

# Incorporating universal design features in a new build or renovation

Universal design produces environments that are accessible and attractive to everyone regardless of their age, abilities or status in life. It typically results in spaces that can more easily incorporate changes in people's lives.



Photo: Jason Mann Photography

**HOUSES THAT** incorporate universal design features are particularly useful for parents with young children, big-bodied people, the elderly and people who sustain a temporary injury or have a permanent disability. Generally, these houses do not have an institutional appearance but instead feel spacious, with wide doorways and clear spaces in bathrooms and the kitchen area.

Universal design should be considered early in the planning stages of a new build or a renovation. Some aspects that could be considered part of universal design – having handrails on staircases, for example – are already addressed in Acceptable Solutions for the New Zealand Building Code or standards. Many more are optional.

New Zealand's changing population gives a good reason for adopting universal design. The number of New Zealanders aged 65 and over almost doubled between 1981 and 2013. People in this age bracket are expected to make up almost a quarter of the population in 30 years' time. One in five of these people will be 85 years of age and over.

There are many excellent local and international resources to assist designers in understanding and incorporating these features in their homes. BRANZ's book *Homes Without Barriers* and web resource *Universal Design Hub* provide practical guidance for all those involved in the design of universally accessible houses in New Zealand.

The non-profit body Lifemark™ assesses and rates New Zealand house plans to a 3, 4 or 5 star rating. The *Lifemark™ Design Standards* handbook contains over 80 standards relating to key areas of the home. The handbook is only available to Lifemark™ Accredited Partners.

The New Zealand standard NZS 4121:2001 *Design for access and mobility: Buildings and associated facilities* sets out the requirements for making non-residential buildings accessible to and usable by people with physical disabilities. The requirements of this standard are not compulsory for houses, but its content has useful ideas for residential designers.

The New Zealand Building Code sets out broad requirements for construction. For example, one of the objectives of clause D1 *Access routes* is to "ensure that people with disabilities are able to enter and carry out normal activities and functions within buildings". Again, this is not mandatory for private homes but is obviously an objective that good design will aim for.

## Universal design features

There are many features and options that qualify as universal design, but some core features can be identified, including:

- a step-free path of travel from the garage/parking area or street entrance to the front door (this does not apply to very steep ground)
- at least one level entrance into the building
- all internal passages at least 1,200 mm wide
- a toilet on the ground or entry level, beside a wall with a grab rail
- a bathroom with a level-entry shower
- all internal and external doors have a minimum 860 mm clear opening
- extra dwangs are specified in bathroom and toilet walls to allow grab handles to be fitted
- all power sockets and light switches are between 0.9 m and 1.2 m above floor level.

Looking in more detail around a home, there are some specific suggestions for different rooms and spaces.

### Entranceways

- Parking space or garage that is wide enough for everyone getting in and out of cars – at least 3,500 mm wide for wheelchair users and 3,000 mm for other disabled drivers.
- Slip-resistant paths (such as broomed concrete) at least 1,200 mm wide (with an area 1,800 mm wide if there is a need to pass). Make the gradient as gentle as possible – preferably 1:15 maximum – and maximum crossfall 1:50. If there is soft or falling ground adjacent, a 75 mm kerb upstand could be specified for safety. Longer paths may require lighting for night entry.
- A covered, level entry platform of 1,200–1,500 mm<sup>2</sup>.
- Entryways that are not obstructed.
- The threshold needs to keep wind-blown surface water out while presenting the least possible barrier to the user. Concrete slab floors must be at least 150 mm above permanent paving and 225 mm above unpaved ground, but E2/AS1 gives some options for achieving level entry.
- Sensor lighting.
- A seat at 450 mm high just outside the entry may be useful for some people.
- Easy access from gate to front door.
- A garage with internal access to the house allows sheltered and secure entry. Entry should be flat or a maximum 20 mm difference in floor level.
- Ramps can provide good access. Specify:

- a maximum gradient of 1:12
- a maximum rise between landings of 750 mm
- an upstand of at least 75 mm where there is a drop-off side
- level landings at both top and bottom
- handrails on both sides and around landings.

### Inside the house

- Wheelchairs should be able to turn 360° at the end of corridors and in the kitchen, living room and at least one bedroom and one bathroom/toilet. Allow 1,500 mm minimum turning space.
- For corridors and other circulation spaces, 1,200 mm should be considered the minimum width – this is the figure in NZS 4121:2001 – but design out hallways where possible.
- Specify good hallway lighting (a minimum of 20 lux per square metre), using natural light where possible during the day. Two-way light switches at both ends of a hallway (and other rooms with multiple entrances) means there is no need to negotiate the space in darkness.
- Do not specify low-level (floor or wall-mounted) heaters in circulation spaces – they reduce usable space.
- Stairs may be necessary for access between levels, although without modifications, they are impossible for wheelchair users and many disabled or infirm people to use. Stairs can, however, be designed to be as easy as possible to use:
  - Use single straight flights or straight flights with a 90° or 180° turn and a flat landing between, not winder treads.
  - Allow unobstructed space at the top and bottom for users to steady themselves before changing direction.
  - Make a change of flooring surface and colour at the top and bottom of the stairs.
- Only install doors where they serve a clear purpose.
- A door width of 860 mm or wider is easier for a wheelchair to manoeuvre.
- For door hardware, select lever handles rather than knobs.
- Locks on external doors should operate independently of the latch so users do not have to turn the lever handle and the key at the same time.

### Kitchens

- Do not design the kitchen as a main thoroughfare.

- Locate the dining area close to the kitchen.
- Allow room for everyone to move.
- Ensure appliances are easily accessible and positioned away from corners.
- Specify taps that are lever handle, push or electronic.
- Favour drawers over cupboards.

### Living rooms

- Locate light switches and door handles at a consistent 0.9–1.2 m above floor level.
- Locate power sockets, telephone, televisions and computer outlets away from corners and at 0.9–1.2 m above floor level.
- For windows that open, specify lever handles.
- Specify floor coverings that are slip resistant and can handle wheeled traffic.

### Bedrooms

- There should be at least one bedroom on the primary living level.
- That bedroom should have easy access to a bathroom.
- Design clear space to easily access the bed from the doorway.
- Ensure a wide (minimum 860 mm) and clear door opening with handles 0.9–1.2 m above floor level.

### Bathrooms

- Make sure there is a bathroom on the primary living level.
- Ensure the toilet is accessible for everyone now or in the future.
- Toilet doors often open inwards, but if a person collapses, this could make access difficult. Improve accessibility by designing the door to open outwards or specify a proprietary dual-swing door hinge and latch set so the door can be opened outwards in an emergency.
- Allow space for a level-entry shower now or in the future.
- Specify strengthened walls to accommodate future handrails and shower seat.
- Specify lever handle, push or electronic taps.

### Additional considerations

#### Stair lift

Stair lifts are fitted to the side of the stairs and carry someone up or down. Options include a wheelchair platform lift or a smaller fixed or folding seat stair lift.

Some models work on straight flights only, while others can cope with a 90° or 180° turn in the stair. The stair must be wide enough

to allow an ambulant person to pass the stair lift.

A stair lift can be retrofitted onto a stair where space allows. Apart from space for the device itself, there needs to be sufficient clear area at top and bottom for someone to get on and off the stair lift.

Consider the transfer from wheelchair or walking frame – both wheelchair and walking frame users will probably need a second chair or frame at the other level. If a fixed or folding seat model is being considered, ensure the seat height is adjustable.

### Domestic elevator

A domestic elevator requires sufficient space at an appropriate location in a home. These devices can be expensive. However, if the other options being considered are adding rooms to the entry level of a home or selling and moving house, a small residential lift may be cost-effective.

### Cost

The additional cost to provide many universal design features in new housing is relatively low. Table 1 shows a BRANZ calculation of details for a typical house.

Minor design changes can usually accommodate the universal design features in a new house. The outside items relate to

facilitating easy access particularly for wheelchairs, through widening the car park area and access to the front door, with adequate lighting and shelter.

The largest costs potentially arise from widening passageways, at about \$4,500 for this particular example. However, if space is taken from rooms adjacent to the passageway with no change in overall footprint, this cost is avoided. Usually, a more open-plan design is feasible to eliminate passageways.

The total extra cost then becomes about \$3,000 or 1% of the house build cost and could be lower because many designs will already have many of these features.

### More information

#### BRANZ

Study Report SR263 *Lifetime housing – the value case*

Study Report SR346 *The value of sustainability – costs and benefits of sustainability and resilience features in houses*

*Build* magazine, 'Accessible building access', 1 December 2015

*Build* magazine, 'Universal design for indoors', 1 August 2015

*Homes without barriers* – free download from [www.branz.co.nz/hwb](http://www.branz.co.nz/hwb)

[www.branz.co.nz/universal\\_design](http://www.branz.co.nz/universal_design) – a resource hub on universal design, including:

- a sketch gallery of generic dimensioned design solutions
- a photo gallery of universal design being applied in real New Zealand homes
- a calculation tool to determine the financial implications of incorporating universal design features into new homes or during renovations
- a flyer for those interested in promoting universal design to their clients
- further information and guidance from national and international organisations working in this area.

### Other

[www.lifemark.co.nz](http://www.lifemark.co.nz) – an independent non-profit body. Lifemark™ has a rating scheme where 3, 4 or 5 stars can be awarded to homes that comply with Lifemark™ Standards.

[www.barrierfreenz.org.nz](http://www.barrierfreenz.org.nz) – a charitable trust set up in 1993 to encourage and facilitate built environments that are accessible and usable by everyone, including people with disabilities. The team includes people from the design and construction industries, local government and the disability sector.

[www.standards.govt.nz](http://www.standards.govt.nz) – especially NZS 4121:2001 *Design for access and mobility: Buildings and associated facilities*.

[www.enable.co.nz](http://www.enable.co.nz) – this division of MidCentral District Health Board (Palmerston North) provides government-funded disability equipment, housing and vehicle modifications and information services for eligible New Zealanders.

*Universal housing design guidelines* – a downloadable Australian resource. Available online at: <http://universaldesignaustralia.net.au/2015/03/landcom-guidelines/>

[www.livablehousingAustralia.org.au](http://www.livablehousingAustralia.org.au) – an industry/community/government partnership that promotes the mainstream adoption of universal design principles. The publication *Livable housing design guidelines* (2nd edition) can be downloaded.

Table 1. Typical costs to add user-friendly (UF) features to new housing. (Costs as at final quarter 2015.)

Typical additional UF costs - single-storey house concrete floor, floor area 176 m <sup>2</sup> incl. garage (\$299,000)		
Items		
Outside	Sufficient width at carpark/garage	\$360
	Path with gentle slope/sufficient width	\$310
	Roof shelter over front entrance	\$680
	Sensor lamp	\$30
		\$1,380
Inside	Hallway sufficient width (widen house by 150 mm)	\$4,510
	Wide internal doors, minimum 860 mm (7 of)	\$420
	Extra-size shower, seat, grab rail, strengthen walls	\$1,200
		\$6,130
	Total additional cost option 1 – all outside and inside measures	\$7,510
	Total additional cost option 2 – all measures except no floor area addition	\$3,000

Cover photo: Aotea Home, 5-star Lifemark™ rating. BRANZ would like to thank Don Jamieson Architecture, Lifemark™ and Jason Mann Photography for permission to use the photo on the cover.

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