within the building. Consideration should also be given to future-proofing areas within the facility including possible conversion of areas that are non-patient care to patient care.

A ceiling height of 2400 is a minimum, although 2700mm as a target recommendation (where floor to floor heights and service zones permit) exists for corridors, passages, and non-treatment and non-activity areas, e.g. offices.

A minimum ceiling height of 3000mm is recommended in patient areas where major medical ceiling-mounted equipment may be installed, noting this requirement is consistent with the prescriptive requirements of BCA and the relevant AusHFG standard components. A ceiling height of 2700mm is the minimum ceiling height recommended for all other general patient treatment spaces.

For bariatric patient care the use of high mattresses, ceiling-mounted lifting equipment and large slings should be identified. The resulting clearance above the bed may require an increase in standard ceiling heights if some types of bariatric manual handling equipment and lifting devices are used. Where an increase in bariatric patient intake is predicted, in particular in acute patient care areas, the provision of adequate support for ceiling mounted equipment should be considered in terms of location (flexibility), method and timing (pre or post occupancy).

Aesthetic and other considerations may also lead to variations such as increasing standard ceiling profiles and heights.

Consideration needs to be given to coordination of ceiling heights against required fixtures and fittings including wayfinding signage, lighting installations, annunciators, exit signage and other potential ceiling mounted fixtures. These installations should not impede general circulation for functionality of the space in relation to vertical clearances.

Design teams must consider extending walls above the ceiling into the floor above in certain areas, such as medical imaging or pharmacy to avoid the risks associated with unauthorised access to areas and in particular 'drop downs' into those areas.

In areas where access is restricted, e.g. drinking fountain recess, a minimum ceiling height of 2250mm is acceptable.

Equipment should be selected to avoid increasing existing ceiling heights or affecting overhead services, e.g. air-conditioning ducts and hydraulics, where possible.

For external areas such as entry canopies, ambulance entries and delivery dock canopies ensure that ceiling (soffit) heights provide adequate clearance for the vehicles expected to use them, and to support related activities, e.g. overhead skip removal.

Give special consideration to the impact of whip aerials fitted to emergency vehicles, or specialist emergency vehicles designed and fitted to transport bariatric patients which may result in increased vehicle height and width. The design should always be issued to the relevant ambulance service as requirements may vary across jurisdictions.

A risk analysis should be conducted and include provision for such items as tour coaches and fire fighting vehicles at the main entry.

Provide plant rooms with adequate ceiling and door height clearance for equipment and allow safe access for service, maintenance and future replacement of equipment. A ceiling height of 2400 to 3000mm is recommended, with 2000mm clear below intermittent ductwork. Provide contrast safety markings to low head-height installations as required.

Reinforce the ceiling support structure or mount independently of the ceiling support structure where overhead patient hoists are to be installed.

In addition, review the information provided by equipment manufacturers in terms of the needs of particular items of equipment for passage through full height door openings, e.g. to ensuites or that may affect the positioning of bed screen tracks or other such fixtures in multi-bed rooms.

3.5 DOORS AND ASSOCIATED HARDWARE

3.5.1 Performance Requirements

Refer to BCA Performance Requirements DP2, DP4 and DP6

Comply with requirements of the BCA and the AS1428 series as applicable for the provision of doorways, including all related ancillary requirements such as construction, compartmentation, clearances, glazing, operation, hardware and signage. Consider the application of AS1428.1 to door opening widths and circulation space as appropriate.

For areas occupied by patients with cognitive deficits and scheduled mental health patients, consideration needs to be given to design compliance against the relevant performance requirements of the BCA to ensure the functional and operational requirements of these areas are addressed.

It should be noted that Mental Health Units, particularly Acute Care units, have their own special considerations when it comes to doors, such as anti-ligature furniture, concealed cut-down leafs and purpose made hinge types. Detailed Guidance on Doors is provided within the specific HPU documents (B.0131 – B.0137) for doors within these units.

3.5.2 Doors

Automatic Doors

Automatic doors may be used in high traffic areas and routes, including entry doors to facilities and departments. They may also be used successfully in areas where hands-off access is necessary, such as in access routes for critical care, ambulance and helicopter cases, entries to Operating Unit, etc.

Satisfy the requirements of BCA for emergency egress and fit automatic doors with sensors to activate opening that ensures safe use by infants, people with a disability, frail patients and visitors.

Subject to compliance with BCA, consider the use of electronic drop bolt locking where lock down security is required.

Note 1. While it is noted automatic swing doors are sometimes unavoidable in departmental planning, their use should be minimised where possible due to WHS and maintenance issues that can arise.

Sliding Doors

Sliding doors such as, single, dual, telescopic etc., may be used subject to compliance with the BCA and the AS1428 series as applicable.

The use of sliding doors in patient care areas may necessitate a performance based solution in accordance with BCA. In addition, consultation with infection control may be required to ensure standards can be met.

These guidelines recommend careful consideration when using sliding doors in healthcare facilities due to hygiene concerns, poor acoustic performance, maintenance problems and potential for locking in place.

Cavity sliders should not be used. Surface mounted sliding doors may be used subject to the requirements of accessibility, egress and access in emergency situations.

If used, sliding doors should resist warping or twisting. Top roller mechanisms, guides and channels should be fit for purpose and ensure safety of operation.

Door Swing

Ensure that doors do not open into a zone which impedes the manoeuvring of patients / residents nor swing out into a circulation area in a manner that might obstruct traffic flow or reduce the required corridor recommended minimum clear width.

Doors along egress routes may need to swing in the direction of egress to satisfy requirements of BCA.

Some doors may be required to swing out, or in both directions, for reasons of patient safety, e.g. patient bedrooms in mental health units, for reasons of staff safety such as in consultation rooms, or where they form part of an escape route.

In consultation rooms ensure that privacy, door seals and acoustic performance are not compromised.

Doors in the Path of Fire Egress

All doors on the path of fire egress are subject to the requirements of the BCA. Doors along egress routes may need to swing in the direction of egress to satisfy requirements of BCA, which may include both directions in some cases.

Doors forming part of a fire or smoke compartment enclosure, should when in the closed position, maintain the integrity of the enclosing structure.

Wherever possible and pending on the type of patient care area, use hold-open devices controlled by the building fire safety system(s) to assist the safe movement of patients, staff and equipment through doorways. Refer: References and Further Reading.

Consider isolating the function of these doors to be strictly for use in a fire event. Using these doors (which are heavy to operate and latch / close very loudly) for departmental control can be problematic for acoustics and WHS reasons.

Locking to Doors in the Path of Travel

Doors along paths of travel in locations of security or by virtue of type of patient care, including mental health, may be secured in the locked position, including during fire mode. Such cases are to be designed and assessed against the relevant BCA performance requirements and will generally require preparation of a BCA performance-based assessment.

The fire and evacuation plan for the building should also include appropriate operational procedures / training requirements for the opening of locked fire exit doors in emergency situations. This needs to be outlined as part of the BCA performance-based strategy to the satisfaction of the Crown Certifying Authority, jurisdictional fire brigade organisation (as applicable) and the asset operator.

Consideration may need to be given to the location of manual override devices that automatically unlock secured doors in locations of patients with cognitive impairment and mental health patients within locked units.

Doors providing egress from enclosed and open courtyards should also be considered when design egress strategies.

Manual override devices should also be provided to enable automatic unlocking of secured doors in cases of emergency evacuation for reasons other than fire, including occupant safety, patient threats, gas leaks and bomb threats.

Security Issues

As a risk management measure, all perimeter doors should be provided with locks to prevent unauthorised entry or exit. In the case of openings into a secure area or courtyard, security may still be breached in a variety of ways. Any decision to omit locks should be formally recorded.

The use of alarms to indicate the unauthorised use of perimeter doors not used for public access and the use of secure hinges (non-removable pins, etc.) to doors identified by risk assessment should be considered.

Entry and exit points into a facility or department should be reduced to a minimum and provided with monitoring / access control as applicable. Suitable provision should be made for use after hours and after dark.

The provision of electronic locks on access and cupboard doors to pharmacies and to clean utility / medication rooms should be considered to provide both security and a record of access.

All door and latching systems are to be compliant with the relevant performance requirements of BCA.

Doors should be made of a material and mounted to withstand physical force.

Doors used by Patients

Use swinging single or double doors to rooms likely to be used by patients without staff assistance. See previous clause *Sliding Doors*.

Swinging doors will generally open from corridors and distribution spaces into rooms for safety, egress. However, examples of some doors that may need to open out are:

- doors to patient ensuites;
- doors to accessible toilets and showers;
- doors to small change cubicles; and
- doors in areas accessed by mental health patients.

Ensure that doors are easy to open and close (door weight) particularly where patients are using mobility aids such as walkers. A full height or a wide single leaf solid core door can be relatively heavy and can cause injury. Other lighter door leaf constructions that meet the required performance are recommended.

Doors required for emergency access to patients / occupants, e.g. toilets, generally should open out or use special purpose hardware to enable an open out over-ride option for emergencies.

All door hardware should address risks such as opportunities for self-harm in areas where patients are assessed and treated as being at risk, e.g. emergency departments, mental health units.

All door and latching systems are to be compliant with the relevant performance requirements of BCA together with the requirements of the Access to Premises Standards 2010 and the AS1428 series as applicable.

Door openings

Doors within separating corridors are covered by the BCA for doors in the path of fire egress. For the purpose of these guidelines all corridors are on the path of egress.

All doors and door openings throughout the building are to be compliant with the relevant performance requirements of BCA together with the requirements of the Access to Premises Standards 2010 and the AS1428 series as applicable.

Ensure that door openings are provided with the minimum clear widths to comply with BCA.

Ensure that appropriate smoke reservoirs are provided over fire and smoke doors used in compartmentation barriers in accordance with BCA.

Consideration is to be given to providing the recommended minimum clear dimensions of 1400mm wide and 2030mm high for doors as clear openings to inpatient bedrooms in new areas to ensure clearance for the movement of beds.

In patient care areas, and acute care areas in particular, the minimum clear opening dimensions may need to be increased for large sized beds and equipment, e.g. bariatric beds exceeding 1200mm width.

Door closers and hold open devices are dealt with later in this section.

Existing doors of lesser dimensions may be considered acceptable in some instances where function is not adversely affected and replacement is impractical, however the requirements of BCA and the AS1428 series are to be accommodated in all instances.

To allow access for equipment expected to be used such as IV poles, fracture frames and electric beds, generally a door clear opening height of 2030mm high is adequate. Where necessary this may be increased to 2330mm or higher, e.g. for doors in specialised equipment transfer path and other special circumstances.

Ensure that doors are easy to open and close (door weight), as a full height or wide single leaf solid core door can be relatively heavy or require supplementary hinges and can cause injury. Choose a lighter durable alternative where possible. Special attention should be given to seclusion room doors.

While these guidelines are intended to facilitate access by staff and mobile equipment, consideration should be given to the size of furniture and special equipment that is to be delivered via these access ways.

3.5.3 Emergency Access

Provide doors and hardware that permit emergency access from outside the room to rooms identified through risk assessment. These may be defined as rooms that:

- are used independently by patients;
- have only one door;

- are smaller than $6m^2$;
- have less than 2.5m of clear space behind the single door;
- form patient bedrooms, bathrooms and ensuites in mental health facilities; and
- form secure rooms in mental health facilities.

Similar areas used by visitors and staff should be considered for emergency access as a part of risk assessment.

3.5.4 Door Handles

Performance Requirement

All door and latching systems are to be compliant with the relevant performance requirements of BCA together with the requirements of the Access to Premises Standards 2010 and the AS1428 series as applicable.

Ensure that all door hardware is fit for purpose and complies with all relevant WHS, user and patient safety, security, special requirements (including anti-ligature), durability and function.

In areas with frequent staff movement by or through doorways, door handles should be selected with a shape that minimises the risk of snagging clothing or other items. Lever handles with a full return are recommended.

Mental Health

All door and latching systems are to be compliant with the relevant performance requirements of BCA together with the requirements of the Access to Premises Standards 2010 and the AS1428 series as applicable.

In mental health facilities ensure that door hardware used in patient accessible areas is:

- of a type manufactured and marketed as anti-ligature; and
- installed in accordance with the manufacturer's instructions.

The use of specific door hardware in areas such as mental health may necessitate performance-based assessment against BCA.

Paediatric Rooms

All door and latching systems are to be compliant with the relevant performance requirements of BCA, together with the requirements of the Access to Premises Standards 2010 and the AS1428 series as applicable. In paediatric rooms where no latching is required, consider providing two sets of push plate / pull handles - one at high level and one at low level. Door controls should be considered against the requirements of AS1428.3 as applicable to paediatric units.

3.5.5 Locks and Hardware

All door locks and hardware are to be compliant with the relevant performance requirements of BCA together with the requirements of the Access to Premises Standards 2010 and the AS1428 series as applicable.

Consider the use of flexible hardware systems where the functionality of the door may be changed without changing the hardware.

The type of locking function should be appropriate for the use of the room and prevent a person becoming inadvertently locked in a room.

Keyless entry systems may be required for controlled access areas.

Where access control systems are provided to doors the fixing location is to be between 900 to 1100mm AFFL and not closer than 500mm to an internal corner.

If the access control system includes for video systems, the access control unit will need to be located in accordance with the manufacturers' instructions but should not to be located closer than 500mm to an internal corner.

3.5.6 Push Plates / Pull Handles

In many instances a door latch is not necessary. Rooms that do not require latching may work well with only a push plate / pull handle and a self-closer. Push plates / pull handles should be used in rooms that are used frequently by staff carrying objects, e.g. dirty utility rooms.

3.5.7 Hold Open Devices

Door hold-open devices, including fire and smoke doors, should be considered for doors that may need to remain open, such as doors on main traffic routes and delivery doors. Devices should meet the following recommendations:

- hold-open devices should be capable of activation and de-activation without any need for the staff to bend down, reach upwards or reach behind the door;
- hold-open devices should not be fitted to doors where this compromises doors that are required to achieve a specific air pressurisation or isolation scheme;
- hold-open devices should not be fitted to the side of a door that may permit a disturbed patient to lock the door from inside or where they may provide a potential hanging point for patients who are at high risk of self-harm;
- in areas frequently used by staff holding objects or pushing trolleys, the use of delayed action combined self-closer / hold-open device is recommended; and
- hold-open devices used for fire and smoke doors should comply with the BCA and be controlled to activate in fire mode.

3.5.8 Door Grilles

Door grilles should not be used in any door within a healthcare facility, due to the infection control, acoustic and maintenance issues they present. Undercuts to doors (maximum of 20mm) and transfer ducts are recommended as alternatives to support heating, ventilation and air-conditioning design.

3.5.9 Self-Closers

Self-closers required for fire and smoke doors are covered under the BCA. This section deals with other door types.

Self-closers should be provided for:

- doors required to achieve a certain airflow or air pressurisation scheme required by these guidelines;
- entrance doors to any area nominated as a restricted area including:
    - operating unit;
    - sterile supply unit;
    - kitchen;
    - sterile stock room;
    - isolation rooms; and
    - birthing rooms.

The over-provision of self-closers can lead to unnecessary capital expenditure and maintenance costs. Door closers should not be fitted where they exacerbate or create manual handling risks, where they impede the movement of patients or where they reduce the independence of patients.

The use of delayed action closers is an option where there is a high incidence of staff carrying objects or wheeling trolleys.

Refer to BCA and AS1428 series for permissible maximum opening forces.

3.6 INTERIOR GLAZING

3.6.1 Performance Requirements

Refer to BCA Performance Requirement BP1.3

Interior glazing, in the form of glazed panels within partitions or doors, is often required for the safe and efficient operation of the door or space. When provided in this context it should be fit for purpose and comply with the relevant regulations, guidelines and standards, in particular:

- AS1288 Glass in Buildings - Selection and Installation;
- AS1905.1: Components for the Protection of Openings in Fire Resistant Walls - Part 1 – Fire Resistant Door Sets, e.g. glazing in fire doors; and
- AS1428 series.

3.6.2 General Considerations

Apart from aesthetic considerations, interior glazing is used for a number of purposes, some of may include:

- employee safety;
- safety of patients, public and others;
- clinical observation of patients;
- security;
- visual communication, e.g. to indicate whether rooms are occupied and location of staff; and
- access to borrowed light.

Glazed panels for both doors and partitions should be sized, positioned vertically and located to enable use by the majority of occupants when seated (eye height 685 to 845mm), and standing (eye height 1405 to 1745mm). For people in wheelchairs, assume a seated eye height (Standards Australia).

A variety of terms are used for interior glazing that include ‘viewing panels’, ‘observation panels’ and ‘glazed doors’.

The use of glazing in doors is similar to partition glazing in that it provides for all of the functional categories above, however the use and operation of doors present a separate WHS risk to staff and safety risk to occupants. Glazing is typically used in the following areas and situations:

- entry / exit to operating rooms or procedure rooms;
- scrub room to operating room;
- airlocks;
- clean utility, medication and dirty utility rooms;
- work rooms frequently used by staff;
- kitchens and pantries; and
- entry doors and doors across corridors.

Where glazing is required to areas for the functional purposes listed previously, it is usually provided in the form of glazed panels in partitions.

Where venetian blinds are provided these should be incorporated between glazing for protection against damage and dust collection. Controls should be located to facilitate the required access. In cases where partition glazing is required as above but cannot be included due to room layout, furniture or fittings, glazed door panels can be used provided that required obscuration can be achieved.

Interior glazing is not recommended in the following areas:

- rooms requiring acoustic isolation, unless the panel can be designed to achieve the required rating; and
- where patient or staff privacy is required, although safety requirements may need to be balanced against this in some situations.

Glazed panels should have a mechanism, device or material to obscure the glazing in the following areas:

- patient bedrooms to facilitate privacy; and
- staff areas when privacy is required.

Glazed panels should have the means (mechanism, device, material) to maintain the integrity of the level of protection or security required in the following and other similar areas:

- operating rooms and procedure rooms where a laser may be in use;
- rooms requiring x-ray or other radiation shielding; and
- rooms requiring electromagnetic shielding, e.g. a Faraday Cage.

Door observation panels may be obscured glazing (varying grades) in areas where a clear vision of the room is not required. This type of glass or applied film may suit rooms where the primary concern is WHS, patient, staff or functional privacy. Obscured glass is usually adequate in rooms such as consult rooms.

The type and grade of safety glazing should be fit for purpose, e.g. avoiding potential risks for security, violence or self-harm, and complying with any the BCA requirements.

Ensure any glazing installations which could be mistaken for uninterrupted paths of travel are provided with appropriate markings in accordance with BCA, AS1288 and AS1428 series, as applicable. The markings are to be contrasting to the background hence consideration needs to be given to the selected colour of wall and floor finishes on each side of the glazed panels against the colour of the contrast decals.

3.7 WINDOWS

3.7.1 Performance Requirements

Refer to BCA Performance Requirements FP4.1, FP4.3 and JP1

It is recommended that all rooms occupied by patients or staff on a regular basis have glazed windows or doors to achieve external views and / or make use of direct or borrowed natural light where practical.

The external windows of all patient bedrooms should overlook external areas defined as the perimeter space around a building as well as naturally ventilated and lit atriums and courtyards.

To allow a view of the outside environment, the height of window sills should be level or lower than the sight line of patients in their beds or in a chair. Refer to section 3.8.2 below.

Note 1: BCA Performance requirement FP4.1 requires the provision of natural light to all rooms used for sleeping purposes in a Class 9a building. This does not apply to the Operating Unit, Emergency Unit and similar areas.

Note 2: Where possible, the provision of external windows to ICU and CCU bed areas is required

Table 6: Natural light requirements

Room / Space	External window Required	Alternatives	Remarks
Bed room	Yes		BCA F4.1 (c) Natural light
Birth room	Yes		BCA F4.1 (c) Natural light
Patient bay – critical	Desirable	Skylight or internal	CCU / ICU bed cubicle, pre-op cubicle
Patient bay – non-acute	Desirable	Skylight	
Patient bay – acute	Desirable	Skylight	
Nursery	Yes		BCA F4.1 (c) Natural light
Patient lounge	Desirable	Skylight	
Patient activity area	Desirable	Skylight or internal	
Patient dining	Desirable		

Windows should be made of a material and mounted to withstand physical force, as far as practicable.

3.8 EXTERNAL VIEWS

3.8.1 Performance Requirements

Refer to BCA Performance Requirement FP4.1

Windows and skylights can provide natural light, natural ventilation and views. These functions are often undifferentiated but each is separate and should be accessed separately.

Ensure windows to all patient overnight rooms are located not less than 3000mm to any external obstructions (or potential obstructions) including allotment boundary, walls of other buildings or walls of the same building.

3.8.2 Indoor Environment Quality

Access to external views and natural light is a part of optimising indoor environment quality (IEQ) designed to assist in the healing process for patients, and to improve the working conditions for staff.

In addition to improving IEQ in general use areas, access to external views can be particularly beneficial for areas such as:

- critical, acute or long term care;
- general and intensive medical procedures;
- repetitive technical and clerical work processes; and
- deep plan clerical and offices areas.

In all of the above examples, and in similar areas, every opportunity should be sought to provide an external view. The need for external views is in direct proportion to restriction experienced by patients, the repetitive nature or intensity of a task, and some desk-bound clerical or technical tasks.

Some environmentally sustainable design (ESD) rating tools and systems apply credit points to external views or daylight and views under IEQ.

3.9 WINDOW TYPES

3.9.1 Performance Requirements

Refer to BCA Performance Requirement DP3, FP4.1, FP4.3 and JP1

In multi-level hospitals with ducted air-conditioning systems and in buildings in cyclone prone areas, it is not always possible or desirable to utilise operable (opening) windows. In these circumstances, fixed windows are acceptable with access for external window cleaning where required that complies with WHS regulations.

For mechanical services refer to Part E of these guidelines and the policies within each jurisdiction, e.g. for the use of mixed mode air-conditioning to utilise natural ventilation to minimise energy usage.

Other factors affecting IEQ include external pollutant sources such as vehicle and building emissions, bushfires, and naturally occurring allergens or pollutants.

Provide operable windows as necessary and appropriate to allow for cleaning and ventilation in case of breakdown of mechanical ventilation systems, e.g. air-conditioning. The use of operable windows for this purpose should be regulated by the use of key operated sashes managed by staff.

Provide operable windows with hardware to control / restrict the degree of opening. Windows, fittings and hardware should be fit for purpose and comply with all relevant regulations and standards.

If it is considered undesirable to allow patients to open windows for reasons such as avoiding potential problems with the central air-conditioning, then the opening section of the windows should be operated with a lock or ‘Allen key’ held by the staff. See previous clause.

Note 1: Fly screens should be fitted to the opening sections of a window or door as described above.

Note 2: The provision of opening windows also facilitates energy efficiency as artificial lighting and air-conditioning systems may not be necessary at certain times of the day and year. However, Infection Control requirements may override this. Refer to AusHFG Part D Infection Prevention and Control.

Note 3: To prevent unauthorised access through windows, a restriction device should be used. This applies particularly to areas that may accommodate children or people with cognitive impairment or mental illness.

Refer: AS2047 Windows in Buildings - Selection and installation.

3.10 WINDOW SIZE

3.10.1 Performance Requirements

Refer to BCA Performance Requirement FP4.1. FP4.3 and JP1

Comply with the requirements of the BCA in relation to natural light and natural ventilation (as applicable) and Ecologically Sustainable Development (ESD) requirements.

Privacy or shading where required should be provided without affecting the requirements of the BCA.

Ensure windows to all patient rooms for overnight are located not less than 3000mm to any external obstructions (or potential obstructions) including allotment boundary, walls of other buildings or walls of the same building.

3.11 WINDOW CLEANING

3.11.1 Performance Requirements

Refer to BCA Performance Requirement DP3

Ensure appropriate provision for window cleaning is in accordance with the BCA and in accordance with any window cleaning policy or contractual arrangements that the respective asset operator may have in place.

3.11.2 General Considerations

The selection of methods used to clean exterior window panes and facades is dependent on a number of factors such as; roof types, balconies, shading devices, ledges, number of storeys within the building and relevant WHS requirements.

Windows and their opening function for cleaning may also be influenced by the room use and interior fittings or furniture, e.g. workstations.

Façade cleaning and maintenance methods should be designed to prevent people or other objects falling from heights and can be classified as:

- passive;
- active; and
- personal protective equipment.

Refer to:

- relevant WHS legislation and related guidelines in each jurisdiction.

3.12 WINDOWS - SECURITY

3.12.1 Performance Requirements

Windows are to be provided with active and or passive security risk mitigation measures to the degree necessary, having regard to the use of the space and the level of security required to prevent unauthorised entry and discharge.

Passive treatment measures such as bars and heavy security screens are discouraged.

A security risk assessment should identify risk mitigation treatments such as; security screens, security glazing, electronic security, locks and restrictors to external perimeter windows as appropriate to minimise unauthorised entry.

SUMMARY

All fixtures and fittings that are installed and fixed to the building, are part of the building and subject to the requirements of these guidelines including considerations such as:

- ergonomics;
- human engineering;
- safety precautions;
- fire safety;
- security; and
- infection control.

Selection of Fixtures and Fittings is covered in detail in AusHFG Part F.

Refer to:

- AS4145.3 Mechanical locksets for windows in buildings;
- AS5039 Security screen doors and security window grilles; and
- AS5040 Installation of security screen doors and window grilles.

3.13 CEILINGS AND CEILING FINISHES

3.13.1 Performance Requirements

Refer to BCA Performance Requirement CP4

Ensure that ceiling types, assemblies and finishes meet all relevant regulatory requirements, in particular the BCA criteria for acceptable fire hazard properties.

Ensure that fitness for purpose, and satisfy aesthetic, sustainability and life-cycle requirements.

Ensure that suspended ceiling systems meet the structural requirements of the BCA including air pressure and earthquake resistance.

3.13.2 General Considerations

Ceiling type and finish have an impact on the aesthetics, acoustics and the general atmosphere of a room. Ensure that the effect of the ceiling finish and colour do not adversely affect the level of lighting in a room.

3.13.3 Selecting Ceiling Systems and Finishes

Surface durability and soil resistance are key considerations where ceilings may be damaged or need to be kept clean. Other factors may include the need for effective noise reduction, light reflection, moisture resistance or the need to accommodate the support of heavy equipment such as medical imaging or other screening machines, patient lifters and other devices.

Ceilings should be easy to maintain and repair. Locally available standard systems are recommended to ensure continuity for replacement of damaged parts.

Ceilings will generally be subjected to the cleaning protocols documented in the operational policies for the facility or for the specific unit.

Access panels should be fit for purpose, minimise the ingress of dust and be secure, i.e. accessed only with a special key tool to prevent unauthorised access.

Ceilings should comply with applicable ESD regulations and guidelines.

3.13.4 Resistance to Surface Damage

Ceilings in emergency receiving areas and mental health units may need to withstand surface impact.

In any areas where inlaid ceiling panels frequently need to be removed for access, resistance to surface scratching and breakage is recommended.

The specification for the proposed finish should be adequate for the particular requirements for each location, including resistance to impact and fracture, surface scratching, mould and air diffuser soiling.

3.13.5 Infection Prevention and Control

Each area within a facility will require a different degree of infection prevention and control management or standard of hygiene. Collaboration with the facility infection control representative and compliance with the current infection control policy in each jurisdiction is a required part of the risk management process.

Select and design ceilings to support the level of infection control management required in each space.

Although ceilings rarely become soiled with any hazardous matter, use a smooth washable finish in areas where splash or spillage might occur, e.g. resuscitation rooms, operating rooms, or where routine wash-down or isolation is required.

For further information refer to:

- AusHFG Part D Infection Prevention and Control; and
- AusHFG Isolation Rooms - Engineering and Design Requirements.

3.13.6 Use of Acoustic Finishes

Ceilings can be used independently or together with floor and wall finishes and furnishings to control the acoustic environment in occupied spaces.

For recommended sound levels refer to AS/NZS 2107: Recommended design sound levels and reverberation times for building interiors), in particular Table 1: Recommended design sound levels for different areas of occupancy in buildings.

Materials should be selected to achieve the recommendations of AS/NZS 2107 while not compromising the medical or functional performance required in each area, e.g. infection control, hygiene, WHS, cleaning and maintenance.

Sound control includes reducing the transmission of air-borne sound from space to space, using the mass of the material layer, e.g. solid plasterboard, fibre cement, and / or reducing the reverberation time or reflected sound within a space by absorption, e.g. using mineral fibre, perforated surfaces. The industry label ‘acoustic’ is generally used to indicate low-mass, sound absorbent products.

Most acoustic ceiling tile products consist of absorbent materials with a porous surface and are generally used with a suspended grid system either exposed or concealed. Both of these factors usually exclude their use in areas where infection control or hygienic conditions are required, e.g. N-class isolation room or operating theatre.

Acoustic products specifically produced for use in clean areas should be assessed on their tested performance. Do not use acoustic and / or tiled ceilings where particulate matter may interfere with hygienic environmental control. The use of acoustic tiles should be avoided in areas where splash can occur.

3.13.7 Access to Services

Provide access to services, concealed fire systems and ceiling voids through ceilings as required except in areas such as operating and procedure rooms, isolation and controlled environments. If access panels are used in procedural areas, they should be provided with an effective air pressure seal.

Suspended modular ceiling systems may be used where access to services is required and a smooth seamless finish is not required.

Access panels should be opened only with a special key tool to prevent unauthorised access.

Ceilings to patient areas in mental health inpatient units should be designed to prevent patients from accessing ceiling spaces. Compressed fibre cement sheet may be required to reduce damage and prevent access.

In areas requiring security or restricted access, e.g. cash holding, pharmacy, stores, medication / clean utility rooms, suspended ceilings or partitions should incorporate measures to prevent unauthorised entry, e.g. steel mesh, or locked access panels.

3.13.8 Avoidance of Deformation and Sagging

Sagging ceilings are often the result of moisture exposure in high humidity areas such as; laboratories, kitchens, laundries, locker rooms, shower areas and indoor pools.

Ensure that exhaust and fan systems are appropriate, e.g. dedicated, single-use systems and adequate for processes and occupancy. Provide remote alarm indication of fan failure where required.

By avoiding where possible the following situations, the incidence of ceilings sagging may be reduced or eliminated by:

- intermittent, seasonal use of facilities or long refurbishment where heating, ventilation, and air-conditioning (HVAC) systems might be shut down for extended periods;
- installation of ceiling systems prior to the activation of the HVAC system in new construction or renovation projects; and
- refreshment of indoor air quality by increasing the percentage of outside air that is circulating through a ventilation system.

For air-conditioning equipment installed within the ceiling space provide condensate pans and drains as necessary. Refrigerant and chilled water piping should have appropriate lagging and be supported along its length to prevent moisture from pooling and damaging the ceiling. Penetrations above the ceiling should be appropriately sealed to prevent the ingress of moisture and to maintain the integrity of fire / smoke compartments.

3.13.9 Suspended and Exposed Grid Systems

The design of suspended exposed grid ceiling systems should have adequate resistance to corrosion, fire and sagging, and be dimensionally stable.

Exterior soffit linings and support systems in adverse environments such as coastal locations and indoor hydrotherapy pools require special consideration.

3.14 FLOOR FINISHES

3.14.1 Performance Requirements

Refer to BCA Performance Requirement CP4 and DP2

Ensure that floor finishes meet all relevant regulatory requirements, standards and policy guidelines. They should adequately address the following issues:

- staff safety including WHS and manual handling;
- patient and visitor safety such as slips, trips and falls;
- area function, sustainability and life cycle cost efficiency;
- infection prevention and control;
- odour control;
- the needs of special user groups;
- acoustic and aesthetic considerations and
- accessibility requirements including colour contrast provisions.

Ensure that interior floor finishes, linings, materials and assemblies meet the criteria for acceptable fire hazard properties required by the BCA.

3.14.2 General Considerations

Floor finishes have an impact on various requirements within the AusHFG.

Part D covers matters that affect the management of infection prevention and control. This section of Part C covers aspects that affect access, mobility, WHS, manual handling and known floor safety issues, e.g. slips, trips and falls, maintenance, sustainability, etc. Ensure that floor finishes support the aims and requirements of the other parts of the AusHFG.

The selection of floor coverings can impact on staff work practices affecting:

- cleaning / maintenance procedures, e.g. too rough a surface may lead to arm and shoulder injuries when using a mop;
- manoeuvrability of wheeled equipment relating to the degree of resistance to push / pull and turning forces;
- risk of slipping or tripping, and injury from falls; and
- fatigue on feet and legs from standing and walking and in this instance, the types of shoes worn by staff should also be considered.

Floor finishes also have a direct impact on the whole of life costs of any building where cleaning and maintenance is concerned. This is especially true in a healthcare facility. Lower initial capital cost may result in higher whole of life costs.

3.14.3 Selecting Floor Finishes

General Considerations

Selection of floor finishes requires consideration of multiple factors, often calling for balance and / or compromise.

Investigate alternative materials, arrange for realistic on-site testing, and check other existing installations with clinical, housekeeping and maintenance staff before selection. The following clauses set out the issues to be considered.

Also refer to TS-7 Floor Coverings in Health Care Buildings (NSW Health & CHAA, UNSW 2009).

Movement of Objects

Floor finishes should be selected to provide minimum rolling friction to wheeled equipment such as beds, trolleys and wheelchairs to minimise the WHS risks and to allow independent mobilisation for people using manual wheelchairs. This is particularly relevant to acute, rehabilitation, and other areas or situations where there is frequent use of wheeled equipment.

The movement of bariatric patients should be considered in all areas.

When selecting floor finishes:

- wheels on equipment should be appropriate for the floor finish;
- rubber tread wheels (softer) suit smooth hard or resilient finishes while polyurethane (harder) suit softer textile finishes;
- if both carpet and vinyl is used in clinical areas, the wheeled equipment should be selected for the highest friction surface, i.e. carpet; and
- equipment is generally supplied with a standard wheel diameter and tread material. While tread materials may be varied, the diameter cannot usually be varied.

Standard vinyl and similar resilient sheet products are the easiest materials for the movement of beds, hoists, trolleys and wheelchairs.

Carpet should be level short pile thickness, tufted loop pile construction, direct stick, dense (high 'Pile Weight Density Factor'), heavy duty commercial grade or above.

Bonded (flocked and needle punched) budget carpet has poor whole of life performance and now has limited use, e.g. external, back of house. The one-way pile characteristic can cause tracking problems with wheeled equipment.

For areas subject to heavy wheeled traffic, foam-backed acoustic vinyl may be unsuitable as the resilience can provide resistance to movement and may deform or delaminate. A resilient backed vinyl with a heavy gauge wear layer should be used if this product type is sought.

Note: Fibres from carpet can collect in the wheel mechanism and increase maintenance and manual handling risks.

Noise Generation and Sound Absorption

Textile floor finishes reduce both impact sound (footfalls) and airborne sound.

Although carpet may be used in corridor areas outside patient bedrooms, where a great deal of noise can be generated, its use is circumscribed by resistance to wheeled equipment, WHS concerns and reduced cleaning efficiency. Improved sound reduction should not be implemented in a manner that adversely affects employee or patient safety, e.g. manual handling, slips, trips and falls.

Cushion backed acoustic vinyl, rubber and linoleum are also effective in minimising sound generation but are less effective than carpet. Ceramic tiles, terrazzo and similar hard surfaces generate sound from impact and reflect airborne sound. They may also generate additional risk to safety from falls.

Sound level reduction data tests should be compared to determine if claimed advantages are beneficial.

Easy Under Foot

Surfaces such as vinyl - standard and cushioned, rubber and linoleum and thin dense carpet are considered easy to stand on for long periods of time. Most WHS research indicates that surfaces such as ceramic tiles and terrazzo are too hard to stand on for more than a few hours but this may be alleviated by suitable shock absorbent footwear. Hard surfaces are therefore not generally recommended in work areas and should be used with caution due to potential injury from falls with appropriate slip resistance coefficients where contamination is expected, especially in food preparation / servery, wet areas, etc.

Infection Prevention and Control

Each area within a facility will require a different degree of infection prevention and control management or standard of hygiene, e.g. staff office areas versus an operating theatre. Collaboration with the facility infection control representative and compliance with the current infection control policy in each jurisdiction is a required part of the risk management process.

Floor finish selection should support the level of infection control management required for each space.

Selection should also satisfy any other specific functional or environmental criteria, e.g. acoustic.

Carpet, tile and broadloom, with a good maintenance regime is acceptable for general use in patient care areas, e.g. lounges, interview rooms. Carpet is less easily cleaned than resilient or hard finishes and should not be used where there is a high rate of spillage or soiling or where smooth, impervious, seamless surfaces are required.

For further information refer to:

- Part D Infection Prevention and Control Section 04 - Surfaces and Finishes.
- Infection control policies within each jurisdiction.
- TS-7 Floor Coverings in Healthcare Buildings (NSW Health & CHAA, UNSW 2009).

Ease of Cleaning

Floor materials should be easy to clean and have wear resistance appropriate for the location involved.

Wet Areas

In areas subject to running water and regular wetting,(e.g. ensuites, floor finishes should satisfy BCA and all related regulations and standards for safety.

Installations should be durable and waterproof having regard to the location of use and requirements for installation.

Conductive Flooring

Static conductive or anti-static 'Astatic' flooring may be required in some areas, e.g. areas with electromedical equipment use or testing / repair facilities. Static control floors are categorised as ‘static dissipative’ and ‘static conductive’.

The degree of electrical resistance or conductivity required should be accurately briefed to ensure that the correct grade of anti-static flooring and associated construction are selected.

Special grades of flooring are available for specific conditions. However for some applications standard flooring may be adequate.

Flammable anaesthetic agents such as ether, cyclopropane or ethyl chloride are no longer used for the treatment of humans. Previous anti-static flooring requirements for these agents in theatres and gas storage areas are therefore no longer applicable except to veterinary procedures.

3.14.4 Selection and Installation

Provide the slip resistance required under BCA and the AS1428 series and appropriate for different conditions. Select floor finishes capable of maintaining slip resistance for areas such as; showers and bathrooms, kitchens, entries and similar work areas that are subject to traffic whilst wet.

Floor finishes should be slip resistant where the presence of fine powder such as talcum powder on a smooth dry floor will constitute a slip hazard.

Refer to:

- AS/NZS 3003: Electrical installations - Patient treatment areas of Hospitals and Medical and Dental Practices (b);

- AS4663 Slip Resistance Measurement of Existing Pedestrian Surfaces
- AS/NZS 3661: Slip Resistance of Pedestrian Surfaces;
- AS 4586: Slip Resistance Classification of New Pedestrian Surface Materials;
- AS Handbook 197: An Introductory Guide to the Slip Resistance of Pedestrian Surface materials;
- BRANZ Bulletin 370: Slip Resistant Floors (BRANZ 1998);
- BRANZ 018-2000: Selecting Flooring (BRANZ 2000);
- Centre for Health Assets Australasia 2007, Wall and Floor Finishes for Wet Areas, University of New South Wales, Sydney (CHAA 2007);
- CIRIA 2006: C652: Safer Surfaces to Walk On, Reducing the Risk of Slipping (CIRIA 2006);
- NSW Health & CHAA UNSW 2009, TS-7: Floor Coverings in Healthcare Buildings V1.1, NSW Health;
- The Center for Health Design: Sound Control for Improved Outcomes in Healthcare Settings (Joseph & Ulrich 2007);
- WorkSafe Victoria, A Guide to Designing Workplaces for Safer Handling of People (For Health, Aged Care, Rehabilitation and Disability Facilities), 3rd, edn, Work Safe Victoria.

3.15 WALL FINISHES

3.15.1 Performance Requirements

Refer to BCA Performance Requirement CP4

Ensure that wall finishes meet all relevant regulatory requirements, standards and policy guidelines. Also ensure that they are fit for purpose and adequately address requirements for safety, WHS, sustainability, life cycle cost efficiency, IEQ, e.g. acoustic, durability and aesthetic value, and indoor air quality (IAQ).

Ensure that interior wall finishes, linings, materials and assemblies meet the criteria for acceptable fire hazard properties required by the BCA.

3.15.2 General Considerations

Wall finishes are often the largest visual element in an area and thus can have an impact on the aesthetic appeal of the space. Selection of appropriate wall finishes may help create a non-institutional atmosphere and assist in the healing process. Other aspects such as the ease of cleaning, infection control, BCA compliance and patient care requirements may need to be considered in the finish selection.

See Part D for infection prevention and control issues.

3.15.3 Selecting Wall Finishes

In addition to the performance requirements above select wall finishes to adequately address the following issues:

- durability and resistance to impact from furniture, trolleys, highly agitated patients, etc.;
- ease of cleaning and retention of appearance over time;
- fire hazard properties; and
- requirements for infection control.

3.15.4 Wall Protection

Wall protection is recommended to improve the longevity and to retain the appearance of most wall finishes, particularly in patient care areas, service corridors and other areas where beds, trolleys and other mobile equipment are used.

3.15.5 Skirtings

Skirtings can perform an important function including barriers against bacterial penetration and build-up of contaminant.

Flat skirting is commonly used with textile flooring with a feather edge for resilient floors. Other factors influence skirting type such as; the sequence of trades, new or retro-fit work, protection of wall or integrity of skirting during carpet laying operations.

Integral coved, on-site formed, skirting involves dressing the floor material up the wall over a preformed coving fillet usually 20 to 38mm radius.

Coved skirting should be a minimum of 150mm high. The skirting can either be tapered at the top to provide a minimal horizontal dust catching edge or finished with a capping seal profile.

The combination of sheet resilient flooring with welded seams and integral coved skirtings, as described above, is generally recommended for all patient care, clinical, wet and other areas where hygiene, infection control, ease of cleaning and decontamination are desirable or required.

For semi industrial and food process / waste handling areas, seamless coatings or ceramic tiling, may be used as appropriate to function.

Where used for wet, clean or similar applications, vinyl wall finishes may be welded to the vinyl floor finish provided that both finishes are homogeneous with a matching or 2mm minimum thickness. The use of vinyl wall sheet products of 1mm thickness carried down over the skirting and glued with an overlap is not recommended for healthcare use.

3.15.6 Corner Guards and Crash Rails

Provide corner guards and crash rails to protect wall linings and finishes against damage from impact in:

- inpatient, outpatient and public circulation corridors;
- support services corridors, storage bays, equipment rooms; and
- any areas with trolley, mobile equipment or bed traffic.

Crash rail design should be appropriate for differing functional requirements.

Crash rail function may incorporate in a dual purpose handrail / crash rail design. Ensure that the combined handrail and crash rail functions comply with the relevant requirements of BCA and the AS1428 series and meet specific user requirements.

3.15.7 Handrails

Handrails may be provided along not less than one side of all corridors and passageways in patient care areas to provide assistance and support for patients and visitors.

Wall system design along corridors and passages in patient care areas need to be appropriate to accommodate fixing of handrails and to withstand the likely loads to be imposed with the use of the handrails. Consideration should also be given to future-proofing of wall systems in this regard where non patient care areas may be intended for future use as patient care.

While handrail installations along general corridors and passageways (excluding ramps and stairways) need not meet the specific requirements of the AS1428 series in accordance with BCA, consideration is to be given to compliance with the accessibility standards to the degree necessary, including recommended returns at handrail ends and reduce the potential for pinch points or grip obstructions.

Handrails are to be continuous along the corridors and passageways wherever practical.

Handrails to stairways and ramps are to comply with BCA and the AS1428 series as required.

3.15.8 Splash Protection

Apply splash protection to walls in areas such as; laboratories, formula rooms, beverage bays, kitchens, bathrooms, showers, and dirty utility rooms in addition to hand basins, scrub troughs, cleaners and laundry sinks.

3.15.9 Radiation Protection

Radiation protection will depend on individual room requirements. Material used and the extent of radiation shielding should be determined by a radiation services consultancy in accordance with the governing regulations and guidelines.

3.15.10 Bench Tops

Bench tops should have a smooth, impervious and durable finish and be resistant to stains. Joins should be avoided where possible for ease of cleaning. The design and the materials used should adequately meet all functional, sustainable and life cycle requirements. A range of products are suitable, e.g. laminates, synthetics and stainless steel.

The junction between wall and bench top work surface may be sealed, provided with an upstand and / or wall protection, or designed with an upstand and / or cleanable gap, as required by function, e.g. cleaning, infection control.

3.16 REFERENCES

Ensure that current versions of the following documents or web references are consulted

AUSTRALASIAN

- Australian Human Rights Commission www.humanrights.gov.au.
- Commonwealth of Australia 1992, Disability Discrimination Act 1992, Office of Legislative Drafting and Publishing, Canberra.
- Department of the Environment and Heritage 2006, ESD Design Guide for Australian Government Buildings, 2nd edn, Australian Government.
- Green Building Council Australia 2009, Healthcare V1, Green Star.
- Green Guide for Health Care www.gghc.org.
- Joseph, A 2006, The Impact of Light on Outcomes in Healthcare Settings Issue Paper 2, Centre for Health Design, Concord, CA.
- Joseph, A. and Ulrich, R. 2007, Sound Control for Improved Outcomes in Healthcare Settings, The Center for Health Design.

STANDARDS AND REGULATIONS

- The National Construction Code Series (NCC)
- Access to Premises Standard 2010
- AS4145.3 Mechanical Locksets for Windows in Buildings
- AS5039 Security Screen Doors and Security Window Grilles
- AS5040 Installation of Security Screen Doors and Window Grilles
- AS/NZS 3003: Electrical Installations - Patient Treatment Areas of Hospitals and Medical and Dental Practices
- AS4663 Slip Resistance Measurement of Existing Pedestrian Surfaces
- AS/NZS 3661: Slip Resistance of Pedestrian Surfaces
- AS4586: Slip Resistance Classification of New Pedestrian Surface Materials
- AS1288 Glass in Buildings - Selection and Installation
- AS2047 Windows in Buildings - Selection and Installation
- AS1905.1: Components for the Protection of Openings in Fire Resistant Walls - Part 1 – Fire Resistant Door Sets, e.g. glazing in fire doors
- AS Handbook 59 - Ergonomics - The Human Factor - A Practical Approach to Work Systems Design (Stds Aust 1994a).
- AS Handbook 197: An Introductory Guide to the Slip Resistance of Pedestrian Surface Materials
- AS/NZS 2107: Recommended Design Sound Levels and Reverberation Times for Building Interiors
- BRANZ Bulletin 370: Slip Resistant Floors (BRANZ 1998)
- BRANZ 018-2000: Selecting Flooring (BRANZ 2000)
- CIRIA 2006: C652: Safer Surfaces to Walk On; Reducing the Risk of Slipping (CIRIA 2006);
- SafeWork NSW
- State Government of Queensland 2009, Workplace Health and Safety Act 2008, Office of the Queensland Parliamentary Counsel.
- Workplace Health and Safety Queensland 2007, Guide to the Workplace Health and Safety Obligations of Designers of Structures, Queensland Department of Employment and Industrial Relations.
- Workplace Health and Safety Queensland 2007, Guide to the Workplace Health and Safety Obligations of Designers of Structures, Queensland Department of Employment and Industrial Relations.
- Workplace Health and Safety, Queensland, 2009, Work at Heights, Department of Employment and Industrial Relations.
- WorkSafe Victoria 2007, A Guide to Designing Workplaces for Safer Handling of People (For Health, Aged Care, Rehabilitation and Disability Facilities), 3rd, edn, Work Safe Victoria.

04 HUMAN ENGINEERING

4.1 INTRODUCTION

Human engineering includes occupational ergonomics which aims to fit the work practices, FF&E and work environment to the physical and cognitive capabilities of all people.

In preparing this section of the AusHFG a performance requirement approach has been adopted for each instance where accessibility is to be incorporated into the design of a Health Facility. Within this document these are referenced as **Human Engineering Performance Requirements** (HEPR).

The HEPR identify broadly the requirements to be achieved in the design of health facilities.

4.2 OBJECTIVE OF SECTION

The objective of this section is provide, as far as reasonable, effective, appropriate, safe and dignified use of healthcare facilities by all people including people with disabilities.

4.3 LEGISLATIVE FRAMEWORK

4.3.1 General Considerations

The legislative framework identifies the applicable Acts, Codes, Standards and Guidelines at the time of development of this AusHFG.

Applicable Acts, Codes and Standards indicate the minimum performance requirements to be achieved but in some cases may be exceeded to meet project specific need.

The following Acts, Codes, Standards and Guidelines will need to be considered when designing health facilities:

- Disability Discrimination Act 1992
- Disability (Access to Premises - Buildings) Standards 2010 (DDA 1992)
- Building Code of Australia
- AS1428 Design for Access and Mobility
- AS2890 Parking Facilities
- AS1735.12 Lifts, Escalators and Moving Walks - Facilities for Persons with Disabilities
- AS1680.2 Interior and Workplace Lighting
- Government office design requirements according to jurisdiction
- HB198 Guide to the Specification and Testing of Slip Resistance of Pedestrian Surfaces
- NSW Health GL2014_018 Wayfinding for Healthcare Facilities
- NSW Health, Protecting People and Property: NSW Health Policy and Standards for Security Risk Management in Health Facilities' 2013

4.3.2 Hierarchy of Documents

There could be conflicting information between the above Acts, Codes, Standards and Guidelines.

Where such conflicts occur the most recent publication will take precedence. An example is AS1428.2:1992 and AS1428.1:2009 where accessible bathroom design details vary. In this instance AS1428.1:2009 will take precedence.

The Building Code of Australia provides the minimum performance requirements to be satisfied.

4.4 PEDESTRIAN ACCESS FROM THE BOUNDARY TO THE PRINCIPAL PEDESTRIAN ENTRIES

HEPR1. Wayfinding will need to be provided to the degree necessary to assist the public navigate the grounds of hospital facilities and within the network of circulation zones within the Hospital.

Hospitals are accessed by ambulance, patient transfer, private vehicles, taxis and by public transport. Parking is generally provided on the healthcare campus however it is common for the streets surrounding the hospital to provide additional parking.

Generally public transport provides stations and set down points external to the healthcare campus. Accessible paths of travel will need to be provided from the boundary adjacent to these locations to the principal pedestrian entrances generally associated with the designated main entry of the hospital or the public entry to the emergency department.

4.4.1 Path of Access

Provide a slip-resistant pathway from the boundary to the designated entry points.

The pathway will be step and barrier free. Any changes in level along the path of travel will be addressed by ramps compliant to the provisions of AS1428.

Paving materials will be close fitting and abut each other in accordance with the tolerances noted in AS1428.

Any grated drains along the path of travel will need to be the heel guard type.

The lighting levels of paths of travel will need to achieve the minimum lighting levels nominated in the respective Australian Standards.

The width of the pathway will not be diminished by encroachments in to the pathway such as light poles, sign posts, landscape or seating areas.

4.4.2 Circulation and Passing Areas

The minimum clear width of any path of travel is to be not less than 1m.

Where paths of travel are longer than 20m then passing bays for wheelchair users or people with mobility aids in accordance with the requirements of AS1428.1 will need to be provided.

Where ramps are provided, appropriate landing zones will need to be provided at the top and bottom of the ramp section.

4.4.3 Seating Areas and Street Furniture

If seating areas are provided along a path of travel issues that need to be considered include:

- the position of the seating will need to be located adjacent to the path of travel however not encroaching into the path of travel;
- seating will be of suitable dimensions to meet the needs of the elderly and the frail;

- arm rests will need to be provided to the street furniture to assist the elderly and the frail; and
- a hardstand will be provided adjacent to any seating zone so that wheelchair users can sit adjacent to any bench seating zone. The minimum size of the seating zone will need to be 800 x 1300mm.

Any street furniture such as bins, drinking fountains and information boards will need to be located outside of the path of travel. Access to any street furniture will need to be located within the reach range zone nominated as part of AS1428.

Drinking fountains will need to be accessible for wheelchairs users.

Where tables and chairs are provided along the path of travel a solid pathway will connect the path of travel to the seating zone. The leg support will need to be setback from the table edge to allow a wheelchair user to approach the table. The height of the table will need to be suitable for wheelchair users.

4.5 WAYFINDING

HEPR1. Wayfinding will need to be provided to the degree necessary to assist the public navigate the grounds of hospital facilities and within the network of circulation zones within the hospital.

For more detailed guidance on Wayfinding refer to Section 5 of this Guideline.

4.6 VEHICULAR ACCESS AND SETDOWN

HEPR1. Vehicular access is to be provided to the degree necessary to gain access to the main entry, emergency department and car parking areas. The design of the set-down areas should provide sufficient approach distance, standing zone and departure distance for the manoeuvrability of a range of vehicle types. Pedestrian safety is to be maintained.

HEPR2. Appropriate wayfinding signage will be required to assist vehicle navigation within the hospital road network.

HEPR3. Where possible set-down areas should be covered to provide limited protection from the elements. The covered area should extend over the pedestrian zone and to some degree over the vehicle carriageway.

HEPR4. Accessible parking space(s) is to be provided where set-down locations are provided associated with pedestrian entries to hospital facilities.

HEPR5. Designated seating areas should be provided with set-down areas.

A range of vehicle types need to be considered when designing the approaches to buildings and associated set-down areas. Delivery vehicles may utilise the same road network to access loading dock and loading facilities. Delivery vehicles will not be encouraged to utilise the pedestrian set-down areas.

The approach to the set-down area may include traffic calming devices such as speed humps, roundabouts or wombat crossings as nominated by the traffic engineer.

The use of pedestrian crossings within set-down areas should be avoided to maintain pedestrian safety.

The manoeuvrability of vehicle types including the height of vehicles, including antennae projections, sweep path of the vehicle, turning circle are required to be considered when designing the approach to the set down zone.

The design of the set-down area can either be a:

a) traditional design where the vehicle zone and pedestrian zone are separated by a 150-190mm kerb, or

b) flush design where the vehicle zone and the pedestrian zone are at the same grade.

When the traditional design for set-down areas is implemented, it will be necessary to provide kerb ramps as needed to enable the transition from the carriageway to the pedestrian walkway. AS1428 provides advice as to the design of kerb ramps.

When the flush design approach is adopted it will be necessary to provide tactile ground surface indicators (TGSI) and bollards to delineate the pedestrian and vehicle carriageway zones. Where possible, the selection of paving materials should provide a 30% luminance contrast differentiation to assist people with low vision.

Specific consideration should be given to the circulation zone at the top of the kerb ramp zone to provide sufficient turning area having regard to the range of pedestrian movements potentially being undertaken within this precinct.

Any grated drains provided along the path of travel will need to be the heel guard type.

4.6.1 Private Vehicles and Taxis (including maxi taxi)

Private vehicles and taxis will be the predominant vehicles utilising the set-down area. The design should allow for the safe manoeuvrability.

Where the set-down area is large, a designated taxi zone should be nominated. A seating areas should be located adjacent to this taxi zone.

Entrances to parking structures should be easily identifiable from the set-down zone. Where possible the set-down zone should not form part of the through traffic route of the hospital.

4.6.2 Accessible Set-Down Zone

The set-down areas should include an accessible set-down area designed in accordance with the provisions of AS2890.6.

The accessible set-down area should be located as close as practically possible to the building entry point.

Where the set-down area incorporates a kerb then either a kerb ramp or a set-down in the pavement should be provided in a convenient location adjacent to the accessible set-down zone. The accessible set-down zone should be clearly signposted.

The interface of differing pavement finishes and the acceptable tolerances will need to satisfy the requirements of AS1428.

4.6.3 Patient Transport including Community Buses

Ambulance bays are generally associated with an emergency department. The design of ambulance bays will need to satisfy the specific requirements of the ambulance service in the relevant jurisdiction.

Patient transport vehicles will have similar physical requirements to ambulances. Patient transport vehicles will utilise both the ambulance bay as well as the set-down areas depending on the service being provided.

Community buses and other private community service vehicles will also utilise the set-down area. Sufficient set-down and parking areas should be made for these types of vehicles.

A seating zone should be located adjacent to the community bus set-down / pick up location.

4.6.4 Service and Emergency Vehicles

Notwithstanding that service and delivery vehicles will be directed to loading dock areas, it will be necessary on occasion for service vehicles to access the set-down area to undertake activities such as repairs, removal of waste and cleaning. The available height over the set-down area should allow for these types of vehicles.

The set-down areas should allow for a range of emergency vehicles to access the area including the fire brigade. The fire indicator panel and booster valves are often located adjacent to set-down areas.

4.6.5 Covered Area

The height clearance of the covered area should be for a range of vehicle types. Height bars should be provided where there is the possibility of larger vehicles colliding with any covering / awning associated with the set-down zone.

The covered area may be limited to the pedestrian zone only or may extend over the set-down zone.

Where a part of the building over provides cover to the set-down area consideration of the protection of any building fabric, engineering services, service pits or the like will need to be made.

4.6.6 Pedestrian Zone

The design of the pedestrian zone associated with the set-down area will need to be considered as three distinct zones.

a) alighting zone located at the kerb edge (1500mm);

b) circulation zone to enable two wheel chairs to pass side by side (1800mm min). This zone is to be clear of obstacles; and

c) seating and street furniture zone located external to the circulation zone.

4.7 ACCESSIBLE PARKING

HEPR1. Accessible parking is to be provided in accordance with the minimum rates of accessible parking identified in the Disability (Access to Premises – Buildings) Standard 2010. The number of parking spaces to be provided is determined on whether the facility is an “outpatient” or “non-outpatient” facility.

HEPR2. The use of park assists or intelligent parking systems within multi-level parking structures together with the identification of remaining parking spaces located at the approach to parking structures assists in the navigation to parking stations where multiple parking structures are provided.

HEPR3. The project briefing following community consultation may require increased levels of accessible parking to be provided over and above that statutorily required.

HEPR4. Accessible parking spaces should be located as close as practically possible to entry points to the Hospital.

HEPR5. Where possible the path of travel from the accessible parking space should not traverse major vehicle routes. The path of travel should be the safest and most direct.

HEPR6. Consideration is to be given as to the placement of access control barriers, pay machines and miscellaneous equipment associated with parking facilities

Car parking represents a significant part of healthcare infrastructure. In addition to public parking there is also a requirement for parking areas to accommodate a range of hospital vehicles.

The location of health facilities facilitates differences in approaches to planning with the result being horizontal, vertical or a mixture of form. The adoption of a hospital road within the healthcare facility providing pedestrian connectivity between clinical departments / buildings has supported the development of multi-level parking structures providing singular or multiple access points.

Each configuration provides options and challenges concerning the relationship of vehicle circulation routes, parking areas and proximity to entry points to the healthcare facility.

Private vehicle parking is provided either at grade or within multi-level parking structures. Parking is provided for both hospital staff as well as the general public.

4.7.1 At Grade

Accessible parking provided as part of an 'at grade' parking configuration should be located as close as possible to a path of travel leading to an entrance to the healthcare facility. Preferably the path of travel should not traverse a hospital arterial route. Kerb ramps should be provided as close as possible to the accessible parking spaces to assist in the transition from the carriageway to the pathway. The space associated with kerb ramps will need to satisfy the requirements of the respective Australian Standards.

4.7.2 Multi-deck Carpark Structures / Basement Parking

Accessible parking spaces should be located as close as possible to pedestrian access points to the healthcare facility whether they be at ground level or by way of aerial bridges.

Where accessible parking spaces are provided at the ground level of the parking structure, an accessible path of travel will need to be provided from the parking structure to the adjacent principal pedestrian entrance. The path of travel should provide a safe route preferably not crossing any hospital arterial circulation route.

Access control, security, concierge functions and wayfinding need to be considered where an aerial bridge provides connectivity between the parking structure and the healthcare facility

The provision of accessible parking spaces has the potential to burden the architectural and structural design of the parking structure. Specific attention is directed to the increased clearances required in the driveways leading to accessible parking spaces and the minimum clearances required above accessible parking spaces and along the aisle ways leading to accessible parking spaces.

4.8 CIRCULATION SPACE AT PRINCIPAL PEDESTRIAN ENTRIES

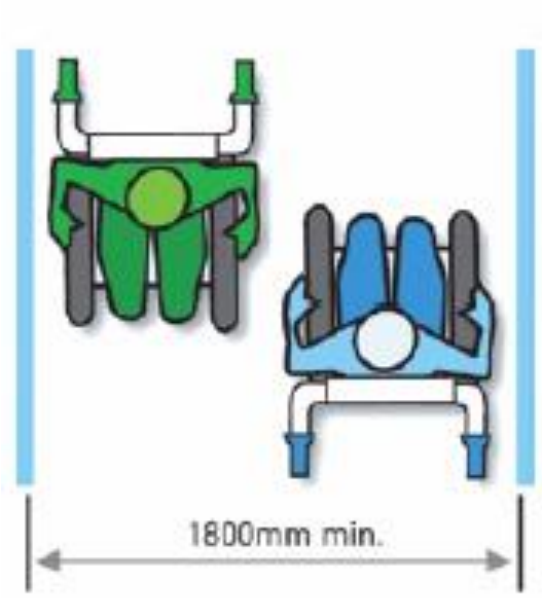
HEPR1. Accessible access is to be provided to the degree necessary at the Principal Pedestrian Entries. The circulation zone is to be barrier free. The surface will need to be slip resistant. The doorways should not restrict access to and from the facility and be of sufficient width to enable two wheelchair users to pass side by side through the entry.

The approach to the main entry, passing through the main entry and the exiting of the main entry, needs to be appropriately dimensioned to accommodate the anticipated design population. The configuration of the entries often incorporates an air lock between a pair of auto sliding doors. In some instances the doors to the air lock are swing doors.

The distance between the doors in the airlock should not be less than 1450mm.

The circulation space on approach and the exiting side of the entry doors should be a minimum clear zone of 1500mm although 1800 to 2000mm would be preferred. The minimum clear width of the path of travel through the entry should be sufficient to allow two wheelchairs to pass each other (1800mm).

Figure 1 –diagram showing min. clear width required to allow two wheelchairs to pass each other



In some instances, the sequence of doors is perpendicular to each other, necessitating a right or left turn within the airlock zone. The clearance zones required for wheelchair turns are identified in AS1428.

4.9 ROOMS AND AREAS EXEMPTED FROM COMPLIANCE (BCA CLAUSE D3.4)

HEPR1.	Provide work places appropriate for people with a disability. Accessible access is not required to be provided to areas within a hospital where the function of the area would pose a health or safety risk for people with a disability.

The following list of room types is provided as an example of rooms and functions where accessible access is not required to be provided. This listing of room types has been determined on the assessment of the use of the room and whether the designated use could pose a health or safety risk for people with disability.

Accessible access leading to each of these rooms is not required to be provided.

- plant rooms;
- clean / dirty utilities;
- store rooms;
- medical records rooms;
- main kitchens;
- loading docks;
- ‘wet’ laboratories; and
- accessible access leading to each of the following rooms should be merit assessed:

- laundry
- pharmacy
- laboratories.

4.10 CIRCULATION

HEPR1. The width of corridors is required to be suitably wide enough to accommodate the functional requirements of the unit while satisfying the minimum requirements nominated within the Building Code of Australia and associated Australian Standards.

HEPR2. The corridors shall incorporate zones within corridors for handwashing locations, linen stores, equipment stores

HEPR3. Accessible access is not required to be provided to areas within a hospital where the function of the area would pose a health or safety risk for people with a disability.

4.10.1 Passing Bays

Generally, corridors in hospital facilities are wider than 1800mm. Many facilities have developed a hierarchy of corridors where depending on the function of the department. Where long corridors are less than 1800mm in width, provide passing bays at intervals of no greater than 20m to enable two wheelchair users to pass.

4.10.2 Circulation at Doorways

The Australian Standards nominate the minimum spatial arrangements to allow people with disabilities to approach and pass through doorways.

4.10.3 Dead Ends (1540 x 2070 zone)

The master planning process nominates block areas for departments within a healthcare facility. The detailed design of the departments could result in conditions where dead ends occur, e.g. beverage bars, workstation zones or consulting room corridors.

As part of the accessible paths of travel within medical facilities, suitable turning areas are required to be provided for wheelchair users. The Australian Standards nominate the required spatial arrangements for wheelchair users to make a 180 degree turn in dead end configurations.

4.10.4 Vertical Circulation

Lifts are integral to the patient and public transfer in multistorey healthcare facilities.

In larger healthcare facilities patient transfer between departments is undertaken by lifts located within the back of house areas. These lifts are generally sized to accommodate patient transfer by hospital bed. In addition, these lifts are utilised as part of the movement of supplies and the removal of waste from the various departments. The functionality of these lifts requires the finishes within the lift cars to be more robust. Notwithstanding the functionality of these lifts it is recommended that the accessible lift features, nominated by the Australian Standards, be incorporated into the fitout of the lift installation. These features include braille tactile buttons, lift car levelling, and door safety features.

The design of the public lifts will need to satisfy the requirements of the Disability (Access to Premises – Buildings) Standard. The sizing of the lift cars will be driven by criteria other than satisfying the relevant Australian Standards. Design criteria may include design population, lift speed, number of stops, cycle times and stretcher lift requirements.

The introduction of 'destination control' systems to the lift installation to improve utilisation of the lift service may pose several challenges for people with disabilities. The system entails the centralised calling of a lift car and the system nominating lift car to transport to the various levels of the building. This approach provides no assistance for people with little or no vision. The considered placement of lift call pylons together with the use of audio and visual lift car identification will assist with the navigation of these systems.

4.10.5 Long Circulation Paths (Hospital Streets)

Pedestrian connectivity between departments is provided by circulation spines often labelled as a 'hospital street'. These circulation spines are often long. The range of movement speed, movement of equipment and supplies, static obstacles and the overlay of signage makes this space most confronting.

The design of these spaces should consider:

- the provision of wider spaces at intersection nodes;
- the provision of seating areas as rest zones in long spines. These seating zones should be located outside of the main path of travel;
- clear wayfinding information;
- increased height provisions; and
- consistent lighting levels, having regard for the benefit of natural lighting.

Where cafés and other concessions are introduced as part of the circulation zones, it will be essential that fixtures associated with the tenancies do not encroach on the circulation zone.

4.11 FLOORING

HEPR1. The selection of the flooring material should be appropriate for the function of the area, satisfy the infection control plan and should achieve the designated slip resistance levels.

HEPR2. The transitions between floor finishes should be as flush as possible to minimise the risk of trips and falls.

HEPR3. Maintenance and cleaning instructions will need to be obtained from the manufacturer so that cleaning personnel can be trained in how to maintain the flooring without diminishing the performance properties of the flooring.

4.11.1 Slip Resistance

The risk of slips, trips and falls is increased in high traffic areas especially where the user is unfamiliar with the surroundings. Standards Australia has published HB198:2014 Guide to the specification and testing of slip resistance of pedestrian surfaces. This publication outlines methods of testing flooring materials and has formulated reference material identifying the various levels of slip resistance of flooring materials required for differing conditions.

It will be necessary to demonstrate that the design slip resistance is satisfied by the selection of flooring materials and that any cleaning or maintenance regime will not diminish the manufactured slip resistance properties of the flooring material.

Where carpet is nominated to be installed, it should provide a flush interface with adjacent floor finishes. Carpet tiles should be laid flat to prevent the curling of edges.

The thickness of the backing and the pile height will need to satisfy the requirements of the Building Code of Australia and the relevant sections of AS1428.

4.11.2 Junctions of Differing Floor Finishes

The transition between differing floor finishes should be as flush as possible. The Australian Standards identify the minimum acceptable tolerances between paving materials and suggests suitable methods to address the transition between flooring materials.

4.11.3 Floor Mats

Floor mats are generally incorporated as part of the airlock design entry to healthcare facilities. These entry mats should be located within recessed mat wells. The mats will need to be securely installed and the junctions between flooring finishes should be as flush as possible. The mats should be easily removable to assist with the cleaning.

The distance of the matting should facilitate the sole of each shoe interacting with the mat a least on two occasion (approximately 3m) before transitioning to the lobby finishes. Research indicates that this assists in removing debris and some moisture from the soles to prevent slips, trips and falls.

It is increasingly becoming the practice to install temporary matting over flooring adjacent to the entries on rainy days to provide additional safety. These mats should be laid flat and provided with rigid feathered edging.

4.12 STAIRS, WALKWAYS AND RAMPS

HEPR1. The use of public and fire stair networks is to be encouraged to reduce the load on the vertical transport system.

4.12.1 Walkways

The term walkways refer to pathways where the gradient of the pathway is less than 1:20.

AS1428 provides guidance as to maximum lengths of walkways before the need to introduce handrails or kerbs. The standard also provides direction as to the form of the paving and the requirement to define the edges of pavement finishes.

4.12.2 Ramps

The term ramp refers to pathways where the gradient of the pathway is steeper than 1:20.

AS1428 identifies several ramp conditions which will provide designers with several tools to address efficiently changes in levels within health facilities. AS1428 also nominates the conditions when handrails are required to be included as part of the ramp system.

4.12.3 Stairs

The BCA and Australian Standards provide guidance as to how to detail general circulation stairs and fire stairs. The issue to resolve as part of the design process, is the approach to detailing to be adopted when it is known that sections of fire stairs will be utilised for circulation purposes.

The detailing of circulating stairs requires a more extensive approach with regards to handrail design, the provision of TGSI and lighting levels.

4.13 RECEPTION AND WAITING AREAS

HEPR1. Reception and waiting areas should accommodate the needs of a wide range of users including the provision of suitable areas for people with disabilities, the aged and the very young.

HEPR2.	Where play areas are provided for children inclusive options should be incorporated into the design.
HEPR3.	Third party equipment installed within hospital facilities shall satisfy the accessibility provisions nominated by the Australian Standards.

4.13.1 Reception

The design of reception counters will vary according to the size of the facility and service requirements.

AS1428 provides guidance as to the design of counters and the spatial arrangements and clearances required for wheelchair users to circulate and utilise the counter.

4.13.2 Provision of Wheelchair Waiting Areas

Hospital facilities include waiting areas. The principal waiting areas should include wheelchair spaces. The path of travel between static seating should allow for the passage of wheelchairs.

The provision of wheelchair locations within waiting areas at a departmental level should be determined according to function and need, e.g. medical imaging, renal dialysis and oncology departments.

4.13.3 Vending Machines

The provision of vending machines within healthcare facilities are typically managed by third party providers. The machines provided will need to satisfy the access requirements nominated in the Australian Standard for vending machines.

The positioning of the vending machines should not provide an obstacle within the path of travel of the corridors.

4.13.4 Public Phones

The inclusion of public pay phones within healthcare facilities is reducing. Where public pay phones are provided then the detailing will need to satisfy the requirements of the respective Australian Standards. Issues considered include mounting heights of equipment and teletypewriter (TTY) options.

The international sign for deafness will need to be provided at these installations.

4.13.5 Furniture Selection

The selection of furniture to be provided within waiting areas should be able to accommodate the widest range of users. Seating with a variety of seat heights meeting the needs of children and the elderly should be considered.

A mix of seating with and without arms should be provided. The provision of seating with arms provides additional assistance for the elderly.

Larger seating types should be provided for larger individuals.

The Australian Standards provide detailed guidance as to furniture design to meet the mobility needs of people with disabilities.

4.13.6 Child Play Areas

It is common for child play areas to be provided as part of waiting areas. If play areas are to be provided inclusive play options should be considered.

The management of infection control in the play areas poses a challenge for the health professionals. If play areas are provided, then easily maintained (cleanable) equipment will need to be provided.

4.13.7 Staff Stations

Staff stations are generally located within selected clinical areas and provide a location for a range of activities, e.g. reception, work base for clinical and clerical staff, clinical observation point.

Generally, the nursing staff are ambulant.

Unlike the main reception or triage, there is no requirement to provide set-down zones or other accessible features associated with the staff station locations.

4.14 OFFICE ACCOMMODATION / CONSULT ROOMS

HEPR1. The design of the office accommodation should provide accessible access to and within all areas used by the occupants.

HEPR2. The design of the offices associated with health facilities will need to satisfy the provisions of the office design requirements of the various governmental jurisdictions.

4.14.1 Accessible Offices / Consult Rooms

Universal design principles should be used when planning all office space. Ideally consult rooms will be designed using a similar approach. An alternative is to allocate at least one consult room per pod of rooms that meets universal design principles.

There will be instances where, due to a variety of legitimate reasons, e.g. refurbishment, it will not possible to provide compliant accessible facilities. In these instances, it will be necessary to determine in conjunction with the users an appropriate approach to address accessibility to these offices.

4.14.2 Workstation Areas – Circulation within Workstations

Accessible access is to be provide to and within workstation zones. Where circulation dead ends occur, compliant circulation spaces to make a 180 degree turn will need to be provided.

The furniture selection will need to facilitate modification or adjustment to furniture to meet the needs of a staff member with disabilities. The flexibility of workstations is accommodated by the selection of ergonomic furniture.

4.15 COUNTERS AND BEVERAGE STATIONS

4.15.1 Reach Range

Beverage stations and a range of counters are provided within health facilities. Accessible access will be needed.

While it is preferable for wheelchair users to be able to wheel up to a counter and position themselves under the counter, the Australian Standards nominate the anthropometric data associated with for IPU and side reach range capabilities.

When designing these types of facilities, it will be essential to consider how each of the facilities will be utilised.

Sufficient circulation space will need to be provided within beverage areas to allow wheelchair users to make a 180 degree turn to position themselves in relation to fixtures included.

4.16 PATIENT AREAS

4.16.1 Patient Rooms

The room layout sheets prepared as part of the AusHFG standard components provide guidance as to the sizing, circulation and inclusions to be provided.

The brief provided to inform each project will indicate the number of patient room types to be provided.

4.16.2 Accessible Change Rooms - Patient

Where change rooms are provided, at least one change room should be designed with additional space to meet the needs of people with disabilities. Refer to standard component Change Cubicle - Accessible, 4m2.

4.17 SANITARY FACILITIES (BCA F2.3 AND F2.4)

HEPR1. The location, sizing and fitout of sanitary facilities will need to meet the needs of the intended users.

Sanitary facilities are to be located in convenient locations and be easily identifiable.

Circulation to and within WC facilities should provide safe environments for all.

With the exception of a few instances ‘banks’ of toilets are provided in key areas such as the main entry. Typically, WC facilities are provided as single stand-alone modules accessed from a circulation corridor. The number of toilets will be dependent on the size and scale of the healthcare facility. The toilet door will be planned with a gap at the base so occupancy can be easily assessed by staff.

Accessible and ambulant WC facilities for public use should be incorporated within public zones. AS1428 provides design guidance for the detailing of accessible WC, ambulant WC and accessible shower facilities.

The model of care defines the spatial arrangements of fixtures within patient WC and shower facilities.

Accessible WC and shower facilities should be provided as part of staff change rooms. The accessible facilities should be conveniently located within the respective change areas.

‘End or trip’ change facilities, where provided, should also include accessible facilities.

Consideration should be given to the provision of larger accessible WC facilities associated with the main waiting areas in accordance with the Changing Places initiative. Refer to AusHFG HPU430 Front of House.

4.18 References

Australasian

- Commonwealth of Australia 1992, Disability Discrimination Act 1992, Office of Legislative Drafting and Publishing, Canberra.
- Australian Government, Disability (Access to Premises - Buildings) Standards 2010.

Individual Jurisdictions

NSW

- SafeWork NSW.

QLD

- Queensland Health 1998, Planning and Design Guidelines, Section 1, Queensland Health.

SA

- Department for Transport Energy and Infrastructure 2006, Disability Access Guide, Government of South Australia.
- Government of South Australia 2004, Compliance Obligations of Building Asset Owners, Government of South Australia.

Tasmania

- Department of Premier & Cabinet, Tasmania 2005, Disability Framework for Action 2005 - 2010: a Whole-of Government Framework for Tasmanians with Disabilities, Department of Premier and Cabinet.
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Victoria

- State Government of Victoria 2006, Disability Act 2006, Victoria, www.legislation.vic.gov.au/.

WA

- Disability Services Commission 1999, Buildings - A Guide to Access Requirements, Disability Services Commission.
- Disability Services Commission n.d., Disability Access and Inclusion Plans for Local Government, Disability WA.
- Disability WA 2009, Disability Services Commission, www.disability.wa.gov.au/index.html
- State Government of Western Australia, 1993, Disability Services Act 1993, www.austlii.edu.au/au/legis/wa/consol_act/dsa1993213

Standards

- AS 1428 (Set): Design for Access and Mobility
- AS 3590.2: Screen-based Workstations - Workstation furniture
- AS 1735.12: Lifts, Escalators and Moving Walks - Facilities for Persons with Disabilities
- AS/NZS 2208: Safety Glazing Materials in Buildings
- AS/NZS 2343: Bullet Resistant Panels and Elements
- AS/NZS 4442 and 4443: Office Desks and Workstations;
- AS/NZS 2243.1: Safety in Laboratories - Planning and Operational Aspects
- AS/NZS ISO 31000: Risk Management
- AS Handbook 59: Ergonomics - The Human Factor - A Practical Approach to Work Systems Design

05 WAYFINDING

5.1 WHAT IS WAYFINDING?

Good wayfinding means knowing where you are, knowing where you are going to, then being able to follow the best route to your destination and recognising it on arrival. Wayfinding is more than just signs: it is an integrated group of systems and tools to help people navigate.

There are three key processes in wayfinding:

1. Decision making – deciding to make a journey and developing a plan of action to get there by making a series of connected decisions.
2. Decision execution – putting the plan into action by setting out on the journey. Factors along the route may produce a change in the plan of action and affect decisions made along the route. People will look for information in order to create a mental map of the route and layout of places.
3. Information processing – using the information available to all the senses. People need to understand information, including spatial relationships, and be able to use it in a particular setting.

There are three elements need to inform and provide wayfinding:

1. Wayfinding strategy – informed by patients, visitors and staff and brought together into a set of wayfinding principles that involve both design and management components.
2. Wayfinding system – developed by understanding existing or future building and site design as well as common journeys.
3. Wayfinding tools – used to implement the wayfinding system. Tools include people, technology, building elements, signs, information and auditing.

A comprehensive approach to wayfinding, including a range of examples of both good and bad, are available in NSW Health GL2014_018 Wayfinding for Healthcare Facilities (2014).

5.2 WAYFINDING PRINCIPLES

Wayfinding principles are overarching statements that set the tone and approach to wayfinding.

Good wayfinding approaches:

- support equity of access to healthcare;
- is informed by the types of people who using or visiting a healthcare facility;
- is helped by good design;
- is the concern of every person working in a healthcare facility;
- ensure resources are managed holistically;
- uses clear language, both spoken and written;
- ensure environments are not be visually cluttered;
- ensure that legislative and regulatory requirements must be met;
- support and simplify patient journeys; and
- support easy identification of territorial boundaries, e.g. staff only areas.

5.3 WAYFINDING STRATEGY

The development and implementation of a strategy is the key to consistently good wayfinding. It sets the scene and the boundaries for all wayfinding approaches and systems. It must respond to the needs of patients, visitors and staff.

A wayfinding strategy provides an overarching view of wayfinding for either a building, a healthcare campus or across an entire health service or region. To be successful and effective it needs to be understood and supported by senior management.

A wayfinding strategy must be developed as an integral part of both the overall building design strategy and the operational strategy. It should be a collaboration between the design and management teams, patients, visitors and staff, specialised wayfinding strategists, the design team, access consultants and ICT specialists.

Design strategies that support wayfinding can include:

- campus arrival points, leading directly to building entries;
- safe and clear pedestrian routes, connecting buildings and hospital services in a logical sequence;
- welcoming entry experiences, including access to information and assistance;
- readable building layouts which assist in developing mental maps; and
- a system of identifiable internal landmarks to assist in orientation.

Management strategies that support wayfinding can include:

- a focus on the patient and visitor experience;
- care models which incorporate preadmission orientation;
- engagement of care coordinators to streamline patient visits;
- maps and other information incorporated into appointment letters; and
- training of staff to provide assistance with directions.

Terminology used to support the wayfinding system needs to be consistent. It should be clear, simple, and descriptive, e.g. ‘Car Park’ or ‘Parking’, but not ‘Multi-deck Parking’. If a destination requires distinction from other similar destinations, then a distinguishing code should be used, e.g. ‘Car Park A’.

Using clinical department titles results in long, difficult to pronounce words that can easily be confused, such as Orthodontics, Orthopaedics, Orthotics, or Ophthalmology. Using descriptive, plain English names reduces the complexity of information, and enables easier navigation.

People with special needs require targeted strategies and these should be identified and articulated early on in planning so the right wayfinding tools can be implemented.

When a significant percentage of visitors are those from culturally and linguistically diverse backgrounds, appropriate initiatives will need to be considered by management, usually in the form of bilingual or multilingual signs and the provision of interpreter services. Two way telephones can also be useful in reception areas at emergency, outpatients and other high use areas.

People with impaired sight will benefit from the option of an orientation service, offered in advance of their initial appointment. This introduces them to the healthcare facility or campus, and accompanies them until they become accustomed to navigating unaided.

Those with a mobility issues need instructions on how best to access the facility, and where amenities such as parking and toilets are located. Route design must be appropriate to allow for access, e.g. ramps and lifts.

5.4 WAYFINDING SYSTEM

Good wayfinding systems can support the steps in a patient's journey:

- **Step 1** – Getting ready to go
- **Step 2** – Getting there
- **Step 3** – Getting around
- **Step 4** – Arriving and departing.

Developing an effective wayfinding system requires an understanding of the information that people are likely to need. Creating a set of the most common journeys can assist with this process.

Common journeys test how comprehensive and effective a wayfinding strategy is. Identification of common journeys made by visitors, patients and others is critical to understanding how wayfinding systems should be designed and what tools should be used.

The design of wayfinding systems for existing healthcare facilities requires an accurate understanding of tools currently in use and existing building features that contribute to wayfinding.

An existing healthcare facility or campus will already have a range of wayfinding tools in operation. The extent to which these tools are working together will need to be considered in the development of a cohesive wayfinding system.

A wayfinding audit, patient shadowing, 'mystery shopper', visitor surveys, asset registers and maintenance schedules provide useful information about signs, language, maps, people, and written materials currently in use.

Other information can come from suggestions or requests for improvements provided by patients or visitors through feedback or complaints processes.

A site survey of key architectural elements will identify:

- buildings and elements that contribute to good wayfinding;
- buildings and elements that cause poor wayfinding; and
- opportunities for improvement including changes to facades, landscaping, pathways and entrance points.

5.5 WAYFINDING TOOLS

Wayfinding tools are utilised together to implement a Wayfinding System. Key tools are:

- planning and design of buildings and campuses;
- landmarks / nodes;
- signs;
- technology; and
- people.

5.5.1 Planning and Design

Architectural Design

The architectural and spatial design of healthcare settings can provide intuitive cues to assist people to orientate themselves and navigate through campuses and buildings. Design factors such as form, the layout of buildings, arrangement of roads and pathways, alignment of corridors and location of clinical settings all contribute to a positive wayfinding experience for patients and visitors.

The question, 'how does the overall design and planning of the environment assist wayfinding?' should be asked at each stage of the design process. Decisions made early in the project are fundamental to establishing a clear wayfinding strategy which can be supported by other tools such as technology, signage and people.

Urban Design

Urban design and master planning can support wayfinding by:

- the creation of clear connections between the health campus and its surrounding network of streets; and
- the arrangement of buildings and landscaped spaces to support intuitive way finding.

In each instance it is important to imagine what people will see as they approach and move around the campus. Campus circulation systems can be both formal and informal. Understanding how well these work in existing campuses can provide important clues as to how they may be improved. Creating clear connections between these systems and those of the surrounding context is integral to a good wayfinding experience.

Planning

Healthcare environments can be characterised by a number of complex buildings with competing planning requirements. Architectural design informs the shape, size, scale, light and volume of the hospital environment but also clinical and operational requirements. This planning process establishes the sequence of spaces which patients and visitors experience within the building.

The planning of healthcare spaces should be seen as hierarchical, ranging from major circulation systems and spaces to secondary systems and spaces, and finally to individual clusters of corridors and rooms. Being able to visualise the entire structure and layout is important in enabling visitors and patients to establish their mental map of the facility. This can be assisted by incorporating internal vistas and atrium spaces and clearly visible public thoroughfares.

The mental map should be complemented by a logical arrangement of horizontal and vertical circulation systems. Horizontal systems such as corridors and public thoroughfares are best aligned with memorable landmarks, either within or outside the building. Vertical systems such as lifts, stairs and escalators are best located at key points on these thoroughfares with connections to reception, welcoming and information points.

Colour

Colours, materials and furniture selected for healthcare interiors, assist in producing memorable experiences and marking particular places within a hospital setting. These experiences are often associated with particular places, like an outpatient clinic, inpatient area or waiting room. They characterise a place and are helpful in creating a mental map.

The use of colour, in areas such as a waiting space, can assist wayfinding by readily identifying places within the hospital.

Thresholds

The marking of thresholds can also be a useful strategy in establishing and reinforcing people's mental maps. Thresholds mark the transition from one place to another and signify that a destination has been reached. Clear thresholds can be achieved using high contrasts of colour, or different scales or material types on either side of an entry point. These changes can be used to signal a destination point along the journey and to announce that a threshold has been crossed.

5.5.2 Landmarks

Traditionally, landmarks are considered to be objects which are easily seen and recognised from a distance. While this description applies to most 'landmarks' we see about town, landmarks as components of a wayfinding strategy require a few additional attributes; they need to be unique, describable, and memorable.

Landmarks should not be confused with one another. Using a large statue of a kangaroo is unsatisfactory if you also have one of a wallaby. Ensuring that each landmark has a unique identity, reinforces the ability of people to describe it accurately, and recall it later.

Describable objects and treatments are key to a successful landmarking strategy. This means that they are recognisable objects, which cannot be confused with something else, and are familiar to the people describing them. Attempting to send people to the 'blobby orange … thing' is far less effective than sending them to the 'orange octopus.' Leveraging off existing, known imagery helps with later recall, and allows people to imagine what they are going to see on their journey. This helps them construct their cognitive map.

As with any communication strategy, these objects and treatments need to be described in a way people are going to understand. When using too much detail, or when using words which are not commonly understood, people are less likely to understand the meaning contained within the phrase. Simple and evocative are best.

Landmarks, whether they be objects or finishes, need to be positioned where they are going to have the most effect. While this often means putting them near major decision points, there are a number of other locations which benefit from visible landmarks.

Landmarks can form a useful part of giving verbal directions to people.

5.5.3 Signage

For many people wayfinding means signs. First-time visitors will be consciously looking for signs to provide information, and expect to follow arrows on the wall until they reach their destination.

However, signs alone are not the solution to most wayfinding problems. Signs will not resolve problems caused by:

- a campus that has expanded, often illogically, over many decades;
- bad planning; and
- conflicting directional cues in the environment.

It is therefore imperative that signs are connected to all the other elements of the wayfinding system, including pre-visit and verbal information, architecture, landscaping and other visual cues.

There are three types of signage used in a wayfinding system include:

- directional - with information on what direction to drive / walk;
- identity / locational - to tell people where they are and when they have arrived; and
- directory - to inform people where they should go.

In addition, there are other signs in a hospital, e.g. statutory, safety, etc., but these are not part of the wayfinding system. They are covered in Section 5.6 below.

When signs are required, it is important that they convey information clearly, are designed so that they can be seen in their environment, and are positioned so that they can be acted upon.

Text Size

In order for text on signs to be legible, the intended use, viewing distance, font, illumination, and location all need to be taken into account. Text on signs intended for car drivers will need to be much larger than the text on signs intended for pedestrian use.

The size of text will vary according to the characteristics of the font. Clearer fonts can accommodate smaller text sizes, while condensed fonts need to be larger. Different fonts may have drastically different legibility at different sizes, even if they initially look similar. It is important that text size and legibility be tested at the signs actual location.

Text Layout and Grouping

While text size is an important factor in the clarity of information, it is important that the layout and grouping of this information is also considered.

Text layout should:

- be consistent across signs; each information type appears in the same relative location, and in the same style, across the whole system;
- ensure that the most important information appears first;
- create a clear distinction between different types of information; and
- group similar items together.

Text and Arrow Alignment

Aligning text and arrows in the direction of travel helps to emphasise which way people need to move. Arrows should be placed on the left when pointing left, and on the right when pointing right.

Font and Text Style

Legibility depends on being able to recognise individual characters, and this will vary from font to font. This is different from readability, which measures how easy the font is for extended reading. Many fonts, which are very readable, are not very legible.

The font selected for use on wayfinding signs should:

- be ‘sans serif’, or have unobtrusive serifs (a serif is the small line finishing off the strokes of a letter);
- have distinguishable letters. Many letters, such as lowercase ‘l’ (el) and uppercase ’I’ (aye) can be confused. Choosing a font with distinctive letters improves legibility;
- have a large ‘x-height’. The x-height is the height of a lowercase letter x, measured as a ratio of the height of a capital letter;
- have a consistent thickness. Large variations in letter stroke thickness create visual disturbance, reducing legibility;
- not be italic or condensed;
- be set in ’title case’, where each word is capitalised, with all following letters set in lower case;
- be of maximum colour contrast between text and sign background; and
- have consistent letter and word spacing, so that each word is easy to read and distinguish.

The text should be styled so that information is delivered in a clear and consistent format. Changes in font weight, size, or colour should be considered only where they enhance the delivery of information.

Emphasising Information

Text size, layout, and colour are all factors that can be used to change the emphasis of information.

Larger text implies more importance, lighter colour or text weight implies less importance. Text setting across signs should:

- create importance through variation in scale;
- create importance through position (relative to other information elements); and
- group similar pieces of information together (i.e. lifts with other lifts, receptions with other receptions)

Symbols and Pictograms

Symbols and pictograms are visual shorthand for amenities within the building such as toilets, lifts and disabled access. While they take up less room than text information, they suffer from a lack of visual clarity. Symbols and pictograms are often misinterpreted or not understood.

Pictograms and symbols should:

- be tested for legibility and recognition;
- conform to commonly understood visual traits;
- be accompanied by a plain English description where a new or uncommon symbol is used;
- be larger than the relative text size. Due to their visual complexity, symbols often need to be significantly larger than text to achieve the same visual recognition and legibility; and
- be of simple and clear design and generally in accordance with ISO 7001 Graphical symbols – public information symbols.

Colour

The use of colour in wayfinding systems is recommended only to reinforce information. Colour use on signs can improve the organisation and clarity of information, and assist with the creation of an integrated, designed environment. Colour used on signs should:

- be consistent from sign to sign. Creating a visual system gives the wayfinding signs an identity, and means that people understand where to look to receive navigational assistance;
- use red to highlight Emergency services only. Red is not recommended for any other use; and
- be consistent in its application and design where it is used to highlight information.

Positioning of Signs

Signs need to be positioned where people have an opportunity to act upon them. Placing signs well before, or just after, a decision point will create frustration and confusion. Sign placement should:

- be clearly visible from the direction of approach;
- ensure that the area surrounding the sign is free of visual clutter, including statutory signs, public information displays, message boards, etc.;
- ensure that the viewing angle is comfortable when signs are above head height, particularly for those people in wheelchairs;
- consider the surrounding environment. for instance, signs should not be placed directly above stairs or escalators, unless they are intended to direct people up or down those elements; and
- consider effects of vegetation growth adjacent to outdoor signs.

Additional Requirements of AS1428.2

- Directional and wayfinding signage should comply with the signage provisions of AS1428.2: Design for access and mobility – Enhanced and Additional Requirements – Buildings and Facilities

Signage details are to be provided as part of the Construction Certificate documentation.

The mounting heights of signage will need to incorporate the viewing zones as identified in AS1428.2.

Construction

Sign construction needs to be suitable for the building, the surrounding environment, and the purpose. High traffic and impact-prone areas will require more robust construction, while overhead signs benefit from lighter weight materials. Sign construction should:

- allow for easy maintenance, including removal and replacement of wayfinding information; and
- be of high quality fit and finish.

Signs for People with Visual Impairment

Signs needs to account for users with visual impairment so that most people can find their way independently and easily. While it is not necessary to provide Braille and tactile information on every sign, a number of factors will enhance the use of signs for those with limited vision. Ensure that signs are highly legible, have appropriate illumination and reflectivity, are positioned well and consistently in the environment, that information is laid out in a logical and consistent manner, and that colour contrast is appropriate.

If the facility has a high proportion of people with visual impairment, measures additional to signs may be required, such as environment treatments and staff assistance.

Illuminating Signs

In some circumstances it will be necessary to illuminate signs to increase the legibility of information, even during daylight hours and in relatively well-lit areas. There are two types of sign illumination:

- external, where the light source projects onto the sign, e.g. overhead road signs or billboards; and
- internal, where the light source is installed within the sign hardware, e.g. retail signs and signs.

Externally illuminated signs should:

- account for reflection and glare from a range of lighting sources;
- ensure that shadows created by lighting do not degrade legibility; and
- ensure that lighting does not obscure or obstruct vision.

Internally illuminated signs should have illuminated text and a non-illuminated background. Illuminating text increases visibility and legibility, whereas illuminating the background can reduce legibility with excess glare.

Maps

Fixed maps on signs should:

- be oriented in the direction of view so that people can orient themselves;
- contain ‘You Are Here’ markers;
- be used for orientation support, not major directional assistance;
- clearly define corridors and destinations;
- use a key to identify the meaning of symbols; and
- include QR codes for use with map applications on smart phones (where used).

5.5.4 Technology

Digital Signs

Digital signs are subject to many of the same design requirements as fixed wayfinding signs, and should be treated as an equal part of the wayfinding system. Digital signs can be used to substitute any sign within the wayfinding system. The look and feel of the digital elements should match those of the physical signs; font, colour, arrangement, and scale should all be consistent. The same principles of positioning and construction also apply.

Digital signs should:

- only be used for wayfinding. Additional information should not be displayed alongside wayfinding information;
- have a slightly larger text size than that of physical signs to account for reduced legibility caused by illumination;
- avoid having animation and movement surrounding the information. Where transitions are required, they should be simple and clear;
- be used where information is likely to change often; for instance department directory boards, opening hours, etc.; and
- not be used as a static directional sign.

Kiosks

Interactive digital kiosks are increasingly used to deliver a range of wayfinding information, and should be considered as part of a complete wayfinding system. Kiosks are a good way to provide personal information and directional support, but can only be used one at a time.

Kiosks should:

- be positioned at major entrances to the hospital, so that they are a clearly visible alternative to approaching reception;
- work with other wayfinding elements to deliver a complete solution;
- contain only wayfinding information;
- additional features, such as internet access are not necessary and will create confusion over the function of the kiosks; and
- contain current, updated information.

The detailing of kiosks will need to address the furniture requirements of AS1428.2.

Smart phone applications

According to research, approximately 80% of Australians own smartphones. This is expected to increase over the next few years and wayfinding smart phone applications will become increasingly available and less expensive to develop. Exact figures on usage rates of phones vary, but it is worthwhile noting that wayfinding systems should not be reliant on any one technology. People should be able to navigate through the facility without reliance on bringing their own technology.

Technologies

Most wayfinding and signs are accessible to people with hearing impairment. In some cases where an audible signal or information needed signs will be a need to be supplemented by appropriate assisting technologies.

Where people are affected by both hearing and vision impairments then assisting technologies are essential.

A range of assisting technologies applicable to wayfinding are available for inclusion in facility infrastructure. Personal systems carried for everyday use, e.g. ultrasonic canes, Electronic Travel Aids (ETAs) and GPS Position Locators, should be provided for if their function can be supported within the facility.

Passive systems that can be considered include:

- tactile ground surface indicators (TGSI) for direction and warning;
- raised tactile and braille sign systems;
- tactile maps and information points;
- active systems have been in use for some time, but the more advanced electronic systems are subject to rapid change and development and should be carefully evaluated before use;
- audible systems for lifts;
- hearing induction loops;
- accessible pedestrian signals (APS);
- remote (infrared) audible signs – may be linked to TGSI;
- audible signs – by push button, infrared receiver, proximity or smartcard device;
- wireless pedestrian navigation system devices;
- information terminals using telephone typewriters (TTY) or video telephones;
- initiatives may also include operational policies enabling the routine use of the telephone;
- interpreter service throughout the facility; and
- two-way telephones can also be installed in reception areas of the emergency department, outpatient clinics, general enquiries and other high use areas.

Irrespective of the wayfinding and other initiatives used, some community education may be required.

5.5.5 People

Wayfinding systems are dependent on a series of separate parts working together to deliver a consistent message. One commonly overlooked part of a successful system is the health service staff, who deliver both formal and ad-hoc wayfinding information to people. Staff are a critical point in the system; it is no use having correct signs if information given by members of staff contradicts that information.

Staff throughout the facility need to use the same language as that developed for fixed and digital signs. This means explaining the system and referring to destinations and directions in the same way, using the same terminology. This consistency of language allows people to become rapidly acquainted with how the system works, and enables them to transition from receiving verbal assistance to using directional signs.

5.6 Statutory, Safety and Operational Signage

Where required for safety and operational reasons, signage should be used to clearly identify staff, patient and visitor areas and clearly identify restricted areas.

Operational and statutory signage should comply with the:

- requirements of the BCA and DDA, and with all relevant legislation, regulations, codes and policies including those within each jurisdiction;

- requirements for relevant Statutory Authorities, e.g. roads, aviation, local authorities, utility providers, etc.; and
- relevant security acts and regulations within each jurisdiction, and all policies governing the function and use of healthcare facilities, e.g. access, safety, processes, building services / components and maintenance.

Australian and International Standards symbols or pictograms should generally be used in preference to custom designs to avoid ambiguity. The use of accompanying text with pictograms assists comprehension and is often necessary.

Refer to:

- AS1428: Design for Access and Mobility, Parts 1 and 2 (Standards Australia)
- Draft AS1428.4.2 Wayfinding Standard
- ISO 7001: Graphical Symbols - Public Information Symbols (ISO).

5.6.1 Helipads

Ensure that the marking and signage for helicopter landing areas complies with the requirements of the regulating authority. Refer to:

- CAAP 92-2 (1) - Guidelines for the Establishment and Operation of Onshore Helicopter Landing Sites (Civil Aviation Safety Authority Australia 2014);
- DHS Victoria - Guidelines for Helicopter Medical Transport Landing Sites (2015); and
- NSW Health - Guideline for Hospital Helicopter Landing Sites in NSW.

5.6.2 External Signs

External directional signs should have reflective letters on a contrasting background. A gloss finish that reflects light may be difficult to read. The signs should preferably be constructed with a durable finish.

External illuminated signs are used for an emergency department, main entry and night entry.

5.6.3 Road Signs

Accreditation standards may require that the facility has directional road signs sufficient to enable it to be easily located from the major access roads in the area.

The entry to the emergency department should be clearly signposted by an illuminated sign that is visible from the main entry points to the hospital site.

For ease of comprehension, all on-site road signage should continue the use of public road signage that complies with the requirements of the local council and / or the roads and traffic authority for each jurisdiction.

5.6.4 Emergency Signage

Complex areas of healthcare facilities, such as an emergency, mental health unit and dementia care, have special wayfinding needs that should be dealt with as part of their functional briefing and clinical safety processes.

Emergency signs must be uniform, prominent, concise and in plain language to avoid confusion, e.g. signs stating, ‘If your condition changes you should notify the nurse immediately,’ must be prominent.

5.6.5 Bed Numbering

Bed numbering should be shown outside the patient bedroom with one number allocated per bed.

In bedrooms with more than one bed, all bed numbers, or the range of numbers, should be shown on the sign outside the room. For example:

- beds 78 & 79; or
- beds 78 to 81.

In bedrooms with more than one bed, display the bed number at the bedhead.

Bed numbers outside the room should be clearly visible from the corridor and not be obscured by other objects or wall returns.

5.6.6 Door Identification

Door / frame numbering or tags may be required as part of an asset management and maintenance system or register. This constitutes a separate labelling system and should not be confused with standard room signage. Unlike room signs, door labels are generally small, unobtrusive and may use a simple bar code.

5.6.7 Identification of Staff Only Areas

The clear signposting of 'staff only areas' provides significant security benefits. If these areas are clearly separated from other areas, e.g. by signposting or locking, it reduces the likelihood of others entering the area and does not give intruders an excuse to be there, e.g. that they were not aware it was a restricted area. Additionally, staff are more likely to pay attention to the area and note an intruder.

5.6.8 Fire Service Signs

Install fire services and exit signs in accordance with the following as applicable:

- Building Code of Australia (Australian Building Codes Board)
- AS2444: Portable Fire Extinguishers and Fire Blankets - Selection and Location
- AS2293.3: Emergency Escape Lighting and Exit Signs for Buildings
- AS2419.1: Fire Hydrant Installations - System Design, Installation and Commissioning
- AS2441: Installation of Fire Hose Reels

Note: Cantilevered wall signs, in preference to wall or ceiling signs, are recommended for the ready identification of Fire Service equipment under emergency conditions.

5.7 References

Individual Jurisdictions

NSW

- NSW Health, 2014, GL2014_018 Wayfinding for Healthcare Facilities
- NSW Health, 2018, GL2018_010 Guidelines for Hospital Helicopter Landing Sites in NSW

Queensland

- Wayfinding Design Guidelines, CRC for Construction Innovation, compiled by Apelt, R., Crawford, J., Hogan,D, n.d., 18 May 2010, supported by Queensland Government Disability Services, http://www.constructioninnovation.info/index.php?id=1097

Victoria

- DHS Victoria 2003, Capital Development Guidelines 6.7: Air Ambulance Helipads, Department of Human Services, Victoria.

Further Reading

- National Construction Code, including the Building Code of Australia (BCA)
- Civil Aviation Safety Authority Australia 2013, CAAP 92-2 (2): Guidelines for the Establishment and Use of Helicopter Landing Sites, Civil Aviation Safety Authority Australia.
- Commonwealth of Australia 1992, Disability Discrimination Act 1992, Office of Legislative Drafting and Publishing, Canberra.
- ISO 7010 2003, Graphical Symbols - Safety Colours and Safety Signs - Safety Signs Used in Workplaces and Public Areas, International Organisation for Standardisation.
- ISO 7001 2007, Graphical Symbols - Public Information Symbols, International Organisation for Standardisation.
- AS 2444: Portable Fire Extinguishers and Fire Blankets - Selection and Location.
- AS2293.3: Emergency Escape Lighting and Exit Signs for Buildings.
- AS2419.1: Fire Hydrant Installations - System Design, Installation and Commissioning.
- AS2441: Installation of Fire Hose Reels.
- AS/NZS 2890 (Set): Parking Facilities.
- AS1428 (set): Design for Access and Mobility.

06 SECURITY

6.1 INTRODUCTION

6.1.1 Overview

Security requirements must be considered in the design of a new or refurbished healthcare facility. Patients, visitors and staff should be able to work in, or attend a health care facility and feel safe and secure in the surroundings. Through the creation of a calming and subdued atmosphere, a positive user experience can be created.

Specific security requirements of a facility can only be defined by conducting a security risk assessment of a facility. The outcomes of the security risk assessment will provide details of the current threats, hazards, risks, trends and security landscape for a particular facility. The outcome of this assessment must be considered in the design process as early as possible. Neglecting the incorporation of security in design principles can generate considerable, yet avoidable, costs to healthcare facilities.

This section is not intended to provide a detailed description of all security requirements associated with a variety of healthcare facilities. The individual requirements will vary from facility to facility and will be based upon the criticality, size, location, services provided and current threat landscape. These requirements will be taken into account to enable a considered design approach for security.

The size and complexity of healthcare facilities can vary considerably. Any security considerations must be risk appropriate to the environment and function of the facility whilst maintaining a consistent approach to the protection of people, information and property. Therefore any security design must be based on the outcomes of a security risk assessment so that any proposed security controls are fit for purpose and are planned for a specific purpose in mind.

6.1.2 Purpose

The purpose of this section is to provide a **basis of design** that establishes the system parameters necessary to provide a safe and secure environment for all people and assets within a facility. This section will provide information to architects, engineers, technical and non-technical readers regarding the ongoing coordination efforts required to develop the framework for a sustainable security function / process. It does not provide information or details pertaining to the physical security requirements or operational needs for those providing security services within a healthcare facility. It is instead provided to assist in the development of conceptual recommendations, systems, and components that could be used to provide and enhance the security of a healthcare facility.

Information gathering and stakeholder engagement is critical to identify, determine, design and provide the required security measures.

6.2 LEGISLATION AND OR COMPLIANCE GUIDANCE DOCUMENTS

6.2.1 Overview

Throughout the planning and design process it is important that the planning team obtain guidance from a variety of sources so that any local recommended strategies are incorporated into the overall design. The following are some of the recommended legislative and guidance documents to be considered:

- AS/NZS ISO 31000 Risk Management – Principles and Guidelines;
- AS/NZS Handbook 167 Security Risk Management;
- AS 44851.1 Security for Healthcare Facilities;
- AS4485.2 Security for Healthcare Facilities Procedures Guide;
- AS2201 Intruder Alarm Systems (Set);
- AS 4806 Closed Circuit Television (CCTV) (Set);
- HB 167 Security Risk Management;
- BH 327 Communicating and Consulting about Risk;
- Commonwealth Government Protective Security Policy Framework (PSPF); and
- Workplace Health and Safety Act and Regulations (for each jurisdiction);

Also refer to the **further reading section** for jurisdictional policies and guidelines.

A **glossary of terms** is also provided at the end of this section.

6.2.2 National Guidelines for Protection of Critical Infrastructure

Critical infrastructure (CI), which is defined as 'infrastructure which, if destroyed, degraded or rendered unavailable for an extended period will significantly impact on social or economic well-being or affect national security or defence', may not apply to all healthcare facilities. However the guidelines associated with the protection of CI are seen as high professional practises, and it is suggested that these are considered, depending upon the criticality of the facility, for security escalation planning in relation to National Alert Levels. Generally the guidelines describe the responsibility of CI owners / operators as:

- providing adequate security of their assets, including having a security plan aligned to the current terrorism alert level;
- actively undertaking the planning process in accordance with the current version of the Risk Management Standard ISO 31000, including risk vulnerability assessment, security planning, emergency response, response planning and business continuity planning, within a terrorism context;
- conducting a review of the risk management plan on an annual basis;
- participating in exercises to test plans conducted by government authorities; and
- reporting any incidents or suspicious activity to State or Territory police.

Through the consultation process a designer must make sure that liaison occurs between local and Commonwealth agencies to determine if a facility will be classified as CI or not.

6.3 TERRORISM

Terrorist acts near healthcare facilities and actual attacks on healthcare facilities have become frequent in other countries and should not be ignored when considering the risks to some **critical healthcare facilities** across Australasia. It is not expected that those planning and designing facilities will have the knowledge and experience required to effectively plan for and mitigate such an event occurring. These guidelines do, however, serve to raise the awareness that terrorism-related events do exist and must be considered as part of an overall design process. Early and ongoing consultation with subject-matter experts is critical at each stage of the design, planning and construction phases.

These guidelines provide general details for those planning and / or designing a facility it does not provide specific information relating to the management, coordination or response of such events. Incident management and security operational plans fall outside the context of these guidelines.

Critical healthcare facilities must have the appropriate plans and operational capability to manage an increased demand on a facility following an incident. Consideration must also be given to limit the exposure to the facility and its occupants to 'as low as reasonably practicable' (ALARP) should an incident occur.

Many healthcare facilities operate 24 hours per day and are required to be publicly accessible. Workplace violence is an increasing problem. Drugs are used and stored in many facilities. Money is handled throughout many healthcare facilities. Healthcare facilities can be considered targets for acts of terrorism.

6.4 SECURITY RISK MANAGEMENT

6.4.1 Overview

Security risk management encompasses the assessment of all aspects of the clinical and non-clinical environment, including consideration of internal and external risks, e.g. local crime profile.

Before any design is developed it is vital that an analysis of risks and threats be undertaken. Risks can be defined as the potential harm caused by the action, and threats are actions themselves. Once risks and threats are identified, mitigation techniques can then be applied to limit the exposure of the facility.

The security risk management process should be undertaken, in consultation with staff and other stakeholders, by those who have expertise in the areas being assessed.

A comprehensive security risk assessment is required and the following is a list of potential, although not exhaustive, issues to be considered as part of the risk assessment:

- Security risks:
    - substance abuse related violence (occupational);
    - emotionally charged violence;
    - verbal or physical abuse within reception and / or emergency department areas;
    - issue motivated groups (acts of terrorism);
    - politically motivated activity;
    - unauthorised access, e.g. inpatients units caring for children;
    - inappropriate use of or access to sensitive information;
    - assault in car parking areas;

  - abuse / misuse / loss of medications; and
  - theft of facility and personal assets;
- Organisational risks:
  - appropriate staffing levels;
  - security apathy;
  - lack of staff awareness;
  - regulatory compliance;
  - recruitment / retention and compensation;
  - incident management and preparedness;
  - reduction in patient care due to role changes;
  - financial implications;
  - reputation;
  - inadequate recruitment and probity checks;
  - internal fraud; and
  - intellectual property;
- Technology and infrastructure risks:
  - outdated or obsolete security technology;
  - less effective design of security systems;
  - convergence of IT and security;
  - natural disasters;
  - integration into other security platforms;
  - integration into non-security applications, e.g. HVAC;
  - failure of electronic security systems;
  - communications failure;
  - supply chain; and
  - pandemic.

6.4.2 Security Risk Management Process

A suitably experienced and qualified professional should conduct security risk and threat assessments in accordance with any operational requirements, legislation, policies and guidelines of the appropriate jurisdiction or agency.

Security risk assessments should be undertaken in accordance with standards, policies and guidelines listed at section 6.2.1.

The steps involved in undertaking a security risk assessment include:

Areas of potential threat should be identified by consulting with; employees, user groups, managers, WHS committee members, security staff and local law enforcement officers. This consultation should occur at all planning, design, construction and occupation phases of a project to make sure that all security concerns are adequately addressed and costed.

When undertaking security risk assessments consideration must be given to the criticality, size, location and operations of the facility.

6.5 SECURITY DESIGN PRINCIPLES

The applied security principles to be considered will ensure that an appropriate level of security is applied, in a uniform and meaningful manner, throughout the facility.

The security design philosophy should be based on the principle that the management of security risks is not achieved by technology or staffing alone and that a complimentary design recognising five key elements of security is provided. These elements are detailed below.

6.5.1 Planning and Design

This element refers to the physical security that is afforded by the way in which buildings are planned and constructed, providing access paths both vertically and horizontally through openings for both pedestrian and vehicles, and including considerations of service's penetrations and the use of clear lines of sight to reinforce natural surveillance.

It recognises the various services within the building and how these groups are segregated, yet where applicable, how these groups interact. This will consider the travel paths associated with all services to ensure that there are no conflicts or compromises.

Planning and design also considers exterior and interior environment features such as building setbacks, landscaping, footpaths, parking, common areas etc.

Physical security considers all building fabrics and materials used in the construction of the buildings, door constructions, door hardware, glazing, lighting, cable access, services access and distribution, protection and redundancy of essential services requirements.

6.5.2 Technology

This element refers to the systems and devices that are provided to assist staff in achieving the required levels of security at all times and manage identified risks.

Technology should not be applied simply because it exists. Approved systems and devices should be identified and recommended as part of the overall design philosophy based on the benefits provided, e.g. removing labour intensive tasks which usually compromise the level of security, if left to manual operations.

The presence of security based technology, and particularly CCTV, can create an expectation from staff and others that assistance will be automatically triggered if a violent incident occurs. As a result, this may affect the response of the individual to the situation, e.g. a staff member may not retreat as they are expecting assistance. It is therefore essential that the purpose of the technology, and what staff should do in the event of a threat, is clearly communicated.

6.5.3 Management

This element refers to how the building security hierarchy is organised, relative to the allocated security manpower operations. These people are involved in managing the various spaces to maintain the required levels of security at all times. This includes all assigned responsibilities, duties and other activities relative to providing the level of supervision of all movement, events, responses and liaisons with other authorities, as and when deemed necessary.

6.5.4 Security Education and Awareness

This element is an enhancement to security services provided through passive surveillance by general staff and when applied effectively can increase the effectiveness of dedicated security staff. Staff provide complimentary services by reporting incidents such as vandalism, antisocial or suspicious behaviour and loitering. The education and training of staff is invaluable in the overall context of security within a healthcare facility.

6.5.5 Crime Prevention Through Environmental Design (CPTED)

Security measures that provide an appropriate level of security and control should be maintained and based upon the principle of ‘Crime Prevention through Environmental Design’ (CPTED). The designer should pay particular attention to the environmental design to complement and enhance security. CPTED is an approach to preventing crime and improving overall security by limiting criminal opportunity through the use of natural barriers and natural surveillance.

Where possible, CPTED should be used in conjunction with electronic, mechanical, and structural crime prevention techniques. CPTED considerations that apply to a healthcare facility are based on the concepts detailed below.

- **Territoriality**

  Territorial reinforcement promotes social control through increased definition of space and improved proprietary concern.

  An environment designed to clearly delineate private space does two things; it creates a sense of ownership by the legitimate user and the sense of owned space creates an environment where ‘strangers’ or ‘intruders’ stand out and are more easily identified.

  Natural territorial reinforcement can be achieved using buildings, signs, lighting and landscape.

Territorial reinforcement measures make the authorised user feel safe while making the potential offender aware of a substantial increased risk of apprehension or scrutiny. This can be achieved through the use of clearly defined perimeters, by way of barriers (fences, bollards, street furniture, hedges or rows of trees) and other visual indicators (changes in ground lay material, lighting levels or wide open spaces), in instances that require the restriction of individuals.

- **Natural Surveillance and Lighting**

  Natural surveillance increases the probability of an offender been seen by taking steps to increase the opportunity that people can be seen. Natural surveillance occurs by:

  - designing the placement of physical features, activities and people in such a way as to maximise visibility and foster positive social interaction among legitimate users of private and public space;
  - creative landscape designs that provide surveillance, especially in proximity to designated points of entry and opportunistic points of entry;
  - use of transparent weather treatments at building entrances;
  - creating a lighting design that avoids poorly placed lights, e.g. create blind-spots for potential observers and miss critical areas. Ensuring that potential problem areas are well-lit, such as pathways, stairs, entrances and exits, parking areas and external, passive recreation areas;
  - including sensor lighting to increase lighting levels when presence is detected; and
  - the placement of lighting along pathways and other pedestrian areas at suitable heights for lighting the faces of people in the space (and to identify the faces of potential attackers).

- **Natural Access Control**

  Natural access control limits the opportunity for crime by taking steps to clearly differentiate between public space and private space. By selectively placing entrances and exits, fencing, lighting and landscape to limit access or control flow, natural access control occurs. Examples of natural access include:

  - the use of a single, clearly identifiable, point of entry;
  - the use structures, carpeting, lighting and the like to divert people to reception areas;
  - eliminating design features, e.g. climbing points, that provide access to roofs or upper levels; and
  - reception desks that have clear views of external entrances, and their immediate area, e.g. waiting areas.

The application of CPTED principles can contribute towards the overall applied level of security for a facility but cannot be applied in isolation. To achieve a total security strategy, principles such as CPTED must be complimented by staff vigilance and security technologies, including but not limited to duress, CCTV and staff help call points, strategically located in areas where the level of risk may require it. The effectiveness of CCTV systems is further increased when natural surveillance techniques are employed.

6.5.6 User Spaces and Security Controls (Rings of Security)

During the design stage, communication and consultation must be undertaken with the end users and other stakeholders to fully ascertain their access and security requirements. The consultation must confirm the user spaces and functional areas coupled with the philosophy of **'rings of security'**. The product of this consultation must form the basis for which the final security design can be developed, determining the applied security technologies, physical security and management procedures necessary to monitor and control all movements with the appropriate security controls.

Each user and / or service area will have specific security requirements, therefore may need one or all of the 'rings'. It is vital that the definition of rings be based on the risks identified during the risk management process. Rings include, but are not limited to the areas identified below:

- **Public spaces**

  These areas include external and entry points to a facility such as landscaped areas and pathways, at-grade car parks, main entrances to all buildings, access roads and public areas external to the buildings.

  These areas may experience various risks such as antisocial and criminal behaviours. Many of these risks can be treated through the application of CPTED principles in building design, landscaping and the application of security technologies.

  There are a number of considerations and security controls that can be employed to reduce the risk to the patients, public, staff and contractors including:

  - natural access control, surveillance and territorial reinforcement through the application of CPTED principles to reduce the likelihood of antisocial and criminal behaviour;
  - designing landscaping and flora to ensure that clear lines of sight are provided to support natural surveillance which will need to be enhanced by the application of surveillance technologies;
  - the creation of walkways of light for major external pedestrian pathways through lighting design. These walkways guide users along paths that are designed with minimal corners to enhance natural surveillance and provide an extended field of view for observation and the application of surveillance technologies such as CCTV; and
  - designing car parking areas to incorporate the CPTED principles where ever possible, to enhance the natural surveillance aspects. In addition, event monitoring / recording CCTV coverage of strategically located help call points should be included. Regular security patrols would also be provided to act as a deterrent.

- **Semi-Public Space**

  These areas are described as the semi-public areas within a facility and as foyers, lobbies, corridors, public lifts and toilets. Semi-public areas may extend throughout the facility and generally terminate at a reception or control point of a department or functional area. These areas are designed to promote ease of movement, yet provide the required segregation of user groups. Design, lighting, signage, and furnishings can be used to lead the user to control points such as a reception and are supported by security technologies, where appropriate.

  Risks associated with semi-public spaces usually encompass antisocial, malicious, violent or criminal behaviours. Specific threats include unauthorised or forced entry to departments or functional areas, plant rooms, risers and communication rooms. Nominal security controls that could be applied to semi-public areas include:

  - bright lighting to guide along the access path to the control point or destination;

- reception areas designed for increased natural surveillance, with open fields of view where possible;
- inclusion of CCTV coverage and strategically located staff help call points in high risk locations. CCTV systems design will enable event recording and support an enhanced incident response;
- vandal resistant finishes and fixtures used to reduce malicious damage;
- locking systems included on access doors to plant areas and risers. They may also be alarmed, depending on their vulnerability and criticality; and
- regular security patrols and the visible presence of security staff are designed to deter and respond.

- **Controlled Public Spaces**

  Controlled public spaces are those areas which extend beyond reception or control points. These areas are generally the public areas within a department or functional area, and as such are located nearby areas containing valuable items, or requiring restricted access for other reasons.

  The specific risks in controlled public spaces may include threats or violence, theft of equipment or personal belongings, unauthorised access and antisocial behaviour. Nominal security controls may include:

  - Reception areas designed to enhance natural surveillance of their approaches. Where control points such as access controlled doors are out of view, they may need to be equipped with video intercom and supported by CCTV where required;
  - a reception point which controls access so a person cannot wander freely into consulting rooms or treatment areas;
  - installation of duress buttons at main reception desks and selected staff stations. At major reception desks these buttons should generate an alarm that can interface into a CCTV system to enable incident recording and an enhanced response;
  - fixing / securing furniture, fittings and other attractive or valuable items within controlled public spaces so that they cannot be easily removed;
  - lockable containers and cupboards should be provided for patient belongings to prevent loss; and
  - the use of electronic access control system (EACS) to selected departments, staff only zones and back of house. The entries and approaches to these areas may be monitored CCTV where a high risk exists. The CCTV system can link to alarm events such as duress and forced door alarms to indicate when an incident has occurred and to enable the correct response.

- **Staff Only Spaces**

  Staff only spaces are areas which are restricted to staff categories such as nursing, catering, linen, security and support services. These areas may allow sole access to a category of staff, or they may be open to staff generally including select contractors.

  Risks in staff only spaces may include unauthorised or forced access, entrapment, theft of medical supplies including restricted substances, theft of medical equipment or personal items, access to medical records and staff files and threats or violence.

  Possible security controls may include:

  - use of territorial reinforcement to enhance the restriction of user group access to these areas. When complimented with management and procedures accidental or purposeful intrusion into these areas may be limited;

- passive 'staff only' boundary could be defined by a change in floor colour to prevent accidental entry;
- restriction of access can be achieved through the EACS with assigned access groups, or key locking with a key management system;
- CCTV coverage of access points linked to event alarms such as forced doors or unauthorised entry;
- duress buttons positioned in high risk areas and linked to CCTV as an alarm event; and
- secure storage for the personal items of staff.

- **Restricted Access Spaces**

  These areas are dedicated and specific functional areas requiring restricted access such as laboratories, pharmacies and clean utility / medication rooms. Access control to these areas is required for both security and operational purposes.

  Potential risks to these areas may include unauthorised access, contamination of sterile areas, theft of medical supplies and restricted substances, theft of personal belongings or medical equipment, threats and violence to staff and disruption or cessation of critical infrastructure.

  Each area identified as restricted access space should have detailed security controls applied to suit the specific function of the area and the services provided. These treatments must be measured against the criticality and vulnerability and be designed to reduce the risk of an event. Generally these treatments will be similar to that of the staff only spaces, with consideration given to additional measures such as:

  - electronic access control with restricted user access groups linked to shift timings and rosters;
  - CCTV coverage of high value items such as restricted substances and medications;
  - electronic access control to drug safes with auditing procedures;
  - intercom and CCTV at area entrances with local and central control; and
  - electronic access control system zoned and grouped to ensure sterile areas are not accessed by unauthorised staff or visitors.

- **Services and Equipment Spaces**

  Service and equipment spaces encompass plant and equipment areas such as mechanical, electrical, communications rooms and risers. These areas can be both internal and external to the buildings.

  These areas must be controlled at all times as unauthorised entry could severely disrupt operations. Nominal threats to these areas may include unauthorised entry, malicious damage and / or deliberate attack. Measures include:

  - all critical plant room doors should be of secure construction, key infrastructure rooms should also be controlled and appropriately managed;
  - critical major plant room doors which open into public accessible space should be alarmed to trigger a security response. Where possible these alarms should be linked to a CCTV system for event recording and auditing; and
  - critical central plant rooms should be designed in a manner to prevent, deter or delay forced entry or wilful damage. This can be achieved through the use of clear sight lines to enhance natural surveillance and the application of CCTV.

Regular security patrols for all areas to deter, detect and respond to incidents should be included as part of operational security procedures.

- **Back of House Spaces**

  These areas include loading docks, stores, food services, cleaning, linen storage and waste disposal. Generally, these areas are subject to the threat of unauthorised access, theft, criminal activity, threats and violence to staff and contractors. Security solutions for specific areas should be developed in consultation with users. Potential security controls for these areas may include:

  - electronic access control to all back of house areas which should be restricted, where possible, through management procedures and physical security measures;
  - electronic access control audit trails recorded and cross referenced to CCTV imagery for post event analysis and for routine security auditing purposes;
  - background security checks of staff and contractors should be considered in accordance with human resources policies;
  - high risk areas such as loading docks should be designed to promote natural surveillance and complimented by CCTV with event recording; and
  - expensive and attractive items should be secured in electronic access controlled rooms.

This section provided an overview of the suggested security controls on a macro scale as they relate to security zoning and user spaces.

6.6 STAFF SECURITY

Risk assessments must consider the following factors:

- patient admission;
- risk of violence from alcohol or drug affected patients;
- visitors;
- working after hours;
- working in isolation;
- movement of staff between areas and departments, particularly after hours;
- staff movement around hospital sites, particularly after hours, e.g. to and from public transport, car parks, staff accommodation and movement between buildings;
- high-risk clinical situations;
- access to assistance and support from colleagues;
- ability to observe patients and others and provide early intervention;
- access to alarms and the provision of personal duress alarms or fixed alarms where appropriate;
- security of property; and

  security of staff and patient records.

6.7 PATIENT SECURITY

Consideration needs to be given to risks that affect patient security including:

- reducing triggers for conflict with patients and relatives. For example, the design of areas to incorporate the use of psychological barriers such as carpet types, lighting, paint colour and signage in waiting areas and reception areas;
- minimising the risk of illegal removal of babies and children from maternity and paediatric units;
- managing patients with mental health, cognitive impairment or young children who may be at risk from wandering or absconding;
- management and supervision of hydrotherapy pools;
- management of patients with behavioural disturbances who may need a safe area for containment and observation and adequate personal space;
- managing the risks associated with the security of police and corrective services officer weapons and equipment;
- managing the security of patients in custody;
- managing the risk of contraband such as drugs, alcohol or cigarettes being brought into a high risk unit such as acute mental health; and

  management of the security associated with acute mental health units in accordance with the recommendations and policies defined within each state. For example, the NSW Mental Health Sentinel Events Review Committee.

6.8 ACCESS CONTROL

Access control regulates the flow of people, vehicles, and materials into, out of, and within a facility. It must be designed in a manner that meets the operating needs of the facility and those that use it.

Access control applies to many categories of people including staff, patients, visitors, contractors, vendors, service representatives etc. Additionally, it applies to vehicles, such as trucks moving to and from loading docks and materials, such as mail, furniture, food and beverage, rubbish, construction etc.

Access control requirements will vary from facility to facility and consideration needs to be given to the individual facility requirements when planning or defining areas that may require access control.

6.9 SECURITY TECHNOLOGIES

6.9.1 Electronic Access Control System

A computer based EACS is popular because it expedites the control function. Systems at many healthcare facilities provide the ability to electronically check a cardholder's authorisation to enter a restricted area, to grant or deny access, record the event, and maintain a computer history of everyone that entered.

EACS can help to minimise the number of security personnel needed for the access control task. The system will consist of intelligent field panels / devices connected to a central security server and database. The panels, field devices, and server work in conjunction to monitor system inputs, control outputs, and make access decisions based on logical access rules and criteria.

An EACS is normally used to control access from unsecure (public) areas to secure (non-public) areas. The transition between the two areas establishes the secure perimeter. Specific areas would be identified as part of the security risk assessment.

There may be a need, in some circumstances, for areas where a certain number of people need to be in a controlled space at any given point in time. This is known as the two-man rule and essentially prevents one person from being in the area by themselves to reduce the opportunity for theft or to maintain integrity of operations within the area, e.g. medication room. A combination of entry and exit readers are used to control the count of people within the space to ensure a count of more than one is maintained at all times.

6.9.2 Intrusion Alarm System

The provision of intruder alarm systems should be based on the security risk assessment and should be considered for areas including building perimeter openings and other restricted facility space and these may need to be equipped with security detection sensors and monitored by a 24-hour operation.

These alarms can form an integral part of the security and can be integrated with the CCTV system to allow for alarm activated video recording. Alarms can be programmed by time of day, holiday schedule, or numerous other 'if / then / when' scenarios for point activation and scheduling.

The issues that may be considered include:

- potential for violence against staff;
- the type of work being carried out by staff;
- staff working in isolation;
- cash handling;
- goods and equipment stored in the area;
- level security risks;
- exits points where there is a possibility that they may be left open by staff or patients;
- patients, or children at risk of unauthorised removal from the facility;
- potential for use of emergency exits, e.g. fire escapes used by thieves to remove assets; and
- potential for break-in via doors and / or windows to remove assets.

6.9.3 Duress alarms

Duress alarms utilise devices that can be activated by a person in need of immediate assistance. An activated alarm must summon a planned response to ensure that assistance is provided to the staff member who is experiencing a threat.

Duress alarms may be integrated into a combined communications system which can be of particular value to a smaller facility. The effectiveness of any duress alarm system will depend upon the adequacy of the installation, training, policies and procedures, regular testing and maintenance and most importantly the capacity for a response.

Locations where duress alarms are suggested include:

- reception desks;
- nursing staff stations;
- cashier locations; and
- any areas identified by the security risk assessment.

There are two generic types of duress alarms these include hardwired (fixed) and wireless (mobile).

A **hardwired alarm (fixed duress)** is generally fixed to the underside of a desk and is used to call for discrete assistance without causing a local alarm that may antagonise an aggressor. The silent alarm should be transmitted to the security control room and other satellite security stations (if provided).

Hardwired alarms are effective in areas where there is little or no opportunity for an aggressor to get between the staff member and the button. They are not suggested for use in open public areas where mischievous tampering may occur.

Wireless duress alarms (personal duress) are appropriate for use where a staff member may be mobile during the course of a shift. They are particularly useful in areas such as inpatient or emergency departments and mental health inpatient units. Wireless duress pendants are generally attached (clipped) to clothing, pocket or belt. They should not be worn around the neck.

They should operate in the same manner as hardwired duress points so that a silent alarm is sent to designated responders.

Wireless duress alarms should comply with the current version of AS4607 Personal response systems and relevant jurisdictional standards.

6.9.4 Closed Circuit Television Systems

A closed circuit television (CCTV) system will form a component of the overall security and surveillance for a facility. The security component of a CCTV system would generally consist of:

- general surveillance of all high risk areas including ambulance bays and after hours entrance;
- security CCTV operations to assist with remote operations of doors, gates and the like;
- alarm response to high priority alarms for example duress points; and
- remote surveillance of car parking areas,

CCTV cameras must be located based on the outcome of the security risk assessment, with particular consideration given to the jurisdictional privacy requirements. The purpose of the CCTV must be established prior to its installation, i.e. live monitoring, access control, recording incidents etc.

To maximise security's ability to reconstruct an incident and identify the perpetrator, all pertinent camera footage in the system should be recorded and archived. In this fashion, the video from any camera in the system can be reviewed to ascertain who, what, where, and when. CCTV can provide comprehensive security coverage with a minimum of personnel. A properly configured system ensures continuous monitoring and allows security personnel to respond promptly to problems or non-standard situations observed.

The design and installation should comply with the local jurisdictional requirements and the current version of AS 4806 series for CCTV.

Unless specifically required it is recommended that all cameras are IP based. It is further recommended that camera types are selected as follows:

- internal fixed – mini-dome type with adjustable lens to suit application and viewing coverage require;
- external fixed – fixed camera and housing combination;
- internal PTZ – PTZ mini-dome type with internal dome housing; and
- external PTZ – PTZ dome in weatherproof housing.

External surveillance cameras must be appropriately selected to provide the correct colour rendition to match the perimeter lighting conditions.

All external cameras and lenses must be housed in suitably rated weatherproof housings to ensure that there is no ingress of dirt or moisture and to assist in temperature stability inside the camera housing.

6.9.5 Radio Frequency Identification (RFID)

It is suggested that a RFID technology is used to allow for the monitoring and / or tracking of items that are deemed valuable.

At its core, RFID acts as an asset tracking system. This allows the system user to 'know' the whereabouts of designated items at a given point in time. This can be done either by tracking the location of a person, an item, monitoring designated portals, or a combination of the two.

A RFID system can be used to detect a person who is at risk of being abducted or who may wander off without the knowledge of clinical staff. A suitable asset tracking system would enable such patients to be fitted with interactive RFID tags so that when a patient passes a nominated point (receiver / transmitter) in the vicinity of an inpatient unit's entry or exit doorways, an alarm is activated and / or a message sent to staff via the paging system.

6.10 ARCHITECTURAL / DESIGN CONSIDERATIONS

6.10.1 Lighting

After-hours lighting can deter undesirable activity greatly while adding to the peace of mind of patients, visitors and staff. Lighting can be used to highlight areas, assist in identification, dictate desired paths, reduce the opportunity for concealment, and assist in the general surveillance of an area after daylight hours.

The lighting should be white light, where feasible, such as metal halide. White light is the best for both perception and assisting the colour rendition of CCTV camera images.

All exterior CCTV cameras should have low light viewing capabilities that can account for typical levels of illumination after dark. Based on lighting plans and final camera placements, there may be a need for infrared illuminators for areas with abnormally low levels of illumination.

6.10.2 Blast Mitigation

The threat of terrorist attacks through the use of explosive devices in today's world is a foreseeable threat. The following are non-structural enhancements that can be incorporated into a design. It is understood that some of these recommendations may not be feasible due to the size, complexity and / or location of facilities. These include:

- avoiding eaves and overhangs, since these can be points of high local pressure and suction during blasts. When these elements are used, they must be designed to withstand blast effects;
- avoiding locating helicopter landing sites near hazardous areas for example hyperbaric chambers;
- avoiding having exposed structural elements such as columns on the exterior of the facility;
- considering the use of security glass (toughened and laminated) or another fragment-retention film over glazing to reduce fragmentation; and
- giving consideration to blast-resistant doors for high threats and high levels of protection.

6.10.3 Building Entrances and Exits

All perimeter doors should be lockable (preferable from a remote location), but always available for emergency exiting. All perimeter entrances and exits should be provided with CCTV security surveillance and the number of entrances should be minimised so that security surveillance and access control is manageable.

The number of exits should be based on the local fire and building codes means of egress requirements and facility occupancy loads. Security controls must take account of emergency egress requirements. In areas with heightened levels of security, exit doors could be equipped with delayed egress controls on exit doors. Under normal conditions, or in a non-fire emergencies, these devices require people to continually push the exit device for a pre-determined amount of time before the electric lock release, typically 15 to 20 seconds. During this timeframe a local audible siren will sound and an alarm signal can be sent to the SMS for a response.

These types of devices provide additional security and notification on those areas where an unannounced exit could constitute a security threat. These areas include maternity and paediatric inpatient units, inpatients units caring for patients with cognitive impairment, emergency exits from pharmacies and mortuary. Emergency exits from these areas should also be monitored by CCTV cameras to provide video images of those exiting.

There are specific security requirements for the building fabric of the public entrances as per specific codes and commercial framing can provide adequate protection against a number of risks. However, throughout the design stage, the external areas of public entrances and associated hard landscaping should be reviewed to determine if further physical protection in the form of bollards is required.

External and clear sight lines of entrances is required, not only for wayfinding but also for the management of an incident within the facility.

All public entrances should be electronically access controlled with CCTV coverage and intercoms to facilitate managed entry and exit of movements to and from the facility.

Designs must take account of the need to be able to activate progressive sector lockdown in the event of a threat.

In some facilities, public entrances may need to meet the requirements to enable a 'lockdown,' particularly for risks that include chemical, biological or radiological incidents.

6.10.4 Lobbies

All main reception desks should be positioned to enable staff to observe those entering the building and view access to the lift cars. The desks should not be positioned so that the staff members' backs are to the approaching individuals.

Public access and employee access should be segregated, where possible, to provide efficient monitoring of pedestrian traffic. This lessens the possibility of someone trying to conceal themselves within a group of employees. All staff entrances should be access controlled.

All main reception desks should be equipped with duress alarms to signal problematic situations that require security / emergency response. The design of reception areas should take account of the identified safety and security risks, e.g. violence / spitting.

6.10.5 Lifts and Stairways

When conditions allow, it is a common practice to segregate lift service by dedicating lift cars for to channel and control pedestrian traffic to the appropriate areas.

It is possible that banks of lifts may be used for public, staff, patient, and or emergency use.

Lifts should be equipped with access controls on a floor by floor basis. This will allow independent control over any lift based on security operating conditions. Depending on the outcome of a security risk assessment, it may be necessary to install CCTV cameras in lift cars.

Stairway doors should always be accessible and unlocked in the emergency egress direction.

Stairway doors at the discharge level (normally at ground level) should be mechanically locked to prevent entering the stairway. If a fire stair door leads to a restricted space, the door should be electronically or mechanically locked on the stairway side in accordance to the local fire and building codes. During an emergency, the stairway locks on required, re-entry floors must fail-safe open through a signal from the fire alarm system and allow bi-directional travel.

This strategy provides emergency exit where necessary but provides additional security of the stairwells. CCTV cameras should be placed at stairwell landings that access secure spaces including:

- maternity inpatient units;
- inpatient units managing those with cognitive impairment;
- pharmacy departments; and
- mortuary.

At a minimum, all stairwell doors will have alarm contacts to monitor the open / close status of the door.

6.10.6 Public Lifts

Where required public lifts should be access controlled and have CCTV coverage for the tracking of movement by the publically accessible, vertical pedestrian links to assist in the investigation of claims of harassment, assault and antisocial behaviour. The CCTV system is an extension of the general surveillance of entry foyers and public accessible corridors. Access control of the lifts can be of support in the management of incidents where a total or partial lockdown may be required.

6.10.7 Public Lift Foyer

Public lift foyers should be located in main passage ways and provide clear lines of sight to deter anti-social behaviour. Lift foyers should also have CCTV coverage as part of the security surveillance philosophy for all publically accessible areas.

6.10.8 Fire Egress Staircases

Where electronic access control is used all fire egress stairs must be provided with emergency break glass units to provide unobstructed egress in the event of an emergency incident. In the event of a CBR event, access to staircases would need to be denied, an electronic access control system can assist in providing this control.

In facilities where electronic access control is not used, fire egress stairs must allow for unobstructed egress in the event of an emergency situation.

It is the responsibility of the designer to refer to the BCA for specific guidance and direction.

If emergency stairwells are to be used for inter-floor travel, access control provisions should be made for floors that require access from the stairwell. Normal conditions should have all stairwell doors locked from the interior side of the stairwell with exiting only allowed at the ground level to prevent unauthorised entry to other floors. In addition, entry to the stairwells from the ground floor should be secured to prevent unauthorised people from accessing the stairwells.

6.10.9 Reception Areas

There may be a number of reception areas throughout a healthcare facility which provide varying levels of service and may be subject to different security risks. The primary risks to staff at reception areas include harassment or assault.

Physical security elements, security technologies and security awareness requirements that should be considered for reception areas include:

- working areas such as desks located at reception areas in main entrances, emergency departments, pharmacies and cashier facilities should be designed so that they are anti-jump and anti-vault;
- entry and exit for staff to these reception areas should consider the use of a separate entry that will also allow staff to retreat into a safe space should the need arise; and
- security technologies for receptions should include the provision of duress alarms and CCTV coverage.

The design of reception areas should consider the height and width of reception desks to limit the opportunity of people jumping or vaulting a desk. If a specific risk is identified then additional design considerations could include the use of physical barriers including security glass which is toughened and laminated to limit the opportunity of staff being harmed. The rating of the glass will be dependent on the application.

Security technologies to be considered for departmental receptions include the use of duress alarms and where appropriate CCTV coverage.

Reception areas that are internal to departments may only require controlled access for authorised staff behind the reception counter.

6.10.10 Clinical Units

Inpatient units must be capable of being locked down and / or on a time program basis. Access to inpatient units during times when they are in a lock down situation should be by access card or a combination of intercom call and CCTV acknowledgement, managed from a select staff station located within the unit.

Specific consideration should be given to high risk areas such as an emergency department, maternity inpatient units, paediatric inpatient units, intensive care units and other identified critical areas.

Refer to AusHFG HPU 340 Inpatient Unit for additional information.

6.10.11 Administration Areas

Administration and facility support areas, which provide a public interface, are to be designed to incorporate electronic access control to make sure that the public cannot freely access staff working areas. Individual offices, record stores and areas which house critical, expensive or attractive equipment must be controlled, in keeping with their assessed level of risk.

6.10.12 Laboratories

Laboratory facilities should be secure areas with restricted electronic access control. Laboratories which store hazardous material should be provided with electronic access control and the areas physically hardened in keeping with relevant guidelines for their particular use or the material they hold. Consideration should be given to controlling the risk of drop down entry from ceiling cavities.

6.10.13 Pharmacies

Pharmacies must be secure units with access restricted to authorised staff only. Access should be controlled by the electronic access control system. Duress alarms must be provided at public interfaces and CCTV coverage of these interfaces must also be provided.

Within the pharmacy, intruder detection, electronic access control and CCTV surveillance must be provided for high risk areas and / or secure storage facilities in keeping with relevant guidelines.

As part of the security risk assessment process the following may need to be considered:

- construct walls, floor and ceilings of the pharmacy out of solid material, or reinforce partitions or ceilings with security mesh;
- provide as few windows as possible;
- extend walls, where practicable, to the underside of the floor slab above to prevent any intrusion over the wall in accordance with Commonwealth Government SCEC requirements;
- reinforce windows on the perimeter walls to prevent entry; existing windows may be reinforced with shatter-resistant film or by replacing the glass with security laminated glass;
- incorporate laminated glass windows into the design of the front of the pharmacy to enable staff to carry out transfer operations with safety, while maintaining communication with staff and patients;
- design a two door entry approach, i.e. one door for the public and hospital staff to access glass transaction windows and a separate door for the entry of pharmacy staff to the pharmacy;
- provide the ability to secure open areas at the front of the pharmacy after hours, e.g. by a locked door from the corridor or locked shutter door;
- provide electronic access control to restrict and control entry;
- provide an intruder alarm system that complies with Australian Standards and incorporates a duress alarm(s) to enable staff to activate the alarm in the event of an emergency; and
- provide CCTV coverage of access doors.

Consider the use of electronic locks on drugs and medicine cupboards containing dangerous or addictive drugs.

Refer to AusHFG HPU 560 Pharmacy Unit for additional information.

6.10.14 Pathology

Pathology departments can hold equipment and controlled substances which are at risk of theft or interference. To protect the assets of the department and its staff, the following security measures should be considered:

- electronic access control at all perimeter doors;
- internal access control to entry foyer areas to manage access beyond the foyer into laboratories and administration areas;
- prevent the risk of drop down entry from ceiling cavities;
- controlled access and intruder detection to any loading dock or associated store areas;
- CCTV coverage and intercoms at entrances; and
- physical security elements of pathology areas should be given particular attention as a result of the attractive and valuable items held within.

Refer to AusHFG HPU 550 Pathology Unit for additional information.

6.10.15 Loading Docks

It is suggested that loading dock areas are provided with CCTV coverage of the dock, entry / exit doors at the secure line between the dock area and internal storage areas. The secure line should be access controlled and also under the control of dock staff to allow for managed access to the holding areas for the receipt and despatch of goods. CCTV coverage is generally provided to observe and record suspicious activities and identity of any person who does not have authorised access. This should be complimented by an intercom interconnected to a location within the storage area.

6.10.16 Mental Health Inpatient Units

Specific consideration must be given to relevant mental health policies and guidelines for each jurisdiction.

Security controls for such areas must be designed to control entry and egress to inpatient units and the perimeter of buildings accommodating these services. Access to these areas should be managed from a staff station or other nominated areas within the unit.

Consideration should be given to the inclusion of robust building fabric to ensure that the physical security elements cannot be breached by readily available items within the units.

The building fabric and fit out will vary based upon the individual requirements of the unit or facility, and dependent upon the associated risks.

External courtyards, where used, should allow evacuation, controlled via electric locks installed at emergency exit doors. For security purposes and in accordance with the relevant privacy legislation, CCTV should be positioned to view critical areas within the units that are not visible from the nurse's station.

All physical elements being, but not limited to toughened and laminated security glass, doors and fixtures and the like must be reviewed to ensure their suitability for use within such a facility. Fixtures must be securely fixed with no ligature points to deter the use of them as an aid to escape, self-harm or assault staff.

Refer to AusHFG HPU 131 Mental Health – Overarching Guideline.

6.10.17 Emergency Department

The use of CPTED should be considered in the design of these areas to create a calming and subdued atmosphere.

Security barriers should be considered to front counters, with electronic access control provided to limit unwanted entry into triage and / or clinical areas.

Suggested security controls include:

- CCTV cameras located in visible locations, complimented with the use of monitors facing patients (which may offer a visual cue that they are being observed and are accountable for their behaviour);
- proximity of security staff to the emergency department. If practicable and warranted, a security office be located adjacent to the emergency department (preferably visible);
- clear communication methods and duress alarms throughout the emergency department;
- consideration must be given to the use of physical barriers to limit staff injury resulting from aggression - for example, glass screens for triage and clerical staff. These unfortunately have the potential to make communication more difficult, however this needs to be considered during design;
- electronic access control should be provided to doors entering into non-public areas, including treatment areas and utility rooms where the storage of sharps and medication should be secured at all times;

- duress alarms are recommended for counter staff;
- ensuring there are no potential concealment areas in the design and clear lines of sight from the staff stations;
- ensure all rooms have dual access / egress points;
- clear verbal and signed communication and wayfinding, to mitigate anxiety;
- fixtures should have minimal sharp edges and be well-secured; and
- access points to clinical areas should be controlled via electronic access control.

Refer to AusHFG HPU 300 Emergency Unit for additional information.

Within the emergency department, a gun safe may be required for police use depending on jurisdictional requirements. If provided, the location of the safe should be within restricted access spaces, however it should allow for ease of access for police to quickly store weapons as required.

Provision should be given to nominally allow for four weapons with a separate lockable compartment for each weapon. It is the responsibility of the designer to consult with the local area commander regarding weapon specifications and requirements.

6.10.18 Consult / Interview / Treatment Rooms

A separate, sound-insulated room should be provided to isolate distraught or emotionally disturbed patients, family, friends or those with acute behavioural disturbance in areas such as emergency departments.

Selected consult / interview / treatment rooms may require an additional egress door on the opposite walls to allow a staff member to retreat into a safe area if required. Depending on the outcome of the security risk assessment, these rooms may require the installation of hardwired or provision for wireless duress, as there is a potential that the rooms may be used by patients at risk of severe behavioural disturbance.

6.10.19 Ambulance Entry

Ambulance entry points are used for the delivery of both ambulant and non-ambulant (trolley bound) patients to the emergency department by the ambulance service.

These areas may need to serve a secondary function as a triage and / or treatment area in emergency situations or mass casualty incidents (MCIs). Depending on the facility, they may also be used as a parking area and as a point of emergency access to the emergency department for other emergency services for example police and fire brigade.

Suggested security controls include:

- dedicated and separate ambulance vehicle access and egress;
- signage indicating restricted access;
- adequate lighting;
- CCTV – with views monitored not only by security, but also triage and identified staff stations;
- electronic access control on entry doors with the ability to lock down (if required);
- provision for duress alarm hardwired, and wireless; and
- the use of privacy screening or a location out of public view.

6.10.20 Mail Delivery Areas

Architectural and CPTED planning should be considered when planning for access to mail areas. Mail delivery and sorting areas should be controlled to prevent theft, unauthorised access to or removal of mail, confidential or sensitive documents and valuables. Specific mail screening and security requirements will depend upon the facility, level of risk and its categorisation in the context of critical infrastructure. If a facility is classified as critical infrastructure, then specific mail sorting requirements will exist including the ability to inspect and store suspicious packages and the like.

6.10.21 Radioactive Substances

Areas that contain radioactive waste and the like should be controlled and entry points marked with the appropriate warning signage and the accompanying regulations regarding use of the area, posted at access points.

Access to these areas should be controlled to prevent unauthorised, or accidental access, including consideration of controlling the risk of drop down entry from ceiling cavities. The control of these areas should limit removal or tampering of items or waste stored.

6.10.22 Medical Gases

Access to medical gas storage areas should be restricted and appropriate security measures in place to limit unauthorised access, including consideration of controlling the risk of drop down entry from ceiling cavities. The design of these areas should comply with the relevant standards and regulations and policies.

The requirements of the Dangerous Goods Act and Regulations or Major Hazard Facilities may apply to the design of these areas and appropriate signage must be provided with adequate ventilation in accordance to the relevant requirements.

6.10.23 Car Parks

Car parks are commonly perceived as unsafe because of threats to both personal security and fear of theft from motor vehicles.

When addressing the issue of security within car parks, it is recommended that a number of treatments are provided to manage risks, including but not limited to:

- all parked cars should be visible to approach;
- consideration should be given to maximise visibility and sightlines for both drivers and pedestrians traversing a car parking area;
- access to the parking should be limited, secure, well lit, and free of places of concealment. One-way circulation within a car park can assist in facilitating monitoring;
- where appropriate consideration should be given to separate and controlled staff vehicle entrances;
- consideration should be given to designated staff car parking near entrances for staff working afternoon / night shifts;
- entrance ways should be designed to accommodate portable vehicle barriers (if required). These entrances should be laid out such that a vehicle could not bypass a roadway barrier in the event of heightened security operations. This will allow the facility to physically secure the parking area if conditions require it;
- the types of equipment, layout, location etc. would be determined on a facility by facility basis, in accordance with the outcome of a security risk assessment;
- signage should be provided to clearly mark separate entrances for deliveries, visitors, and employees;

- consider the movement paths of large vehicles and if warranted CCTV coverage of loading zones or drive-through areas; and
- within the parking areas, the design should consider the need for staff and visitor help points. These should be easily identified, well-lit and complimented by CCTV coverage.

6.10.24 Main server rooms

Definitive security requirements for main server and IT rooms will be based on the risk assessment and criticality of equipment contained within. However generally, entry doors will be provided with electronic access control and internal areas supplied with CCTV coverage and intrusion alarms.

6.10.25 Risers

All communication and service risers should be secured utilising the intrusion alarm system, to monitor the door open / close status. These areas should be access controlled by a master keying system and mechanical lock, or through the electronic access control system according to the criticality to the operation of the facility.

6.10.26 Critical Building Utilities

A critical utility is a utility system or portion of a system that, when / if interrupted, would prevent the facility and /or building from functioning in such capacity to perform normal operations. To prevent trespassing, vandalism, and sabotage, critical utility and facility service spaces should be locked and restricted to access by authorised facility service personnel only at all times.

Critical building utilities may include:

- electrical systems;
- transformers, incoming power feeds, and power distribution equipment;
- emergency generators and uninterrupted power supply;
- heating, ventilation, and air conditioning;
- water and water treatment;
- back up water storage – where provided;
- sprinkler and fire pumps;
- fuel storage – gas and / or liquid;
- hazardous material;
- communications – telephone and data;
- head end telecommunications connection to the IT network;
- security management systems; and
- microwave, and satellite infrastructure.

6.10.27 Security Control Room

The access control, alarm monitoring and CCTV systems should be located in a central space. This room should be appropriately sized for general work space and an operating console, sufficiently sized to house the necessary equipment. The room should have sufficient heating and cooling and be in a securable area.

Furthermore, wall space or ceiling space may be required for the mounting of larger LCD displays for viewing of CCTV images and alarm messages for any point within the room, depending upon the requirements of the facility.

Other space requirements in the control room may include building management systems and fire alarm control equipment.

Storage space should also be planned for security equipment, such as radios, torches, and operational documents as well as work space for security staff.

The security control room should be provided with emergency back-up power in the event of a power failure. The power supply should be consistent with the facility requirements and should be sufficient to provide full functionality of each control point.

6.11 GLOSSARY OF TERMS

Access Control: The control of people, vehicles, and materials through the implementation of security measures for a protected area or areas.

All-Hazards Approach: An approach that emphasises preparedness for any and all types of hazards and not just for a specific type of hazard.

Audit Trail: An examination of records, procedures and practices for the purpose of identifying and correcting unwanted conditions.

Buffer Zone: Is known in geography as a zonal area that has the purpose to keep two or more other areas distant from each other and is applied in security design as an area of separation that can be created to help prevent violence and protect an environment.

Closed Circuit Television (CCTV): A video system in which an analogue or digital signal travels from a camera to video monitoring stations at a designated location.

Controlled Access Area or Controlled Area: A room, office, building, or facility area which is clearly demarcated of which, access is monitored, limited, and controlled.

Crime Prevention through Environmental Design (CPTED): For health care facilities the use of CPTED emphasises the proper design and effective use of a designed and built environment to reduce crime and enhance the quality of life. Incorporating CPTED can significantly reduce real or perceived fear and risk of crime as well as the considerable costs associated with adding security equipment and personnel after an incident has occurred or in response to changing standards.

Duress Alarm: A device that enables a person placed under duress to call for help without arousing suspicion.

Disaster Control Room / Emergency Operations Centre (EOC): Is the physical location where an organisation comes together during an emergency to coordinate response and recovery actions and resources. These centres may alternatively be called command centres, situation rooms, crisis management centres, or other similar terms. Regardless of the term, this is where the coordination of information and resources takes place. Administrators and other staff serving in these roles ensure that adequate material and human resources are available to meet the needs of the disaster.

Hazard Vulnerability Analysis (HVA): Healthcare facilities may be required to conduct and annually review their HVA. The HVA provides a systematic approach to recognising hazards that may affect demand for services or the healthcare facilities ability to provide those services. An HVA may be included in a comprehensive risk assessment.

Hazardous Materials: May include, without being limited to biological, chemical or radioactive materials which have the potential to cause immediate and permanent harm at certain exposure levels.

Integrated System: Is an approach that integrates some or all of an organisation's systems enabling an organisation to review data comprehensively and work more effectively as a single unit with unified objectives.

Intrusion Alarm System (IAS): A system combining mechanical or electrical components to perform the functions of sensing, controlling, and announcing unauthorised entry into areas covered by the system. The IAS is intended to sound alarms or alert response personnel of an actual or attempted intrusion into an area.

Mitigation: Actions taken to reduce the exposure to and impact of a hazard.

Motion Detection: Detection of an intruder by making use of the change in location or orientation in a protected area as the intruder moves around. In video motion detection, this means changes in key parameters of a view scene from a recorded reference image of that scene.

Physical Security: That part of security concerned with physical measures designed to safeguard people, to prevent unauthorised access to equipment, facilities, material, and documents, and to safeguard against damage and loss.

Protected Area: An area continuously protected by physical security safeguards and access controls.

Security Glass: Security glass refers to glazing that is toughened and laminated to limit the opportunity of staff being harmed. It can be used to counter many threats to buildings and occupants including bomb (blast) attacks, ballistic attack, burglary or robbery incidents, forced entry, detention containment. The proper choice of security glass will be dependent on the application.

Protected Health Information (PHI): Is any information about health status, provision of health care, or payment for health care that can be linked to a specific individual.

Radio Frequency Identification (RFID): The electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum used to transmit signals. An RFID system consists of an antenna and a transceiver, which reads the RF and transfers the information to a processing device, and a transponder, or tag, which is an integrated circuit containing the RF circuitry and information to be transmitted; an emerging technology that enables companies to better track assets, tools and inventory.

Restricted Area: A controlled room, office, building, or facility area to which access is strictly and tightly controlled. Admittance to this area is limited to personnel assigned to the area and people who have been specifically authorised access to the area.

Risk: The potential for a loss of or damage to an asset.

Risk Assessment: The overall process of risk identification, risk analysis, risk evaluation and determination of the amount of risk that is acceptable. Risk assessment involves the process of identifying internal and external threats and vulnerabilities, identifying the probability and impact of an event arising from such threats or vulnerabilities, defining critical functions necessary to continue the organisation's operations, defining the controls in place necessary to reduce exposure, and evaluating the cost of such controls.

Retreat Room: A designated room within high risk areas treatment area that can be locked from the inside, as a place for staff, patients, and even visitors to 'hide' due to an immediate threat of danger.

Screening: Examining people and their possessions for contraband such as weapons, explosives, and chemical biological radiological (CBR) agents using magnetometer, x-ray, search, or other device.

Security Risk: The potential that a given threat will exploit vulnerabilities to cause loss or damage to an asset.

Security Risk Assessment: The process of identifying threats which could affect personnel, assets or operations, and prioritising those risks and identifying mitigations strategies and measures. A thorough physical examination of a facility and its systems and procedures, conducted to assess the current level of security, locate deficiencies, and gauge the degree of protection needed. A security risk assessment may be included in a comprehensive enterprise or department wide risk assessment.

Security Sensitive Area: A location whose function or activity presents an environment in which there is a significant potential for injury, abduction, or security loss that would most likely severely impact the ability of the organisation rendering a high quality of patient care.

6.12 REFERENCES

- NSW Health, IB2013_024, Protecting People and Property – NSW Health Policy and Standards for Security Risk Management in NSW Health Agencies
- NSW Health, 2015, PD2015_001, Preventing and Managing Violence in the NSW Health Workplace - A Zero Tolerance Approach
- NSW Health Security Manual

Standards

- AS 4485: Security for Health Care Facilities

07 SAFETY

7.1 INTRODUCTION

The planning and design of new and refurbished health care facilities should consider safety as a key focus given the physical environment within these facilities has a significant impact on the health and safety of patients, visitors, staff and contractors alike.

The information contained in this section is not exhaustive but provides a broad overview of work, health and safety considerations relating to the planning and design of healthcare facilities. It does not cover safety considerations relating to the construction process. Service specific planning and design considerations are included in the AusHFG Health Planning Units.

The use of safe design principles during the design process can ensure that:

- Work Health and Safety (WHS) outcomes are incorporated into all aspects of design to minimise illness, injury and damage to property;
- a risk management approach is incorporated into design, through hazard identification and reduction, risk assessment and control processes;
- design features and solutions specifically mitigate known risks, including:
    - falls, slips and trips;
    - hazardous materials handling;
    - injuries from sharps;
    - exposure to body fluids;
    - radiation hazards;
    - manual handling;
    - repetitive strain injuries;
    - violence within facility boundaries;
    - occupational stress; and
    - reprocessing of reusable medical devices.

It is the responsibility of the designer to make sure that compliance is achieved in accordance with the relevant WHS legislation, regulations, codes and policies within each jurisdiction, and with relevant safety regulations issued by individual regulatory authorities.

Staff must always be consulted when planning new facilities. This includes consultation with WHS staff employed by healthcare services to ensure an understanding of risks as they apply to particular sites is understood.

Safety issues are of prime importance as their neglect can generate considerable, yet avoidable, damage to the welfare of people and costs to healthcare facilities if patients, staff, contractors or visitors are injured.

7.2 PURPOSE

The purpose of this section is to provide practical advice on the design of facilities to incorporate safety into the design process. This will improve the health and wellbeing of those who use or work in healthcare facilities and reduce recurrent costs over time.

Specific services, activities or materials are covered by regulations and may require specific design input, consultation, documentation and approvals. These may include but are not limited to:

- building maintenance, fixed walkways, ladders, hatches, window cleaning, roof safety, etc.;

- plant rooms, substations, liquid gas storage etc.;
- electromagnetic interference, radiation, toxic materials etc.;
- helicopter landing areas and access by other emergency services etc;
- exposure to biological infections;
- building services; and
- specific services such as laboratories, radiation therapy etc.

7.3 LEGISLATION AND COMPLIANCE GUIDANCE DOCUMENTS

WHS legislation covers the safety of all people in the workplace. Other safety aspects of the built environment are detailed separately and may be found within general regulations such as the National Construction Code, including the Building Code of Australia (BCA), Australian Standards and utility supply authorities.

Throughout the planning and design process of both new and refurbished healthcare facilities, it is important that compliance to the relevant jurisdictional legislation is achieved. There is extensive legislation and compliance guidance documentation, including the following;

- National Construction Code, including the Building Code of Australia (BCA);
- Safe Work Australia - Hazardous Chemical Information System ;
- Safe Work Australia – Lifting, Pushing and Pulling;
- Safe Work Australia - National Code of Practice for the prevention of musculoskeletal disorders from performing manual tasks at work;
- ARPANSA 2008, Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) – Legislative Framework, Australian Radiation Protection and Nuclear Safety Agency;
- Australian Commission on Safety and Quality in Health Care (ACSQHC) 2009, Preventing Falls and Harm from Falls in Older People: Best Practice Guidelines for Australian Hospitals; and
- Standards Australia including the following:
    - AS 1428: Design for Access and Mobility;
    - AS 1288: Glass in Buildings - Selection and Installation;
    - AS 2047: Windows and External Glazed Doors in Buildings;
    - AS/NZS 2208: Safety Glazing Materials in Buildings;
    - AS/NZS 2107: Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors;
    - AS 2436: Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites;
    - AS/NZS 1269: Occupational Noise Management;
    - AS/NZS 4801: Occupational Health and Safety Management Systems - Specification with Guidance for Use;
    - AS/NZS 4187: Reprocessing of Reusable Medical Devices in Health Service Organisations
    - AS 1940: The Storage and Handling of Flammable and Combustible Liquids;
    - AS 4332: The Storage and Handling of Gases in Cylinders;
    - AS 1216: Class Labels for Dangerous Goods;
    - AS/NZS 2243: Safety in Laboratories;
    - AS/NZS 1596: Storage and Handling of LP Gas;
    - AS 4024: Safety of Machinery;
    - AS/NZS 4442 and 4443: Office Desks and Workstations;
    - AS/NZS ISO 31000: Risk Management;
    - AS 4485: Security for Health Care Facilities;
    - AS 4586: Slip Resistance Classification of New Pedestrian Surface Materials;

- Standards Australia Handbook 198:2014 Guide to the Specification and Testing of Slip Resistance of Pedestrian Surfaces; and
- AS Handbook 59: Ergonomics - The Human Factor: A Practical Approach to Work Systems Sesign

Jurisdictional information is included in the Further Reading section.

7.4 APPROACH TO SAFE DESIGN

7.4.1 Safe Design

Safe Design (also referred to as Safety in Design) is a process aimed at preventing injuries and disease by considering hazards as early as possible in the planning and design process.

Safe Design considers the safety of those who construct, maintain, clean, repair and demolish a building or structure as well as those who work in or access the building. It begins at the initial concept and planning phases to incorporate safety into the decision making process regarding design, materials used and methods of manufacture or construction to eliminate risk and enhance the safety of the finished product.

A designer needs to consider how safety can best be achieved in the project and lifecycle phases. Design teams are responsible for implementing the safe design principles as part of the initial planning process to:

- establish and implement safe design risk registers;
- appoint consultants for review of all design and delivery stages of the project;
- undertake safe design workshops;
- demonstrate the risks identified and control measures proposed for three key phases including:
    - design for safe construction;
    - design for safe maintenance; and
    - design for use.

Those influencing the design, such as engineers, architects, interior designers, project managers and contractors have a responsibility, as far as is reasonably practicable, to ensure that the design and fit-out of new and refurbished health care facilities incorporate safety into the overall design process. The collective safe design obligations requires that the team identify potential WHS hazards, assess the risks the hazards may have on the people that will work in the new facility, and then, where practical to do so, provide an appropriate solution to eliminate or minimise the hazard.

7.4.2 Risk Management Associated with Design

To meet legislative requirements, it is necessary for the design team to collectively, and in consultation with staff, undertake and document a hazard identification and risk assessment procedure throughout all stages of the project design and documentation.

The primary objective of this risk management procedure is to:

- prevent and reduce the number and severity of workplace injuries, illnesses and associated costs;
- promote worker health, wellbeing and capacity to work; and
- foster innovation, quality and efficiency through continuous improvement.

Managing WHS risks involves four steps:

- identifying hazards - find out what could cause harm;

- assessing risks (if necessary) - understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening;
- controlling risks - implement the most effective control measure that is reasonably practicable in the circumstances; and
- reviewing control measures - ensure control measures are working as planned.

Refer to the Safe Work Australia website for further information regarding the recommended process to identify hazards and / or control risk:

https://www.safeworkaustralia.gov.au/safe-design#five-principles-of-safe-design.

7.5 SPECIFIC SAFETY CONSIDERATIONS

7.5.1 Ergonomics

Ergonomics is an applied science that seeks to design and arrange things people use so that they interact efficiently and safely.

Examples for consideration relating to the planning and design of healthcare facilities include:

- height, depth and width of counters, workstations and benches including taking into account any equipment that may be used on the bench;
- height, depth and width of over bench and under bench joinery;
- positioning of fixed equipment, e.g. bedpan racks, drug safes, overhead cupboards or shelves;
- positioning of viewing panels in doors;
- positioning of light switches, door handles and handrails / grab rails;
- height of monitors and other medical equipment for ease of viewing / monitoring;
- push / pull forces for doors and similar items;
- ability to accommodate bariatric patients who may need oversized equipment;
- equipment, both fixed and mobile, to reduce or eliminate manual handling tasks, e.g. hoists;
- design of units for people with cognitive impairment; and
- clarity of signage and directional cues in accordance with BCA and Standards.

Design references, such as Neufert Architect's Data, will assist designers when planning space, detailing joinery or locating heights for fittings and fixtures, e.g. drug safes.

7.5.2 Manual Handling

Poor workplace design and FF&E selection are major contributing factors to injuries associated with manual handling. Poor workplace design may:

- result in restricted space that may lead to constrained and awkward postures during manual handling tasks;
- inability to manage special patient groups; and
- unnecessary handling of patients.

These injuries are costly and preventable.

Given the requirements of WHS legislation to provide safe premises and plant and to identify, assess and control risks, facilities should be designed to:

- facilitate the implementation of operational and other policy procedures that effectively eliminate or reduce the need for patient handling and double handling, e.g. door and corridor widths should allow for a patient's bed to travel with them rather than require repeated transfers from bed to trolley;
- accommodate the storage and safe use of manual handling aids including patient hoists, commodes, wheelchairs, walking belts, slide sheets and patient scales. The quantity and size of equipment, functional space for use of equipment and storage close to proximity of use should be considered including space requirements for the use and storage of bariatric equipment. In some cases, ceiling-mounted hoists will be used but this does not eliminate the need for mobile equipment; and
- manage a range of patients including the morbidly obese and support the safe transport of patients or goods with particular consideration of turning circles and gradients of ramps. Consideration should be given to areas where trolleys, bed movers, tugs or similar are used. Designers should provide transitions in level and landing places that take into account the length and manoeuvrability of the equipment being moved, as these can differ from the wheelchair uses that determine the requirements in AS1428.

Examples of high risk areas relating to manual handling with healthcare facilities include:

- sterilizing services department design requires consideration of opportunities for automation, e.g. at the front and back end of batch washers and integrated trolleys that can be used across the reprocessing cycle. Another high risk area is the handling of loan equipment. Refer to Implementation of SafeWork NSW Design and Handling of Surgical Instrument Transport Cases - A Guide on Health and Safety Standards (May 2011);
- bathrooms/ensuites/showers, when staff are required to provide assistance to patients;
- loading docks should be designed to provide a level surface for loading / unloading. They should match the average tailgate heights and allow for vehicles with both end and side goods access. Proprietary lift / platforms, whether built-in or mobile, may overcome problems with extreme vehicle cargo floor height disparities; and
- canopy clearance heights, including services and projections, should allow for maximum vehicle heights and for overhead dumpster operations. Vehicle height warning notices and overhead horizontal swing bars should be provided.

To comply with WHS legislative requirements, manual handling decisions should be made in consultation with staff in order to understand risks and implement risk management solutions.

Consider the special safety risk factors and duty of care issues associated with acute mental health and aged care behavioural units. Consult with appropriate staff representatives.

7.5.3 Furniture Fittings and Equipment (FF&E)

The selection of FF&E should take into account the need to reduce risks to patients, visitors, staff and students.

Examples of these considerations include:

- height adjustable equipment where appropriate to support best practice manual handling and ergonomics (height adjustable and ergonomic furniture needs to meet current Australian and New Zealand Standards (AS/NZS) or Business and Institutional Furniture Manufacturer's Association (BIFMA) or British Standards or similar);
- support for older people and those with disabilities, including patients and staff, to enable independence where possible and minimise risks to safety;

- use of automation / motorisation where appropriate to promote best practice manual handling, e.g. electric beds and examination couches that are easy to adjust and electric tugs for moving beds and other heavy items;
- support for the special needs of bariatric patients and the staff who care for them, e.g. installation of ceiling mounted hoists for ease of transferring bariatric patients;
- specific service areas / patient cohorts, for example the design of mental health units needs to consider FF&E that are of a type manufactured and marketed as anti-ligature and installed in accordance with the manufacturer's instructions (refer to HPU 131 Mental Health – Overarching Guideline for detailed information and performance requirements);
- requirements to minimise exposure to hazardous substances, materials and items, for example ready access to mobile or fixed sharps disposal containers where required and appropriate controls for the safe use of laser in health care;
- provision of ergonomic staff work areas, e.g. selecting casters for office chairs and stools that are compatible with the floor surface, i.e. carpet or vinyl;
- location of services and fittings, e.g. placement of toilets to ensure nursing staff can provide assistance to patients;
- alignment with relevant policies and Australian Standards relating to infection prevention and control (refer to AusHFG Part D);
- provision of items of commercial quality / durability; and
- consideration of product cleaning methodology and maintenance requirements.

When designing public access throughout the facility, items to be considered include control methods for access / egress, restrictions signage and monitoring.

7.5.4 Slips, Trips and Falls

The design of the facility should ensure that health and safety risks associated with slips, trips and falls are eliminated or minimised as far as is reasonably practicable.

Slips, trips and falls are defined as follows:

- **slips** occur when a person's foot loses traction with the floor. The most common causes are slippery floor surfaces (highly polished, wet or greasy) and inappropriate footwear:
- **tripping** occurs when a person unexpectedly catches their foot. In most instances, the objects that people trip on are small and unobtrusive, such as uneven edges in flooring or electrical leads; and
- **falls** can result from a slip or trip, but many occur during falls from low heights, such as steps, stairs and curbs.

Key design considerations to prevent slips, trips and falls include:

- choice of floor coverings;
- changes in floor levels;
- selection of FF&E, including consideration of older people and those with disabilities;
- location of cables / cords;
- stair nosing;
- lighting requirements; and
- design of stairwells and balustrades to reduce the risk of accidental or deliberate falls (noting the minimum height of balustrades in health facilities often exceeds the general minimum requirements).

7.5.5 Occupational Stress

Facility design also needs to consider strategies to eliminate or minimise the risk of harm associated with workplace stress. Strategies may include:

- optimising access to natural light within all staff work areas;
- providing access to areas for staff to have a break from their work environment, including access to outdoors where practical to do so;
- eliminating or minimising risks associated with occupational violence, including provision of dual egress points and safe retreat areas where appropriate. Refer to jurisdictional policies and guidelines for further information; and
- implementing a zonal approach to design that supports the provision of staff only / non-public zones.

7.5.6 Glazing

Safety glazing should comply with the requirements of the BCA and the relevant Security Acts and Regulations within each jurisdiction.

For sites listed under the State or Commonwealth Critical Infrastructure listing, consideration should be given to utilising blast rated external glazing for emergency departments and intensive care units.

All internal and external glazed panels subject to possible breakage including doors, sidelights, windows and balustrades should comply with the current version of the following standards:

- AS1288: Glass in Buildings - Selection and Installation;
- AS2047: Windows in Buildings - Selection and Installation; and
- AS/NZS 2208: Safety Glazing Materials in Buildings.

Glazing should be selected to prevent risks such as:

- patients accessing out of bounds areas;
- absconding;
- self-harm; and
- preventing staff from reaching a safe place.

Safety glazing should be considered in the following high risk areas:

- entry areas;
- emergency departments;
- drug and alcohol units; and
- mental health units, including community mental health facilities.

Safety glazing should also be used for wall openings in activity areas such as recreation and exercise rooms and for shower screens, internal doors and full height windows.

Safety glazing materials include toughened, laminated, wired glass, or combinations of these (bullet resistant), plastic materials (polycarbonates) and films. Some of these are defined in AS/NZS 2208.

Designers must select the safety glass type and thickness appropriate to the location of the glass, the use of the surrounding spaces, and the requirements of the relevant Australian Standards.

7.5.7 Dangerous Goods and Hazardous Substances

Dangerous goods are substances that are corrosive, flammable, explosive, spontaneously combustible, toxic, oxidising or water-reactive. Incidents involving dangerous goods typically result in explosions or fires and have the potential to cause serious or fatal injuries as well as large-scale damage to property and the surrounding environment. Unsafe use of dangerous goods can also cause poisoning, chemical burns and other serious health problems. These types of goods are widely used in health services and it is vital that they are stored, handled and transported safely.

Dangerous goods are covered by The Dangerous Goods (Storage and Handling) Handling Regulations and are subject to a United Nations International Classification System. They are subject to the HAZCHEM code and identification for emergency personnel.

Hazardous substances comprise radiological sources, harmful biological materials, and hazardous chemicals, and are used in numerous process across healthcare facilities including for; medical imaging, pharmacy, anaesthetics and laboratories, cleaning, disinfecting, laundering, and maintenance.

Hazardous materials and dangerous goods are covered by individual industry Safety Data Sheets (SDS). These include information on characteristics and safe handling. The management of these materials in healthcare facilities involves transportation, storage, use and disposal of hazardous materials and controlled waste.

Key considerations relating to healthcare facilities include:

- radiation safety - rooms containing, or proposed to contain, medical imaging (ionising) equipment will almost always require radiation shielding. Advice should be sought from the relevant radiation regulatory authority to ensure physical design is satisfactory. Further details are provided in HPU 440 Medical Imaging Unit;
- medication management – refer to jurisdictional legislation regulating the safe management and security of therapeutic drugs;
- liquid nitrogen – facility design will need to align with policies in place to minimise the likelihood of injuries and illnesses associated with the use and storage of liquid nitrogen, and in accordance with AS/NZS 2243.2L Safety in Laboratories – Chemical Aspects and AS1894: The Storage and Handling of Non-Flammable Cryogenic and Refrigerated Liquids; and
- Use of glutaraldehyde in health care settings - refer to jurisdictional policies for detailed design and ventilation requirements.

It is the responsibility of design teams to comply with the relevant legislation, regulations and policies within each jurisdiction and with the appropriate industry guidelines.

Design and construction process should address ‘hearing conservation’ aspects of the work environment. The occupied floor area should be designed to maintain internal noise levels at an appropriate level in accordance with the Indoor Environment Quality (IEQ) requirements or recommendations.

Design considerations include:

- acoustic separation for privacy reasons;
- nuisance noise - this requires consideration given it can degrade patient comfort and impair staff function, even though it may not be of a sufficient level to cause hearing loss;
- quiet, low-stimulus areas should be provided in emergency departments, mental health, aged care, maternity and paediatric units;

- designing workplaces to minimise the occupants' exposure to noise. Noisy machines and activities should be remote or isolated from other work areas;
- providing acoustic enclosures to noisy equipment where practicable;
- providing noisy work areas such as workshops with acoustically absorbent ceilings or other means to reduce the amount of noise impacting on other staff working nearby;
- ensuring that checking noise levels of equipment is an integral part of equipment selection / purchasing procedures; and
- considering the impact of ultrasonic noise generation, and the provision of effective solutions.

Building and mechanical services design should achieve ambient internal noise levels in accordance with Table 1 of AS/NZS 2107. Noisy environments can exacerbate the risk of client aggression, anxiety and cause discomfort.

7.5.9 External Environment

Access to outdoor space from higher building levels requires careful consideration of safety issues. Railings, enclosures and other barriers may be required to restrict access to roof areas and to prevent people jumping or falling.

External doors that open directly into food preparation areas and that are used for service deliveries or regular access should be fitted with air curtains, flexible doors or an equal control system to restrict the ingress of insects.

Fly screens are recommended for all opening windows used for ventilation.

7.5.10 Soft Furnishings

It is recommended that soft furnishings comply with the relevant safety and environmental legislation and other relevant policies within each jurisdiction, including infection control, hygiene, cleaning, procurement, whole of life costs and risk management policies.

Soft furnishings in the internal built environment include mattresses, curtains, bed, cubicle and shower screens, upholstery, finishes, and wall and floor coverings including tracks, fittings, sealants or adhesives. Certain materials emit internal air pollutants in the form of Volatile Organic Compounds (VOC).

To reduce the detrimental impact on occupant health, select only materials that meet recommended benchmarks for low VOC content or emissions.

The BCA Section C Fire Resistance covers fire hazard properties, including floor materials, floor coverings, wall or ceiling lining materials. Soft furnishings are only covered under this context. They are not included under non-combustible materials which deals with sheet lining materials.

7.6 REFERENCES

Australasian

- New Zealand Department of Labour, Workplace Health and Safety Strategy
- Parliament of New Zealand, Health and Safety in Employment Act
- Worksafe New Zealand, WorkSafe Cycle, Accident Compensation Council
- Safe Work Australia
- Australasian Health Facility Guidelines, Isolation Rooms - Engineering and Design Requirements

Individual Jurisdictions

ACT

- ACT Parliamentary Council, Occupational Health and Safety Regulations
- ACT Parliamentary Council, Occupational Health and Safety Act
- ACT WorkCover, Guidance on the Safe Moving of Clients
- ACT WorkCover, Occupational Health and Safety Act: A Guide for Users

NSW

- Guidelines for the Prevention of Manual Handling Incidents, NSW Health
- NSW Health, Guideline 2005_070: Occupational Health & Safety Issues Associated with Management Bariatric (Severely Obese) Patients, NSW Health
- NSW Health, Policy Directive 2013_050: Workplace Health and Safety: Policy and Better Practice Guide, NSW Health
- NSW Health, Policy Directive: Guidelines for the Safe Use of Hazardous Substances and Dangerous Goods, NSW Health
- NSW Health, Personnel / Workforce - Occupational Health and Safety, NSW Health
- State Government of New South Wales, Occupational Health and Safety Act
- SafeWork NSW, Codes of Practice - Hazardous Substances List

Northern Territory

- Northern Territory Department of Justice, Workplace Health and Safety Act
- Northern Territory Department of Justice, Workplace Health and Safety Regulations

QLD

- State Government of Queensland, Workplace Health and Safety Regulations
- State Government of Queensland, Workplace Health and Safety Act
- Workplace Health and Safety Queensland, Manual Tasks Involving the Handling of People Code of Practice
- Workplace Health and Safety Queensland, Guide to the workplace health and safety obligations of designers of structures
- Workplace Health and Safety, Queensland, Manual Tasks Code of Practice
- Department of Justice and Attorney-General. Workplace Health and Safety, Queensland, Hazardous materials

SA

- State Government of South Australia, Occupational Health, Safety and Work Regulations
- State Government of South Australia, Occupational Health, Safety and Welfare Act

Tasmania

- State Government of Tasmania, Workplace Health and Safety Act
- State Government of Tasmania, Workplace Health and Safety Regulations
- Workplace Standards Tasmania, Annotated Workplace Health and Safety Regulations

Victoria

- State Government of Victoria, Occupational Health and Safety (Manual Handling) Regulations
- Worksafe Victoria, Manual Handling (Code of Practice No 25)
- Worksafe Victoria, Designing Safer Buildings and Structures
- Worksafe Victoria, Manual Handling - Risk Management in a Large Organisation.
- Worksafe Victoria, Designing Workplaces for Safer Handling of People

WA

- State Government of Western Australia, Occupational Safety and Health Act
- State Government of Western Australia, Occupational Safety and Health Regulations
- Department of Commerce. State Government of Western Australia, Code of Practice: Violence, Aggression and Bullying at Work
- WA Health, OP 0111/91: Control of Workplace Hazardous Substances - National Model Regulations
- WA Health, OP 0953/99: Management and Use of Hazardous Substances in Health Department Workplaces
- WA Health, Guidelines for Engineering Services
- WA Health, Western Australia Health Facility Guidelines for Infection Control
- Worksafe WA, Code of Practice: Manual Handling
- Worksafe WA Commission, General Duty of Care in Western Australian Workplaces

Standards

- AS/NZS 4801: Occupational Health and Safety Management Systems - Specification with Guidance for Use
- AS/NZS ISO 31000: Risk Management, SAI Global.
- AS 1428 (Set): Design for Access and Mobility, SAI Global.
- AS/NZS 4187: Cleaning, Disinfecting and Sterilizing Reusable Medical and Surgical Instruments and Equipment, and Maintenance of Associated Environments in Health Care Facilities
- AS2021: Acoustics - Aircraft Noise Intrusion - Building Siting and Construction
- AS/NZS 2107: Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors
- AS 2436: Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites, SAI Global.

- AS/NZS 1269: Occupational Noise Management, SAI Global.
- AS Handbook 125: The Glass and Glazing Handbook, SAI Global.
- AS 1288/Amdt 1-2008: Glass in Buildings - Selection and Installation, SAI Global.
- AS 2047/Amdt 2-2001: Windows in Buildings - Selection and Installation
- AS/NZS 2208:1996/Amdt1:1999: Safety Glazing Materials in Buildings
- AS 1940/Amdt 2-2006: The Storage and Handling of Flammable and Combustible Liquids,
- AS 2430.3: Classification of Hazardous Areas - Examples of Area Classification
- AS 2430.3.3/Amdt 1-2007: Flammable Liquids
- AS 4332/Amdt 1-2005: The Storage and Handling of Gas Cylinders, SAI Global.
- AS/NZS 1596: Storage and Handling of LP Gas, SAI Global.
- AS 1216: Class Labels for Dangerous Goods, SAI Global.
- AS/NZS 2243: Safety in Laboratories Set, SAI Global.
- AS/NZS 2243.3-2002/Amdt 1-2003: Safety in Laboratories - Microbiological Aspects and Containment Facilities.
- AS/NZS 2243.4-1998: Safety in Laboratories - Ionizing Radiations.
- AS/NZS 2243.5-2004: Safety in Laboratories - Non-Ionizing Radiations - Electromagnetic, Sound and Ultrasound.
- AS/NZS 2243.8-2006: Safety in Laboratories - Fume Cupboards.
- AS/NZS 2243.9-2009: Safety in Laboratories - Recirculating Fume Cabinets.

Glutaraldehyde

For detailed design and ventilation requirements for the use of glutaraldehyde in health care settings, refer to:

- Department of Labour 1992, The Safe Occupational Use of Glutaraldehyde in the Health Industries, Health and Technical Services, Department of Labour, New Zealand.
- Ecospecifier 2009, Ecospecifier: Products, Knowledge, Solutions, www.ecospecifier.org/
- Green Building Council Australia 2009, Healthcare V1, Green Star, www.gbca.org.au/ratingtools/green-starhealthcare-v1/1936.htm
- NSW Health 2005, Policy Directive 2005_108: Policy and Guidelines for Safe Use of Safe Handling of Glutaraldehyde in NSW Public Health Care Facilities, NSW Health.
- State Government of Queensland 2000, Environmental Protection (Waste Management) Policy, Office of the Queensland Parliamentary Counsel.

08 APPENDICES

GLOSSARY AND ABBREVIATIONS

This Document adopts the terms and meanings used in the BCA and Australian Standards, in addition to the following abbreviations. Common abbreviations for NZ, States and Territories and Government Agencies are used without additional explanation.
Refer also to Part A Section 50 - Glossary of Terms.

ABBREVIATIONS

AHRC	Australian Human Rights Commission (formerly HREOC)
AS	Australian Standard
AS/NZS	Australian and New Zealand Standard
AusHFG	Australasian Health Facility Guidelines (this document is a part of these)
BCA	Building Code of Australia
CCTV	Closed Circuit Television
CI	Critical infrastructure
CPTED	Crime Prevention through Environmental Design
DDA	Disability Discrimination Act
ERM	Emergency Risk Management
ESD	Ecologically Sustainable Development
FF&E	Furniture, Fittings and Equipment (see Glossary) includes Fixtures and Fittings
HFG	Health Facility Guideline
HPU	Health Planning Unit
HREOC	Human Rights and Equal Opportunity Commission, see AHRC
HVAC	Heating, Ventilation, and Air-conditioning
IEQ	Indoor Environment Quality
ISO	International Standards Organization
NCC	National Construction Code
PCG	Project Control Group
SA. HB	Standards Australia. Hand Book
AS/NZS	Standards Australia/Standards New Zealand
SDC	Sustainable Development Commission, UK
VOC	Volatile Organic Compound
WHS	Workplace Health and Safety

ORGANISATIONS

ABCB	Australian Building Code Board
AIQS	Australian Institute of Quantity Surveyors
ASCC	Australian Safety and Compensation Council (formerly NOHSC)
CAE	Centre for Accessible Environments (UK)
CASA	Civil Aviation Safety Authority Australia
GBCAUS	Green Building Council of Australia
NHS	National Health Service (UK)
NOHSC	See ASCC
AS/NZS	Standards Australia / Standards New Zealand

GLOSSARY

Accessible
Accessible by people with disabilities.

Critical infrastructure
A service, facility or a group of services or facilities, the loss of which will have severe adverse effects on the physical, social, economic or environmental wellbeing or safety of the community.

Designated Hazardous Substance
A substance listed in the Hazardous Substances Information System (HSIS) provided by the Australian Safety and Compensation Council (formerly NOHSC) as a designated hazardous substance.

Equipment*
Refer 'Fixtures', term used for kitchen, laundry, sterilising equipment etc.

Emergency Risk Management
A systematic process that produces a range of risk treatments that reduce the likelihood or consequences of events.

Fixtures*
Fixed items that require service connection, e.g. electrical, hydraulic, mechanical and includes basins, light fittings, clocks, medical service panels etc.

Fittings*
Fixed items attached to walls, floors or ceilings that do not require services such as curtain and IV tracks, hooks, mirrors, blinds, joinery, pin boards etc.

Furniture*
Loose furniture, e.g. desks, joinery, beds, etc.

Hazardous Substance
Identified on an MSDS as having an exposure standard or being a hazard to health in the 'health hazard information' section of the MSDS. See also Designated Hazardous Substance.

Vinyl
PVC (polyvinylchloride).

Visitor
Any person visiting the facility, including contractors, public, medical and services staff, etc.

Sustainable / Sustainability
General term for ESD

Wayfinding
Strategy to assist people in finding their way.

***** For further information on FF&E and Fixtures and Fittings refer to the Standard Components Room Data Sheets (RDS) 'How to use.'