

# The livable and adaptable house

Many people, when building a new home, anticipate spending a number of years, if not decades, living in it. Others may conceive of a shorter stay. Whatever the intention, any new home is likely to have to accommodate changing needs over its lifetime. A livable and adaptable house is one that is able to respond effectively to these needs without requiring costly and energy intensive alterations.

Australian demographics are changing rapidly, with average households becoming both smaller and older as an increasing number of people live independently in their later years. The balance between home and work life also places altering demands on our houses as many people choose to work from home. A single space may act at different times as a home office, a teenage retreat, a family study or a bedroom for an elderly relative.

*An adaptable house accommodates lifestyle changes without the need to demolish or substantially modify the existing structure and services.*

An adaptable house can be designed to easily enable a large family home to be eventually divided into two smaller housing units, so residents continue living in a familiar environment.



Adaptable floor plans.

Household needs vary over time in relation to physical capabilities. Most people can expect temporary or permanent variations in their physical capabilities in their life due to injury, illness or age. The Australian Bureau of Statistics reports that the percentage of individuals with a disability increases significantly with age, rising to more than 50% of people aged over 60. Longer life spans and higher proportions of older people in our society make it more likely that every home will be required to respond to the needs of a person with a physical limitation whether they are the primary resident or a visitor.

For those with limited mobility, reduced vision or other impairment, the ability to perform common tasks such as carrying shopping into the home, cooking a meal, using the bathroom or accessing items from high shelves may be unnecessarily limited by the physical design of a home. As the needs of individuals are specific to their personal circumstances there is no single solution to designing a home to meet changing needs; however, several approaches exist:

- **Livable house** — designed to meet the changing needs of most home occupants throughout their lifetime without the need for specialisation.
- **Accessible house** — designed to meet the needs of people requiring higher level access from the outset, and usually designed and built with a specific person's needs in mind. An accessible house meets Australian Standard AS 1428.1-2001, Design for access and mobility, and is able to accommodate wheelchair users in all areas of the dwelling.
- **Adaptable house** — adopts the idea of a livable house but in addition is able to be easily adapted to become an accessible house if the need should arise.

## The livable house

The livable house is based on the principles of 'universal design' — defined as the design of products and environments so that they are usable by all people, to the greatest extent possible, without the need for adaptation or specialised design. The intention is to simplify life for everyone by making more housing usable by more people at minimal extra cost.

A livable house uses building features, fittings and products in combination to increase usability, benefiting people of all ages and abilities. It ensures that rooms and services

# Housing of the future

## The livable and adaptable house

within the home are of a size and type usable by as many people as possible. For example, slightly wider doorways or passageways are more easily navigated by users of mobility devices such as walking frames, wheelchairs or a child's pram. People with limited hand function find screw-type sink taps more difficult to use than lever-type taps, which can be used by everyone. The same applies to lever-type door handles and rocker electrical switches. Incorporating these fittings during construction reduces the need for later retrofitting.

When homes are retrofitted with ramps, handrails and other devices, they can take on an institutionalised appearance. Universal design does not propose special features for the aged or disabled but instead promotes the use of standard building products and practices to overcome access and usability problems. For example, designing an entry without steps removes the need for the later addition of a ramp and handrails for wheelchair users, while improving access for children's prams.

Livable Housing Australia's Design guidelines (2nd edition) provide technical advice and guidance on the key living features that make a home easier and safer to live in for people of all ages and abilities. The guidelines were developed and endorsed by industry, community and government, and aim to improve the design and function of new homes in the mainstream and social housing market. The guidelines detail three performance levels for livability — silver, gold and platinum — which range from basic requirements through to best practice.

A livable house does not necessarily accommodate the higher access needs of occupants who require an adaptable or accessible house. The inclusion of livable design features may reduce or eliminate the cost of retrofitting a home to improve access in the future.

## The adaptable house

In addition to being designed to be usable by most people, the adaptable house has provision for further modifications should they be required to meet the specific needs of a disabled occupant. This may include modifying kitchen joinery and altering the laundry and bathroom to improve access and usability, increasing lighting levels in response to vision impairment, or introducing support devices such as grab rails and/or additional security measures.

*Australian Standard AS 4299-1995, Adaptable housing, provides guidance for designing houses to accommodate varying degrees of physical ability over time.*

Starting from the basic premise that every house should be accessible to a visitor using a wheelchair, AS 4299-1995, Adaptable housing, requires the house

to also be adaptable for an occupant using a wheelchair. Although such a need is unlikely in every home, the standard specifies wheelchair space requirements, as circulation and access present the greatest difficulties. By allowing enough space for wheelchairs, other equipment such as walking frames, prams and trolleys can be better accommodated.

Adherence to AS 4299 may be specified in the building contract and enables housing to be certified as adaptable to one of three classes based upon the inclusion of essential and desirable features. It recommends that adaptable features incorporated into a dwelling be clearly documented with 'before' and 'after' drawings. This avoids relying upon recollection and enables the information to be readily passed on to contractors or subsequent owners. Compliance with this standard enables a design to be certified as an adaptable house, clearly identifying and recognising its adaptable features. Whether or not a designer is seeking certification, the certification document provides useful information.

## Benefits to the owner

By meeting occupant needs over a greater period of time, the livable house and the adaptable house reduce the need to relocate to alternative housing, which can break community ties. They are also attractive housing options for the greatest number of people and therefore provide a sound investment for resale and rental.

Design for adaptability enables rapid response to changing life needs which can be swift and unexpected. It also increases the building's serviceable life span before remodelling, with associated financial, energy and material savings.

## Developing a design

In the early stages of designing a new house or renovation, consider what type of use may be desirable and discuss your choices with your architect, designer or builder. Consider the following:

- Is it likely that the house will be extended in the future?
- How might the use of space change over time?
- Is it desirable for the house to be accessible for elderly friends and relatives who have a disability? If so, ask your designer to adopt the Australian Standard for adaptable housing.
- Is it desirable to make provisions for the future accommodation of an ageing or disabled occupant? Again, ask your designer to adopt the Australian Standard for adaptable housing.

*Adaptable housing solutions can also be considered in smaller projects.*

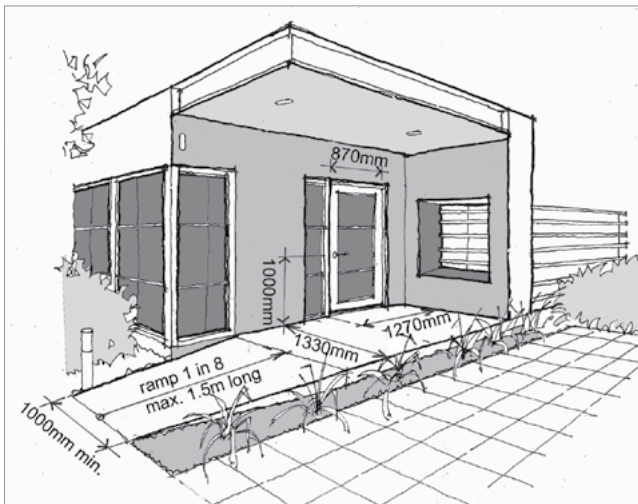
Minor alterations to bathrooms or kitchens can incorporate many adaptable housing features at minimal extra cost, making significant savings when adaptations are required in the future.

The following sections show how spaces in and around a home may begin to accommodate both livable and adaptable housing principles. Features and dimensions prescribed by AS 4299 and AS 1428.1 may vary over time as these documents are periodically revised.

### Access and entry

An adaptable house should:

- provide easy access from both the street and car parking spaces in all weather and light conditions
- avoid stairs and use ramps only where essential
- dimension both ramps and stairs in compliance with AS 1428.1
- construct access paths from well drained, solid, non-slip surfaces that provide a high colour contrast to surrounding garden areas
- light pathways with low level lighting directed at the path surface, not the user
- protect paths and entries from weather
- avoid overhanging branches and plants which may cause hazards.



Adaptable house: access.

For security, the house entrance needs to be visible from the entry point to the site or the car parking space. The entry itself should provide a level sheltered landing that is dimensioned for wheelchair manoeuvrability

and is adequately lit for visibility from inside the home. Entry door locks and lever handles should be fitted at appropriate heights and be able to be used with one hand. Ensure no obstructions or level changes limit access by a wheelchair user or are a tripping hazard to others.

### Interior – general

The interior of the house should allow easy movement between spaces; often, this simply means slightly widening internal doors and passageways. Ideally, access should be easy throughout the entire home but it may be considered necessary only in some parts such as between living spaces, kitchen, bathroom and one bedroom.

Internal doors should have a minimum unobstructed width of 820mm and passageways a minimum of 1000mm, but any additional width is beneficial. Doorway width is measured from the face of the open door to the opposite frame. Circulation space around doors to allow wheelchair access is required, with special attention given to providing enough space to reach and operate the door lever. Refer to AS 1428.1 for dimensions, as door types and room configurations vary.

Electrical outlets are best placed at a minimum of 600mm above the floor; for light switches and other controls the ideal height range is 900–1100mm. The use of two-way switches at each end of corridors and where spaces have more than one entry is desirable. Lighting design needs to respond to the specific use of different spaces by evenly distributing light to avoid shadows, especially over work surfaces. Lighting should also be able to provide stronger illumination when required for those with impaired vision.

Window sills should be low enough to allow unobstructed views to the exterior from standing, sitting and lying positions where appropriate. Where different floor surfaces meet, they need to be level and fitted with cover strips to prevent tripping.

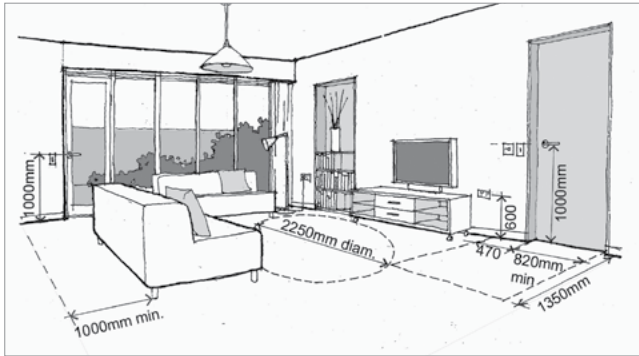
### Living spaces

Living spaces should be comfortable and accessible to all residents and visitors. To accommodate a range of activities and tasks it is advisable to install thermal conditioning and services to suit a variety of furniture layouts. Australian Standards recommend:

- a minimum of four double electrical outlets
- a telephone outlet adjacent to an electrical outlet
- two TV antennae outlets, all located at appropriate heights
- clear circulation space within the room of at least 2250mm diameter for wheelchair manoeuvrability.

# Housing of the future

## The livable and adaptable house



Adaptable house: living room.

In homes accommodating an elderly or disabled person it is advisable to provide a living space separate to the bedroom and main family areas for additional privacy. It may be located inside or outside the home in an area protected from weather.

### Cooking spaces

As a person's physical abilities deteriorate over time, the kitchen is one of the main rooms in the house where the impact of physical limitations is felt. Detailed documentation for designing kitchens and joinery for wheelchair users is widely available; however, as people's maximum reach and strength vary greatly, even among wheelchair users, so kitchens designed specifically for people with disability vary greatly too. The design of a kitchen should not limit a person's independence and ought to be adaptable to accommodate a specific individual's needs.



Adaptable house: cooking spaces.

To accommodate a wheelchair user or other seated occupant, portions of the work surfaces should be constructed at a lower level than those for standing users, with leg room provided under work benches. To facilitate such changes kitchen joinery can be installed using modular components that allow for easy removal

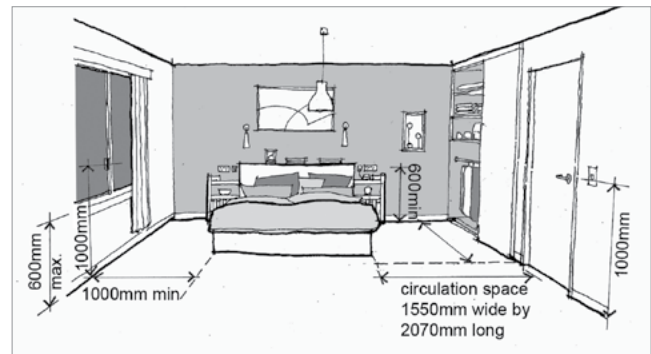
or modification of individual parts rather than the reconstruction of the entire joinery layout. Install such components after the non-slip floor finish is completed.

Design the kitchen with safety considerations in mind including:

- appropriately sized work spaces to the side of all appliances such as the cooktop, oven, microwave and refrigerator
- proximity of the cooktop to the sink to allow easy transfer of pots between the two for draining
- contrasting colours between bench tops and cupboard fronts to assist the visually impaired.

### Sleeping spaces

At least one bedroom in the house should be accessible to a person using a wheelchair and be sized to enable them to manoeuvre within the space. The location of the accessible bedroom should take into account who is likely to use it, be it a family member with a temporary physical limitation, visitors of various abilities or an ageing resident. Additional services such as two-way light switches, telephone outlets, additional electrical outlets and TV outlets are recommended to ensure maximum usability and security.



Adaptable house: sleeping spaces.

### Wet areas

In the design of all wet areas such as toilets, bathrooms and laundry:

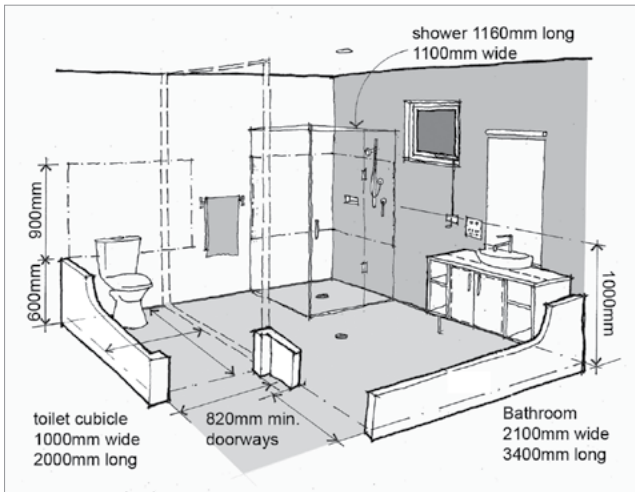
- ensure adequate sizing for access and circulation
- locate storage for easy and safe use
- install non-slip surfaces to minimise accidents.

During construction an accessible toilet should be included for visitors. If possible, make the entire bathroom fully accessible for a wheelchair user, ensuring that all the facilities can be used by residents with limited mobility or who need the assistance of a carer.



# Housing of the future

## The livable and adaptable house



Adaptable house: wet areas.

If separate bathroom and toilet facilities are preferred, install a removable wall between the toilet cubicle and the bathroom during construction. To reduce the amount of work required later, install such a wall as a non-loadbearing partition after the floor and wall finishes are completed. Similarly, install items such as vanity cupboards, toilet bowls or shower screens which may require relocation or modification, as removable fixtures after all surrounding surfaces are completed.

One of the most common adaptations employed in residential bathrooms is the installation of grab rails for support and stability. To avoid demolishing sections of wall to insert support points, fix 12mm structural plywood to any stud wall framing behind the finished wall materials. In addition, allow leg space around handbasins and locate items such as mirrors, electrical outlets and controls so they can be used by people both standing and seated.

Depending upon the user, top or front-loading laundry appliances may be preferred. In either case, provide:

- a minimum circulation space 1550mm deep in front or beside appliances
- taps located to the side, not the back, of any laundry tub
- sufficient storage shelves at a maximum height of 1200mm.

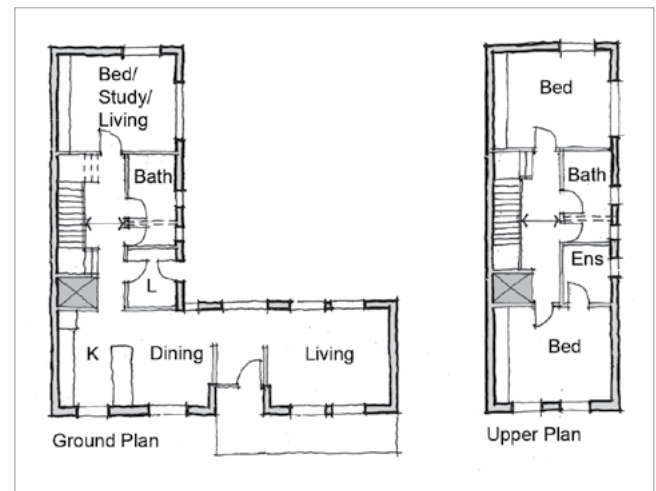
Access to external drying areas should consider mobility issues and the need to use clothes baskets and trolleys.

### Multi-level housing

Although single level homes seem an obvious choice for accessible housing, two or more storey houses and apartments can also be suitable for adaptation. The ground floor of a multi-level house can be accessible

to visitors with a disability or even accommodate an occupant with a temporary disability. In addition to access between living, kitchen and bathroom spaces, include an accessible bathroom and a space appropriate for use as a bedroom on the ground floor.

To facilitate multi-level access, floor plans should allow for the future installation of vertical lifts or staircase lifts. A vertical lift requires space for a hole through each floor adjacent to circulation space on all levels. Initially the hole in the upper floor can be filled in or the space used for storage until adaptation is required. A stair lift requires ample space on top and bottom stair landings.



Adaptable house: multi-level.

### Site

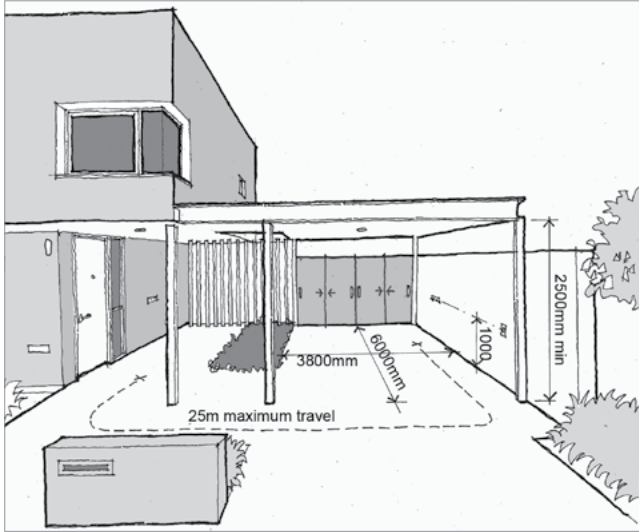
Activities such as mail collection, rubbish storage, car parking and enjoyment of outdoor spaces must also be considered in designing for full accessibility:

- Make rubbish bins, recycling storage, letterboxes, clotheslines and garden tool storage accessible along paths (see 'Access and entry' above).
- Provide access and circulation space to external areas such as patios and terraces (see 'Living spaces' above).
- Provide private, sheltered areas with access to northern sun in winter, visible from inside the home.
- Allow for raised garden beds in the initial garden layout.
- Locate car parking close to the entry with at least one covered parking space sized to enable wheelchair access.
- Install electronically operated garage doors.
- Allow secure space for future storage and recharging of a wheelchair or other mobility device such as a scooter.

# Housing of the future

## The livable and adaptable house

- Ensure that garden and fence layouts do not compromise security by limiting visibility through the site.
- Ensure that house or unit numbers are clearly visible from the street.
- Use movement activated sensor lights.



Adaptable house: site.

### References and additional reading

Australian Network for Universal House Design. 2009. Strawberry Hills, NSW. [www.anuhd.org](http://www.anuhd.org)

Department of Families, Housing, Community Services and Indigenous Affairs. 2009. Livable housing design. Canberra. [www.facs.gov.au/sa](http://www.facs.gov.au/sa)

Friedman, A. 2002. The adaptable house: designing homes for change. McGraw-Hill, New York.

Goldsmith, S. 2000. Universal design: a manual of practical guidance for architects. Prepared with PRP Architects, Architectural Press, Oxford.

Livable Housing Australia. 2012. Design guidelines, 2nd edn. LHA, Sydney. <http://livablehousingaustralia.org.au>.

Mace, R. 2000. Universal design: housing for the lifespan of all people. The Center for Universal Design, North Carolina State University, College of Design, Raleigh, NC. [www.ncsu.edu/www/ncsu/design](http://www.ncsu.edu/www/ncsu/design)

Master Builders Association of the ACT and Department of Veterans' Affairs. 2001. Housing for life: designed for everybody. [www.mba.org.au](http://www.mba.org.au)

North Carolina State University. 2006. Universal design in housing. The Center for Universal Design, North Carolina State University, College of Design, Raleigh, NC. [www.ncsu.edu/www/ncsu/design](http://www.ncsu.edu/www/ncsu/design)

West Australian Government. Liveable homes: designs that work for everyone. [www.liveablehomes.net.au](http://www.liveablehomes.net.au)

### Authors

Principal authors: Jasmine Palmer, Stephen Ward

Updated by Jasmine Palmer, 2013