Safety and security

Good building design can help achieve a safer and secure living environment. These design features can be incorporated upfront in the design and construction phase or through ongoing modification and maintenance. (see *The livable and adaptable house***; the appendix** *The healthy home***)**

Safety

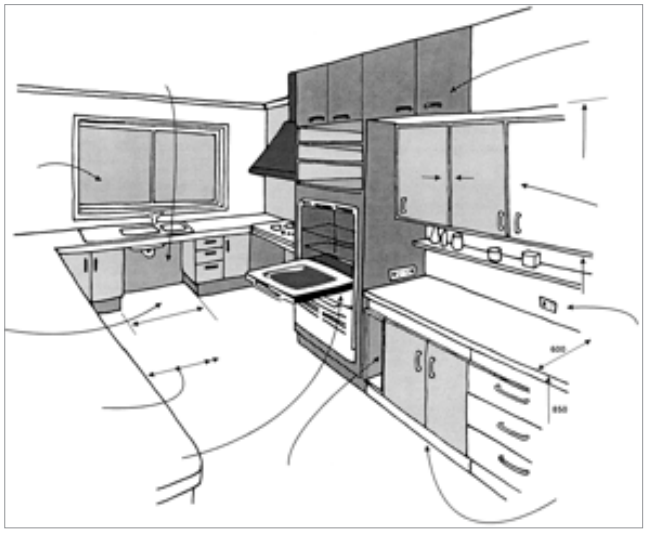
Most accidents occur in the home. The design of a house, construction methods, materials, finishes, appliances and maintenance all influence home safety. Safety issues can relate to:

- kitchens
- bathrooms
- fittings (doors, windows and hot water systems)
- outdoor areas
- fire risk prevention.

Kitchen safety

The majority of domestic accidents occur in the kitchen and bathroom. Apply the following general design tips to reduce the likelihood of accidents in the kitchen:

- Design for unobstructed access to the work triangle (the area containing the stove, sink and refrigerator).



Design for unobstructed access to the work triangle.

- Eliminate or reduce cross traffic through the work triangle.
- Protect hot plates with a guardrail or deep setback and use fire resistant finishes adjacent to and above the cook top.
- Round-off bench edges and corners.
- Design heatproof benchtops or inserts either side of oven and grill for rapid set down of hot dishes and trays.
- Locate microwave ovens above the eye level of children or at the back of a bench to prevent them gazing into it. Have the microwave checked regularly for microwave leakage.

Bathroom safety

- Use slip resistant flooring and avoid steps.
- Provide handles and bars near baths, in showers and adjacent to toilets for elderly and disabled users.
- Design and install child resistant cabinets for medicines and hazardous substances.
- Comply with Australian Standards that specify minimum distances between water sources (baths, basins, tubs) and power points.
- Comply with Building Code of Australia (BCA) requirements for outward opening of sanitary toilet doors or install sliding doors or use hinges that permit doors to be removed from the outside. Many heart attacks occur in toilets with the victim blocking inward opening doors.
- Ensure that privacy locks on bathroom doors can be opened from the outside in the case of an emergency.
- Provide a night light or movement sensitive light switch in the passage for safe access to the toilet at night.

Fittings

Hot water

- Set thermostats on instantaneous hot water systems at 50°C or less to help prevent scalding (see AS/NZS 3500.4:2003 Plumbing and drainage: Part 4 Heated water services).

- Set hot water storage systems to above 60°C to inhibit growth of harmful bacteria such as *Legionella*. Incorporate a fail-safe mixing valve on both the bath and shower to avoid scalding (see AS/NZS 3500.4:2003).
- Install a tempering valve or an outlet shut-off valve in your existing system to reduce the flow of water to a trickle if it's too hot. When cold water is added and the temperature becomes safe, the valve opens and the flow returns to normal. This can prevent accidents if you have small children or elderly people in your home.
- See *Hot water service* for more information on hot water.

Doors

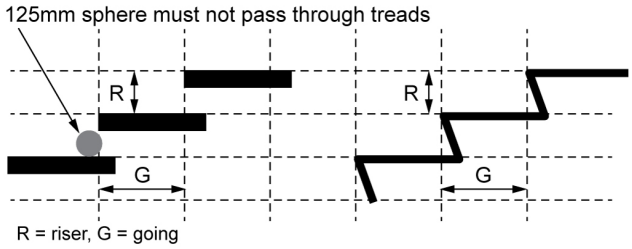
- Install self-closing (but not self-locking) screen doors at external entrances.
- Place internal door handles 1m from the floor so young children cannot open them.
- Consider latch rather than knob type handles for ease of use by weak or disabled people.

Floors, stairs and ramps

- Use ramps instead of stairs where possible.
- Observe optimum rise to run ratios for stairs as shown in the figure below.
- Ensure that stair rails and balustrades comply with BCA minimum standards. Balustrades with maximum 125mm gap between balusters must be provided where finished floor level is higher than 1m above the ground level.
- Avoid changes of level within the house and between the house and the outside. Where changes of level are necessary, ensure that they are clearly visible with colour change in floor covering.
- Use non-slip, impact absorbing floor surfaces where possible, especially on stairs or ramps and in wet areas.

Stair riser and going dimensions (mm)

Stair type	Riser (R)	Going (G)	Slope relationship (2R+G)
	Min–Max	Min–Max	Min–Max
Stairs (other than spiral)	115–190	240–355	550–700
Spiral	140–220	210–370	590–680



Source: Building Code of Australia

Stair riser and going relationships.

Windows

- Design windows with easy access for opening, closing and cleaning. Windows should comply with requirements of AS 1926.1-2007, Swimming pool safety: Part 1 Safety barriers for swimming pools, in situations where the window provides access from a building to a swimming pool area.
- In areas of a building that have a high potential for human impact, use grade A safety glazing. Glazing in high human impact areas should be marked to make it readily visible according with section 3.6.4.6 of the BCA.
- Ensure that all new glazing complies with relevant Australian Standards and bears a manufacturer's stamp certifying compliance.
- See *Glazing* for more information on windows.

Wiring and electrical

- Carefully plan the provision of power outlets. Insist on an electrical layout plan. It will save later inconvenience and may save your life.
- Install earth leakage devices and circuit breakers to all power outlets.
- Provide adequate power points and circuits to eliminate the need for power boards, which can overload circuitry, and reduce the need for cords across walkways to avoid tripping or electrocution.
- Ensure that the switchboard can be easily accessed at night. Use safety switches on indoor and outdoor circuits.

Heaters

- Ensure fan heaters have a safety switch to cut power off if the fan stops or heater overheats.
- Never leave a heater unattended.
- Position the heater to avoid intake blockage or material falling on it.

- Take care to stop pets lying close to heaters, where they can accidentally knock bedding, mats and other materials onto the heater.
- See *Heating and cooling* for more information on heating.

Ceiling fans

- Position ceiling fans at least 2.4m above floor level to reduce risk of injury.

Outdoor safety

- Plant light coloured plants along the edges of paths to make them clearer at night.
- Install solar powered or movement sensitive outdoor lighting along paths, especially near steps or bends. Use energy efficient lighting. (see *Lighting*)
- Provide safety fencing around pools and ponds in accordance with BCA and state regulations to prevent access by unsupervised children.

Fire risk and prevention

House fires can often be prevented through careful design and maintenance.

- Use fire resistant materials, linings and finishes, particularly in kitchens.
- Install smoke alarms and check annually that batteries are fitted correctly and still charged.
- Equip the home with fire extinguishers.
- Consider installing a domestic sprinkler system.
- Favour furnishings and floor coverings with fire retardant properties. Ratings are available for many items and include flammability indexes, spread of flame indexes and smoke generated indexes. Various construction systems have fire ratings that determine how long they withstand a fire and retain structural integrity. Ask your local council for full details.

Security

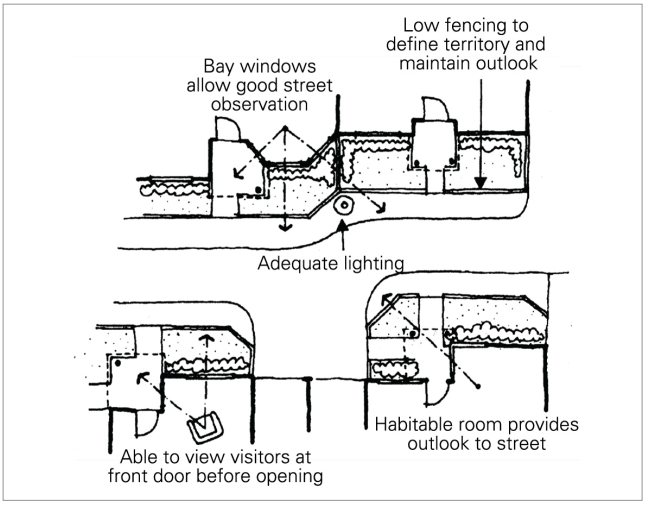
The view that crime prevention and security is only a matter for law enforcement agencies is no longer true. Individuals, neighbourhoods, local authorities and planners can all play a role in reducing the incidence and fear of crime.

Appropriate design of individual dwellings and their relationship to one another and to the surrounding neighbourhood can all play a part in preventing crime. This approach is often referred to as 'crime prevention through environmental design' and there is a lot of evidence-based research to show that it works.

Many burglaries are opportunist crimes. A burglar only needs to spot an open window or an unlocked door or gate to make their move.

The principles for crime prevention through design for individuals and neighbourhoods include:

- **Territoriality** — Outdoor spaces should be designed to foster a stronger sense of ownership and communality. In apartments, for example, residents need to feel that public spaces such as halls and elevators belong to them.
- **Natural surveillance** — Surveillance should be a part of the normal and routine activities of individuals and neighbourhoods. It can be enhanced by positioning windows for clear sightlines so streets, footpaths and play areas can be watched.



Position windows for clear sightlines to streets, footpaths and play areas.

- **Target hardening** — Improve building security standards. Locks and security screens should be installed to deter thieves. Doors, windows and halls should be made more secure, and the quality of exterior doors, door frames, hinges and locks must be high. Exterior lighting and alarm systems can add to security.
- **Access control** — Use real or perceived barriers to discourage intruders. Real barriers include a picket fence, a brick wall or a hedge. Perceived barriers can be created by a flower garden or a change in level or design between the public space of a footpath and private front yard.

More security tips

- Install an intruder alarm system according to AS 2201.1-2007, Intruder alarm systems: Part 1 Systems installed in client's premises.
- Display security system notices prominently.
- Select a security system with low standby power consumption. Many systems use excessive electrical energy over a year. (see *Home automation*)
- Design or modify your home to eliminate dark corners, narrow pedestrian walkways and hidden recesses.
- Design balconies and windows to maximise natural observation of vehicle and pedestrian movement.
- Ensure that perimeter doors and windows are of solid construction and fitted with quality deadlocking devices.
- Glass should be reinforced with shatter resistant material to prevent entry.
- Ensure that skylights and roofing tiles can't be easily removed from the outside.
- Fit the main entry doors with viewing ports to allow identification of visitors.
- Direct infrared activated security lights toward likely access/egress areas to illuminate potential offenders.
- Avoid or modify trees, carports and lattices that can act as 'ladders' to upper storeys.
- Ensure that external storage areas, laundries, letterboxes and communal areas are well lit and observable from inside.
- Clearly delineate property boundaries using gardens, distinctive paving, lawn strips, ramps and fences.
- Build low and/or open fences and walls to improve observation and maximise sunlight. Ensure vegetation does not obscure building entrances, windows and other vulnerable areas.
- Ensure that entrances are clearly private and well illuminated.
- Install sensor lighting or timed lighting that can be controlled from within the dwelling.
- Join or establish Community Safe House programs in your area.
- Provide pleasant, well-defined pedestrian routes overlooked by neighbouring houses and employ traffic calming measures to slow cars and encourage pedestrian activity where possible. (see *Transport*; the appendix *Streetscape*)
- Set buildings back from the verge to create a perception of semi-private space.
- Encourage casual use of public and semi-private open spaces during evening hours so they can be 'animated' with legitimate activities.

References and additional reading

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