Resource Handbook

for

Barrier Free Built Environment

Part 1 : The Accessible Journey

June 2011

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The first edition of this handbook was compiled by the Barrier Free New Zealand Trust with assistance from many people. The reprints with amendments have involved other industry individuals with a special interest in access for people with disabilities. The Trust is indebted to them all and gratefully acknowledges their contribution in this and previous editions.

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Contents

The Barrier Free NZ Trust

Our mission is :

"To encourage, promote and facilitate the creation of environments that are accessible and usable by everyone in the community including people with **disabilities."**

The Trust was formed in 1993 to promote accessible (Barrier Free) built environments by educating key industry practitioners and building users about minimum levels of access provision in public buildings and developing a national network of accredited assessors. Currently the Trust provides a range of education seminars, assessments and an assessor pathway focusing on the design and construction of built environments that comply with New Zealand access laws and emphasise universality.

The Trust provides guidance and advice and actively advocates for improved provision of access to buildings, public spaces and transport systems.

Purpose

1 The purpose of this section (Part 1) of the Barrier Free NZ Trust Resource Handbook is to :

a) Provide guidance on creating barrier free built environments for everyone including people with disabilities.

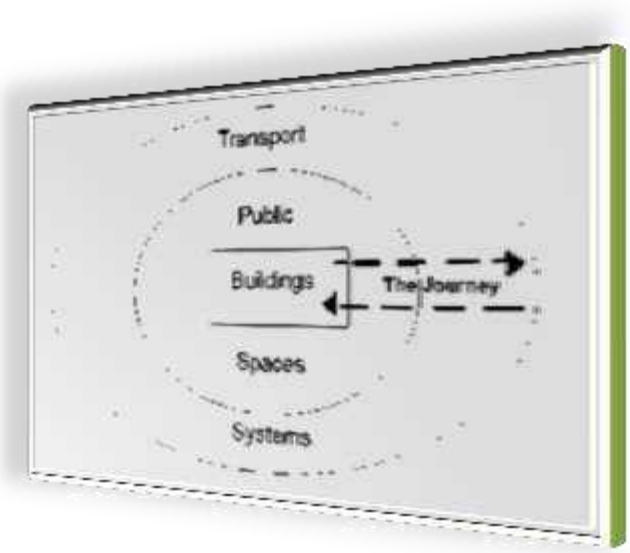
b) Provide additional guidance material for Barrier Free Assessors, Barrier Free NZ Trust Seminar attendees and others with an interest in creating universally usable, barrier free built environments.

2 The specific objective is to :

a) Background the basic principles of and need for universally usable, barrier free environments.

1 The Accessible Journey

The concept of the "Accessible Journey" provides a comprehensive framework and mechanism for creating barrier free and universally usable built environments and for addressing how effectively access requirements for people with disabilities have been implemented. The "Accessible Journey" is a theoretical path of travel that links the three primary components of built environment design and construction (see figure below).



Critical points in the "Accessible Journey" occur at the transitions between components where :

- transport systems deliver / pick-up people;
- transport systems delivery / pick-up points connect to public spaces and buildings;
- public spaces connect to buildings
- building entrances

While the access and usability requirements for public spaces and transport systems are beyond the scope of this document, buildings remain an integral part of these two other infrastructure components and their transitions.

The quality of the Accessible Journey depends on the thoroughness with which the detailed requirements for access by people with disabilities are implemented. The more comprehensive is compliance with the access requirements, the better is the "Accessible Journey".

1.1 Approachability, accessibility and usability

Design and construction of the buildings component of the Accessible Journey needs also to consider the aspects of approachability, accessibility and usability where :

- approachability is concerned with the exterior environs of a building, including carparking, and ensures that people with disabilities can get to a building;

- accessibility ensures that people with disabilities can enter and move about freely within a building without having to call for assistance;

- usability means that the building and facilities are, in fact, usable by people with disabilities.

These practical design principles relate the Accessible Journey to an individual building and connect the legislative requirements for access to the specific compliance detail of the "Accessible Route".

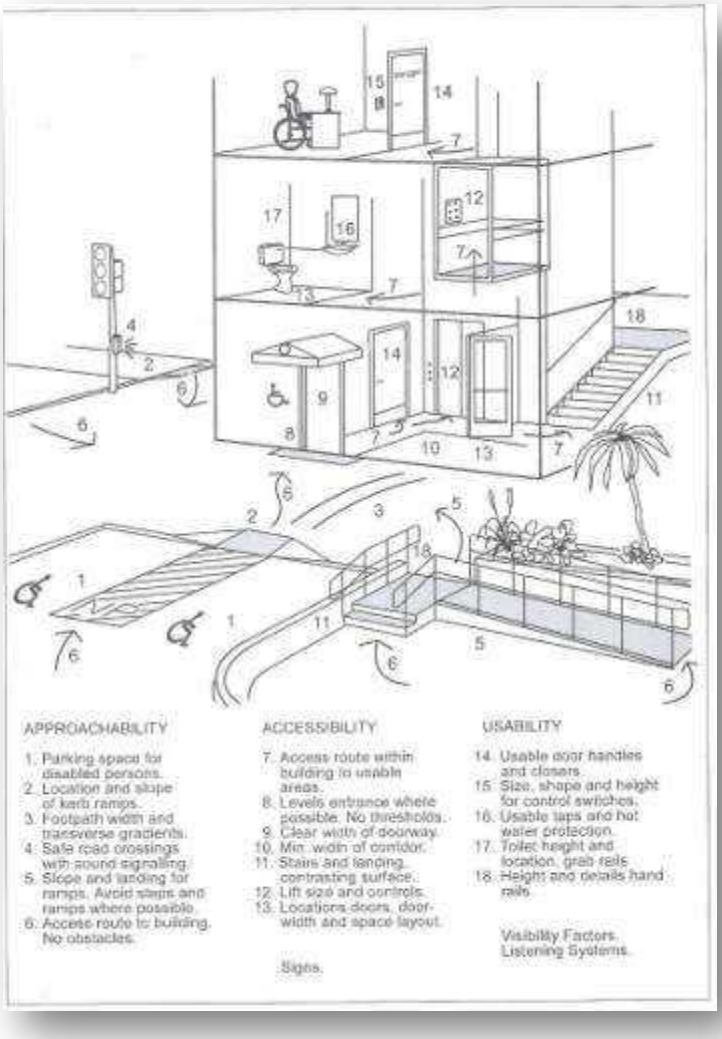


Figure 1 NZS 4121:2001

1.2 Barrier Free and Universal Design

The accessible journey with its approachability, accessibility and usability elements can be further refined by using the "Barrier Free" and "Universal" design approaches.

The term "Barrier Free design" dates from the 1960s. It is an approach and a philosophy towards design using the detailed requirements for access for people with disabilities as the anthropometric base for constructing the built environment.

"Universal design" is a term defined in the USA during the 1980s by Dr Ron Mace as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design"[1] It has an inclusive objective to ensure no one is physically excluded from use of any built environment by unnecessary architectural or engineering barriers.

Universal design has seven basic principles :

1 *Equitable use* – the design is useful and marketable to people with diverse abilities.

2 *Flexibility in use* – the design accommodates a wide range of individual preferences and abilities.

3 Simple and intuitive to use – use of the design is easy to understand, regardless of the user's experience, knowledge, language skill or current concentration level.

4 *Perceptible information* - the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

5 *Tolerance for error* – the design minimises hazards and the adverse consequences of accidental or unintended actions.

6 *Low physical effort* – the design can be used efficiently and effectively with a minimum of fatigue.

7 *Size and space for approach and use* - appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture or mobility.

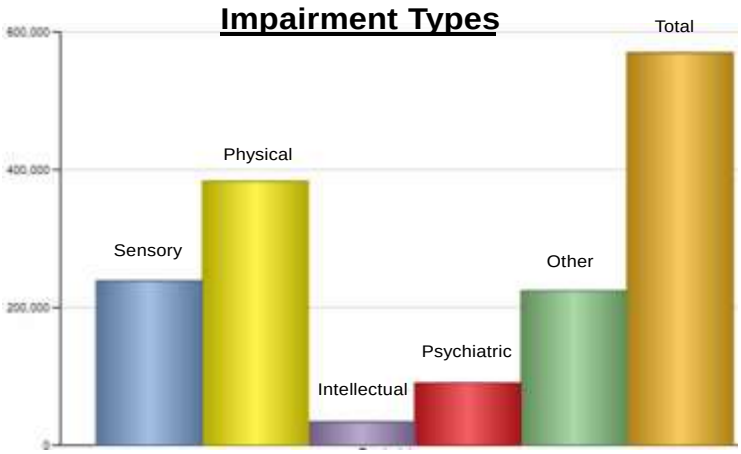
Universal design is a concept and design approach that sets parameters but does not identify any minimum detail to measure successful implementation. In New Zealand effective implementation of barrier free and universal design is based on compliance with the mandatory access requirements for people with disabilities.

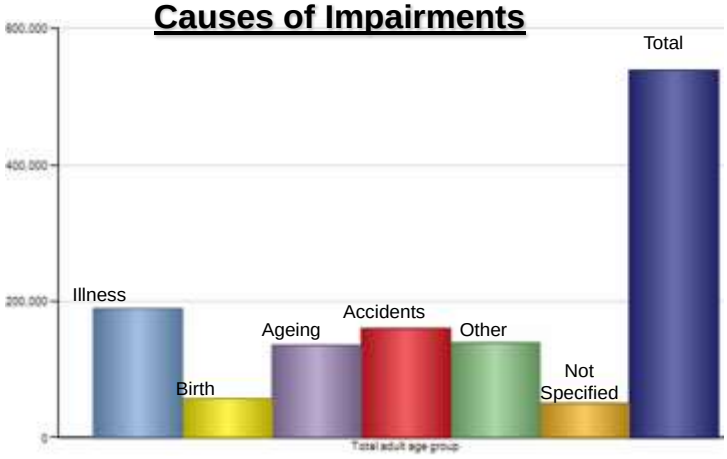
[1] www.design.ncsu.edu/cud/newweb/about_ud/aboutud.htm

1.3 Universality and disability

The access requirements address the coordinated interests of building users with disabilities with (and without) mobility aids such as walking sticks, walking frames, guide-dogs, crutches, wheelchairs (manually propelled and motorised) and motorised scooters and with a wide variety of visual, hearing and cognitive capabilities. They also cover the reality that most disabled people have combinations of impairments.

From the 2001 and 2006 NZ censuses, this group comprises 17-20% of the population (see graphs below) but is effectively universal as the remaining 80-83% of the population will all experience varying levels of impairment throughout their lifetime, particularly as they age, that will affect their ability to use buildings and connecting environments. **The description "people with disabilities" means the whole population.**





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New Zealand is known internationally for its advancement in implementing access requirements. Good

design for access enables independent use of the built environment, enhanced usability of buildings and has a commonsense implication for promoting well being and reducing the possibility for injury by accident.

With an aging population, which will have to stay working for longer than in the past, and with people with disabilities being encouraged to participate fully in the working, training and recreational aspects of community life, provision of universal access has significant implications for the future of society.

Everyone is functionally disabled at some time in life[2]

1.4 Disability and the built environment

Using requirements for access by people with disabilities, rather than the 95 percentile average male, as the anthropometric base for designing the built environment means understanding how and why the compliance detail for access has evolved.

Disability has a wide variety of forms. Some physical impairments are more obvious than others. A person who uses a wheelchair, a guide dog or a walking aid is more visible than someone who uses no mobility aids but has had a stroke, has a heart condition, has arthritis and / or is hearing or visually impaired.

The *Building Act 2004* defines a person with a disability as :

" ... a person who has an impairment or a combination of impairments that limits the extent to which the person can engage in the activities, pursuits, and processes of everyday life, including, without limitation, any of the following:

(a) a physical, sensory, neurological, or intellectual impairment:

(b) a mental illness" (p22)

NZ Standard "NZS 4121:2001; Design for Access and Mobility - Buildings and Associated Facilities" further

[2] Figure by Bengt Serenander from "Building for Everyone", Mats Beckman, Davidsons Bocktryckeri, Vaxjo, Sweden. 1976.

refines the *Building Act* definition as follows :

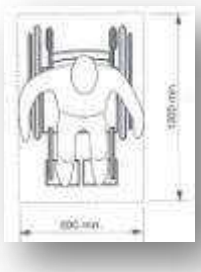
"People with disabilities means people whose ability to be freely mobile or to access and use buildings is affected by mental, physical, hearing or sight impairment, such as :

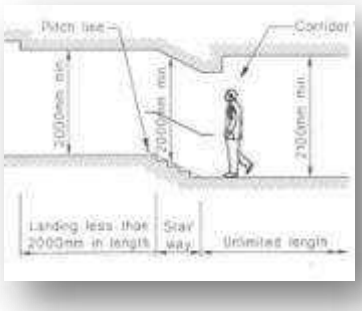
- *(a) An inability to walk;*
- *(b) Walking difficulties;*
- *(c) Reliance on walking aids;*
- *(d) Partial sightedness or blindness;*
- *(e) Hearing difficulties;*
- *(f) Lack of coordination*
- *(g) Reaching disabilities*
- *(h) Manipulation disabilities;*
- *(i) Lack of stamina*
- *(j) Difficulties in interpreting and reacting to sensory information;*
- *(k) Extremes of size;*
- *(l) Learning difficulties.*

"People with visual impairment includes: people who are totally blind (around 5%) , those who are blind but have some light perception, and people who have low vision whose sight may be affected in one or more of a wide variety of ways". (pp13-14)

All these conditions and the range of user capabilities are considered when determining a specific access requirement. The detailed dimensions and layouts, including widths, heights, depths, gradients, clearances and spaces, surface finishes, visibility factors have been established to enable the greatest usage for the widest range of impairment. This means that not every individual need is perfectly accommodated. However, every individual benefits to a greater or lesser extent from every single compliance requirement.

Basic widths, space and heights. (Figures from Appendix D NZS 4121:2001 and Fig 3 from the D1/AS1)





The success of access provision is ultimately measured by the consistency, with which compliance detail is implemented. Consistent provision creates familiar environments within which personal routines can be confidently customised and transposed.

Consistency and comprehensive compliance with the minimum detail of current requirements are the primary objectives. Alternative solutions and suggestions for better practice still need to, at least, achieve the minimum requirements, particularly those with fixed dimensions (e.g. the centre of the wc pan 450mm from adjacent wall). Better practice solutions can include making more generous provision, like ensuring :

- greater numbers of accessible car parking spaces;
- sealed exterior surface finishes;
- better clearances and gradients (e.g. level approaches to entrances, without the need for ramping. Paving and corridors wider than the 1200mm minimum and doorways wider than the 760mm (810mm recommended) minimum clear opening). Note : if 810mm clear opening is provided in corridor thoroughfares, the minimum corridor width required is 1250mm to accommodate the 300mm space required to approach and open the door ;
- sensor operated entry doors;
- greater numbers of accessible stairs;
- larger lift floor dimensions;
- greater numbers of accessible toilets / showers;
- larger toilet floor dimensions. Ensuring that layout and placement of fittings retain their specified dimensional relationships;
- use of new technologies for toilet / shower fittings (e.g. single-mix, lever action taps, automatic handryers);
- quality signage within recommended viewing zones;
- door hardware, light switches and security card devices are all horizontally aligned throughout a building and fixed at an optimum height of 1000mm above finished floor or ground surface;
- improved technologies available for storage (e.g. slide-out drawers, all storage at least 250mm above floor level).

1.5 Usability factors

As discussed in sections 1.2, 1.3 and 1.4 previously, everyone is affected by barriers in the environment some way or other during their lifetime. The access requirements guarantee everyone, particularly people with disabilities, the right to physically participate in community activities. Examples of such activities include :

- education to tertiary level with non-disabled peers
- working in open employment
- going to the pictures
- going shopping
- enjoying recreational activities

- having a family, a social and love life
- contributing materially to the community
- having the usual choices of association and movement
- going on holiday in the usual places
- travelling without fuss on public transport
- using health facilities.

Equality of opportunity and inclusive, non-discriminatory participation for everyone, including people with disabilities, depend upon the foundation of a physically accessible built environment.

(by Chris Booke- White)

Planning the accessible journey

Undertaking the journey, identified in section 1 earlier, requires researching and planning. For people with disabilities, this often entails preliminary investigation of the site and surrounding area to identify the entry to the building, proximity of parking spaces, location of kerb ramps and the general topography around building. In addition, there is often communication with building management to confirm detail like lift provision and location of accessible toilets.

Spatial factors and physical capabilities

The basic spatial components and the physical capabilities affecting accessibility can be categorised as:

- horizontal
- vertical
- reach
- balance
- strength.

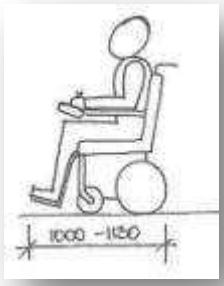
Horizontal travel from point A to point B is the continuous length of travel from a carpark, or drop-off point, to the main entry of a building and the journey(s) to be negotiated within the building. For those with mobility impairments, including wheelchair users and walking frame, stick or crutch users, longer

distances require more sustained physical effort and take longer to negotiate. Exterior pavement and internal corridor widths, lobby clearances and door widths along with surface finishes, thresholds, signage, lighting and door hardware are all critical elements of horizontal access.

motorised scooter - left

(2000mm max turning diameter)

powered wheelchair – right
(950mm max turning diameter)

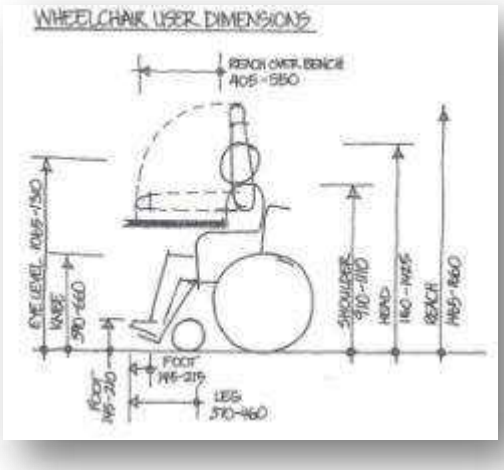


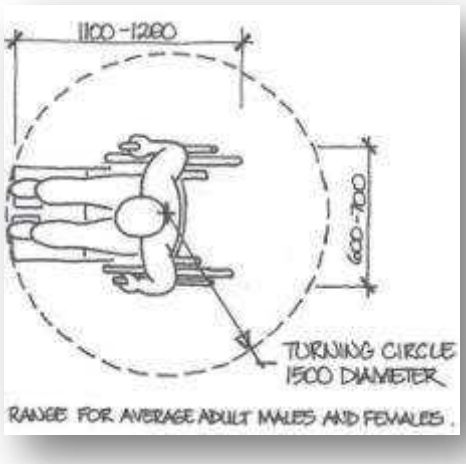
See below for *manual wheelchair*

Vertical travel from one level to another, on accessible routes, depends on kerb ramps, ramps, lifts and stairs.

Critical elements of ramp and kerb ramp design are gradient, width, surface finish and landing areas. Complying handrails are required on both sides and around landings of ramps and stairs. In addition, step dimensions (tread and riser), closed risers and colour contrasted nosings are basic requirements for stair design.

Reaching and stretching capabilities, affect the approachability, accessibility and usability of light switches, door handles, lift controls, security access controls, storage (filing systems, library shelving, cupboards and wardrobes), toilet and shower fittings (taps, handbasins, toilet role holders, etc), sink benches, socket outlets and so on. Work surface heights, clear-under depths and approach spaces also affect reaching and stretching capabilities. Socket outlets need to be located so they do not require reaching across work surfaces.





Balance affects the ability to reach and stretch, to maintain forward movement and to use fixtures and fittings. People with disabilities including wheelchair, crutch, stick and walking frame users, amputees,

those with invisible heart, arthritis, sight, hearing and psychiatric impairments, have a very wide range of balance capabilities. Surface finishes, gradients, corridor widths, grab-rails and handrails, fixing heights and approach spaces all critically affect balancing capabilities.

Strength affects the stamina and power capabilities of fingers, hands, arms, shoulders, trunks and legs. Again, people with disabilities have widely varying levels of strength. The strength of wheelchair users ranges from extremely powerful upper body to no movement in limbs, shoulders, arms, hands or fingers. For wheelchair users and ambulant people with disabilities, strength affects distances that can be travelled without resting and the ability to manipulate controls like door hardware, taps and so on. Controls which require manual dexterity are best operated by a lever action where a wrist or elbow may be used if necessary. Strength also affects the usability of small fittings (e.g toilet door indicator bolts) and door closer tensions. Often, strength levels decrease during the day making negotiation of the built environment even more demanding.

For people who are blind or partially sighted, the following matters need more thorough attention :

- overhead projections
- uneven surfaces and surface finishes
- lighting and glazing
- detailing of stair treads, risers (uneven tread depth and riser height and open risers are not acceptable) and handrailing (on both sides, continuous around landings and with extensions at top and bottom of stair)
- lifts, reception areas, doors, door hardware and other fittings clearly visible and contrasted with their surroundings.

Matters most affecting people with hearing impairment are good signage and provision of appropriate assistive hearing devices with the accompanying international sign of deafness.

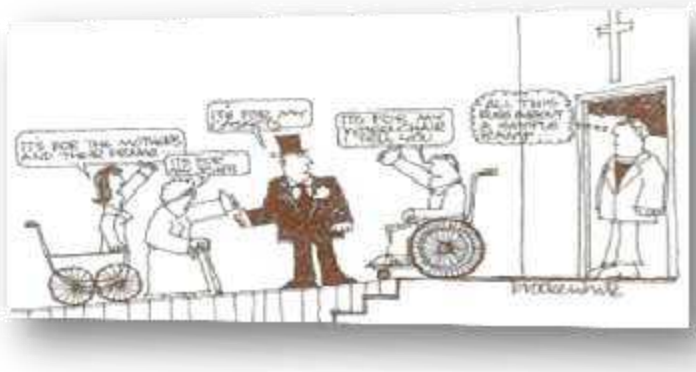
All of the above factors are interrelated and all need to be addressed when evolving the detail of compliance documents.

1.6 Community advantage

The access requirements are more than just implementing the human right of people with disabilities to participate in the everyday use the built environment. In addition to the reality that everyone experiences disability of some kind during their lifetime, that the aged population is rapidly expanding and along with the injury prevention potential offered, there are other significant community advantages in quality access provision. Parents with pushchairs, people involved in the movement of goods and equipment, maintenance personnel all benefit. Also, if requirements are thoroughly incorporated from the early

planning and design stages there are long-term potential cost savings when buildings have to be altered.

Simply, barrier free design is good design. It is good for business, as witnessed by the examples of accessibility now common in large shopping mall developments. Here the need to easily move large volumes of people and their shopping trolleys full of goods to vehicle car parking with a minimum of obstruction is paramount. It is also fundamental to provision of emergency egress, as demonstrated in the design of large sport and concert stadia



(by Chris Booke-White)

1.7 Accessible routes

In practice, the concept of the Accessible Journey, with its approachability, accessibility and usability elements, its Barrier Free and Universal design approaches and the mandatory requirements for access are implemented by means of the **"accessible route"**. This is defined as is *"… a route that is usable by people with disabilities. It shall be a continuous route that can be negotiated unaided by a wheelchair user, walking device or by a person with a guide dog. The route shall extend from street boundary and car-parking area to those spaces within the building required to be accessible to enable people with disabilities to carry out normal activities and processes within the building"* (from NZS 4121:2001 p13).

The three most essential requirements of accessible routes are, that they :

- are continuous
- can be negotiated unaided and
- ensure people with disabilities can carry out normal activities and processes

In other words, every person, including a person with a disability, can approach, enter and use a building without requiring assistance. With the exception of such places as plant rooms and pumping station shafts, the accessible route applies to all parts of a building and its environs. It is a comprehensive network creating numerous connecting accessible routes.

To ensure that the building remains accessible when all accessible carparks are in use, it is also essential

to link the street boundary to accessible route entrances.

An accessible route follows a building user walk-through, or roll-through, of the priority order in which compliance details need to be implemented so that *reasonable and adequate* access is provided for people with disabilities. This sequence is a logical progression for designing *approachability, accessibility and usability* into the built environment. It ensures that anomalies, such as an accessible principal entrance with no access from carparking or street boundary, or an accessible toilet inside a building with a non-complying principal entrance, are avoided.

An accessible route includes paths, car parks, at least one public entrance, all corridors, stairs, all doorways and all lifts with the building. For non-ambulatory people, the accessible route shall not incorporate any step, stairway, turnstile, revolving door, escalator or other impediment that would prevent it being safely negotiated.

Another practical component of accessible route definitions is that the sequence of requirements moves from items of major design significance, most of which cannot be altered once building work begins, to items of specification that can be altered or replaced at any time after building completion. Examples of the former include :

- how the building footprint sits on the site. For good access on sloping sites the highest point on the site is usually the best place to locate the main entrance;
- where entrances are to be located;
- where vehicle access and parking is to be located on the site and how car parking connects to entrances;
- the layout of corridors and doorways;
- location of lift(s);
- configuration of stairs;
- location and layouts of toilets and showers;
- location (height) of light switches, outlet sockets and so on.

Examples of the latter include :

- surface finishes;
- controls (including door hardware);
- reception counters;
- lighting and glazing;
- signs

When a building is completed, non-compliance with the latter items, and with some of the former items, can be remedied by their inclusion in the on-going maintenance and up-grade schedules for the building.

The Barrier Free Checklist(s) in this handbook follow an accessible route sequence as follows :

- accessible routes
- car-parking
- kerb ramps
- footpaths, ramps, landings and handrails
- main entrances, thresholds
- corridors, doorways and doors
- stairs
- lifts
- toilets and showers
- public counters, and kitchen facilities
- surface finishes
- controls
- places of assembly
- visibility factors
- signs
- alerting devices

1.8 Common issues

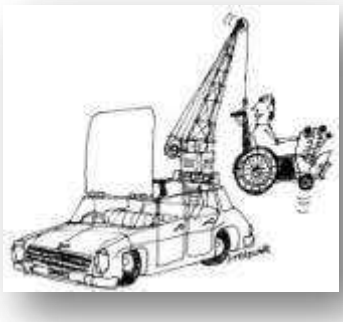
This section identifies the most common design oversights or omissions in implementing access requirements. Each section should be read in conjunction with SECTION /// EARLIER and their equivalent section in the Checklist(s) later in this document.

Accessible routes

An accessible route requires a continuous path of travel from car parking and street boundary to the building entrance(s) and to all parts of a building except for plant rooms, pumping stations and similar rooms. A common error is to identify one accessible route only. Although the Building Code appears to allow this, such an interpretation results in inaccessible facilities.

Parking

The variety of types of vehicle and driver capabilities needs to be considered. Large van-type vehicles with rear, platform lifts like 'maxi-taxis', or side entry ramps for those who drive seated in a wheelchair, require larger parking spaces and higher vertical clearances in car parking buildings than current minimum requirements. The same applies to four wheel drive vehicles with a wheelchair hoist on top.



The proportionate number of accessible spaces needs to be

provided. Current requirements do not adequately address large parking areas for buildings like events centres, malls and supermarkets, stadiums and parking buildings themselves. Refer to Guidance Document on "Accessible car parking spaces" published by the Department of Building and Housing in 2008 for recommendations.

Signage needs to clearly locate and identify accessible space(s) so that they are easily visible from a vehicle. ISA needs to be marked on level sealed surface of car parking space and post signage recommended. (See Fig 4, right, from NZS 4121:2001)

Accessible spaces are required to be located as near as possible to the building entrance so that users do not have to enter and exit the vehicle in, or cross, a vehicle thoroughfare to reach the building entrance from the parking space.

The current minimum width required for accessible spaces allows side entry and exit of a car. This can be achieved on either side of the vehicle by a forward or backward entry to the car park. Parking spaces at a 90^0 angle to the kerb line, and locating two accessible spaces alongside each other, best accommodates all the above space requirements. Oblique angle and parallel parking spaces are problematic as accessible spaces.

Footpaths

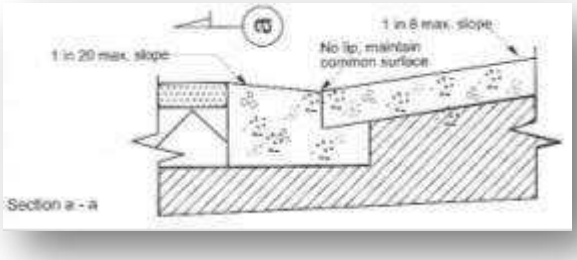
Exterior paving often overlooks the need for :

- maintenance of flush transitions to surrounding surfaces at footpath sides
- a consistent cross-fall slope of 1:50
- a consistent sealed (asphalt or concrete) surface finish – if pavers are used they should be butt-jointed with no bevelled edges. Bevelled edge paving creates a potentially hazardous vibration when a wheelchair moves over it.

Kerb ramps

Attention to detailing of locations, gradients (on road and footpath slopes), gutterline, width, surface finish (including location of tactile ground surface indicators) and footpath (top) landing is critical if a kerb ramp is to perform its intended functions. Best practice, where it is achievable, is to provide level (flush) kerb transitions. Consistency of detailing is vital to ensure safest usability in the potentially hazardous transition from pedestrian to vehicle thoroughfares.

(Figure 46 NZS 4121:2001)



Ramps

The best gradient for a ramp is completely level and the steepest allowable gradient is 1:12. The most common oversight in ramp design and construction include :

- designing to the minimum 1:12 gradient when space available allows for a much gentler slope
- failing to provide at least 1200 x 1200 mm level landing area clear of any door swing at exterior threshold approach to entry doors
- dual slopes on ramp surface finish – the maximum cross-fall gradient is 1:50.
- providing complying handrails (with adequate 'edge' and 'safety' railing to prevent 'drop-off') on both sides of ramp and continuous around all landings
- ensuring no lip or up-stand at the bottom transition of ramp and at least 1200 x 1200mm clear, level landing area at bottom of ramp.

Main entrances and thresholds

The most common design errors associated with building entrances and thresholds are :

- failure to provide level landing areas at the exterior approach to the entry door threshold
- provision of inadequate visibility marking on glazed entry doors
- provision of at least 1200 x 1200mm space, clear of any outward door swing, to approach and open door.

Corridors, doorways and doors

The most important considerations for corridors, doorways and doors are to ensure unobstructed minimum 1200mm corridor widths in association with minimum 760mm clear doorway openings and provision of lever action D-shaped door hardware fixed at an optimum height of 1000mm. The most common design error is the failure to provide a 300mm clear approach space to open a door in an enclosed space and adequate clearances between door swings in lobby areas as per figure 19 from NZS 4121:2001 below. These approach spaces and clearances are essential to achieve the requirement for a door to be able to be opened with one hand.

Other oversights include :

- designing to the minimum 760mm clear opening – 810mm is a

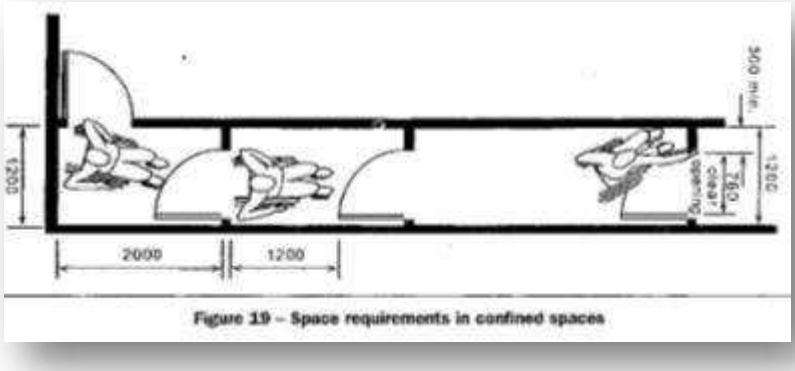


Figure 19 – Space requirements in confined spaces

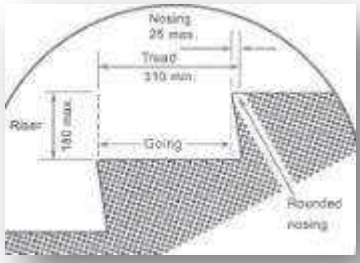
recommended minimum wherever it is achievable

- failing to visibly contrast the door from its surroundings
- inadequate visibility markings on glazed doors and glazed partitioning – marking up to at least 1000mm above finished floor level is recommended
- door closer tensions set incorrectly when closer first fitted - in large office buildings where there are numerous double doors in long corridors, smoke/heat sensor, hold-back devices are recommended.

Stairs

The most common areas of non-compliance in the provision of accessible stairs are the failure to provide:

- at least one accessible stair – it is recommended that all stairs should be accessible stairs because they enable better emergency egress for people with disabilities
- complying tread depth and riser heights (see Fig 25, from NZS 4121:2001, right)
- contrasted nosing strips
- handrails on both sides and handrail extensions at top and bottom of stair
- closed risers
- adequate lighting in stairwells.



Lifts

Ensuring complying lifts are provided where required in new buildings is important because once a building is completed it is extremely rare for a lift to be installed afterwards.

Toilets and showers

Accessible toilet and shower areas appear to present the most difficult challenges in achieving comprehensive and consistent implementation. A toilet area is a personal space that is used in an individualised way. As mentioned earlier in section 1.4 on page 11, the detail and layout of fittings and fixtures in accessible toilets and showers has been evolved to enable the greatest usage for the widest range of impairment. This means that not every individual need is perfectly accommodated. However, every individual benefits to a greater or lesser extent from every single compliance requirement provided there is consistent replication of the prescribed layout (pictured below). This will create familiar toilet / shower environments within which personal routines can be confidently customised and more safely transposed.

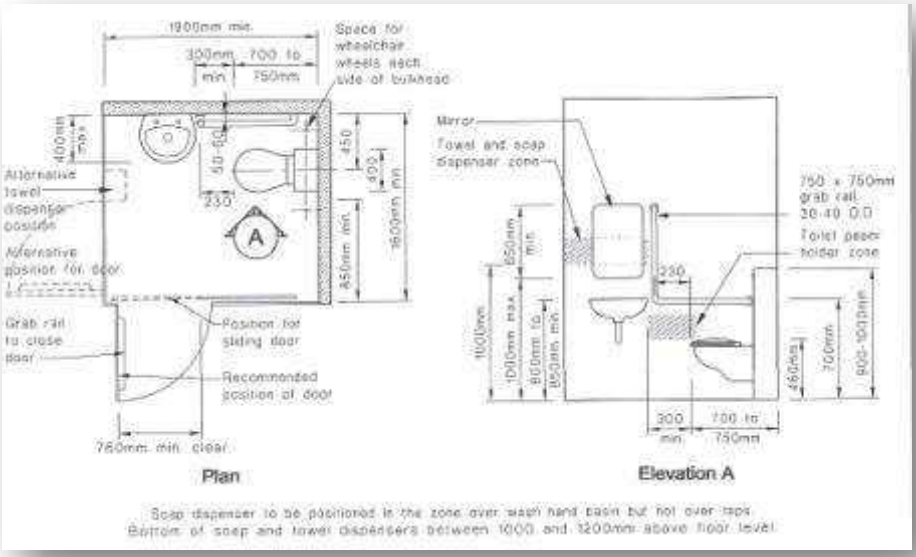


Figure 7 DI/AS1

Major omissions or errors include :

- inadequate number and poor location of accessible toilets and showers. Such facilities are sometimes located in remote areas of a building, separate from other toilet provision, and not on a complying accessible route (e.g. narrow corridors).
- Inadequate space and clearances around door swings in lobby areas accessing a toilet or shower
- inward swung toilet doors – where an inward swung door is provided the minimum floor dimensions need to be extended by the width of the door in the direction of the door swing
- outward swung doors without horizontal grab-rail fitted so that the door can be closed in one action
- sliding doors are the preferred option but require attention to ensure adequate clear opening space, competent installation of the door track (cavity or on wall), line of sight privacy at both ends of any on wall door and positioning of door hardware so that it is usable. Pull D-handles are recommended - recessed handles are often impossible for those with limited arm, hand and finger strength to use. Regular maintenance of sliding doors is essential for successful for their long term operation.
- toilets with angled walls that create unusual, non-complying configurations with less than the 1900 x 1600mm minimum floor dimensions
- fixing the wc pan in the shorter dimension rather than the required longer dimension
- wc pan dimensions (centre of pan fixed 450mm from adjacent wall, front of pan 700-750mm from back wall, height of pan and adequate back support). These omissions often result from the use of wall hung pans. The cistern may be either recessed or surface mounted providing there is a clear unobstructed space on either side of the wc pan. This is essential in accommodation units (including hospitals) so that shower/commode chairs can be wheeled over the pan.

- location of handbasin – needs to be reachable from the wc pan and not obstruct approach space for possible front transfer from a wheelchair to the pan
- location and fixing height for grabrail, toilet roll holders and mirrors
- failure to provide accessible shower(s) – detailing of floor slope and continuous transition from floor to shower area

Public counters

Failure to provide the required lowered portion of reception counters is common. This is also overlooked in the provision of kitchen and laundry facilities. The basic working and visiting requirements for public reception counters are identified in NZS 4121:2001 figures 36 and 37. The Guidance Document on "Accessible reception and service counters" published by the Department of Building and Housing in 2007 offers additional information.

Surface finishes

In addition to the earlier footpaths section on exterior surface finishes, the most common oversight in the provision of interior surface finishes is the use of unstable carpet. This is caused by the use of felt-type underlay or longer, untwisted pile carpet. Heavy duty, direct (or double) stick carpet with a very low pile or a low-level, hard-twist loop is recommended. Carpet movement makes it more difficult to push a wheelchair and creates an unstable footfall.

Another common maintenance error is to over-polish stone, wood or vinyl surfaces finishes.

Controls

Further to the corridors, doorways and doors section earlier, the most common errors are the failure to provide:

- lever action door handles fitted at optimum height of 1000mm above finished floor level
- light switches and security access controls all horizontally aligned with door hardware
- socket outlets and cook-top controls fixed at the front, or side, of work surface (benches, tubs and so on). This ensures the socket is reachable and prevents possible burns from reaching across a cook-top or hot water outlet (also refer to paragraph on *reaching and stretching* in section 1.5 earlier.

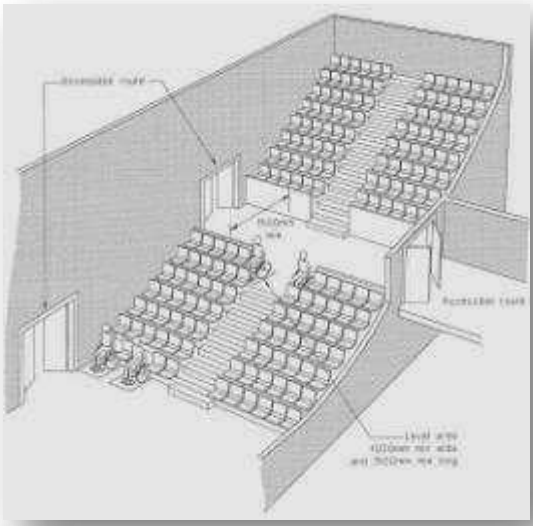
For tub, sink, hand-basin and shower controls, lever-action, single mixing valve tap and outlet are recommended.

Places of assembly

Failure to provide required accessible audience spaces is common. Others errors include :

- locating accessible spaces all in the same place – they need to be spread around the auditorium;
- use of a fire egress route to provide access rather than the inclusive, accessible route;

- no accessible route to the stage or podium;
- no assistive listening system, when there is a permanently installed public address system.



(Figure 30 from D1/AS1, pictured right)

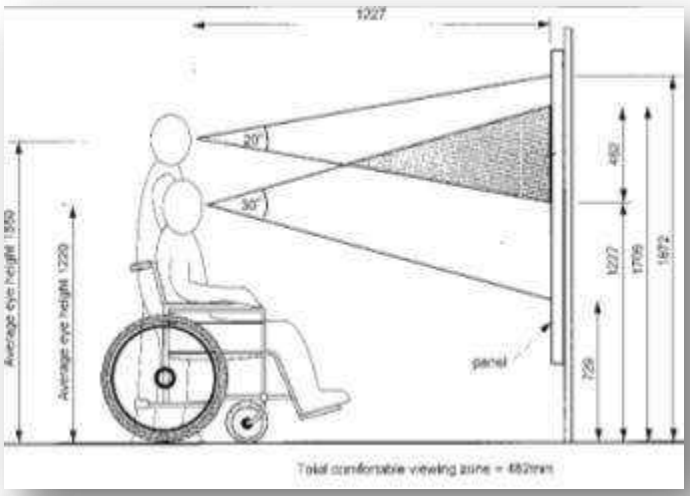
Current requirements for the proportionate number of accessible audience spaces, like car parking spaces earlier, do not adequately address the needs of small (boutique) cinemas which may have only 10 seats, or large venues like sports stadiums which may have 65,000 seats.

Visibility factors

In addition to the comments on door and wall glazing earlier and page 15 comments about visually impaired people, the most important visibility factors are the avoidance of glare and sudden change in intensity of natural and artificial lighting and illumination of signage and greatest intensity of light at surface finish level, floor, stair and work surface top.

Signs

Car parking signs are discussed earlier. Other signage matters include location (on main notice boards, on door to room and on any direction indicators) of accessible toilet facilities and of any assistive listening devices installed. Text fonts, text backgrounds, lighting and viewing zones also apply to the readability of signs (see Figure 5 below from NZS 4121:2001).



Alerting devices

Wherever alerting devices are fitted they are required to have both a visual and audible signal.

1.9 Time line

A brief history of the legislative and compliance requirements for access by persons with disabilities reveals :

- 1971 NZS 4121 Part 1
- 1975 NZS 4121 Part 2
- 1975 *Disabled Persons Community Welfare Act (section 25)*
- 1985 NZS 4121 comprehensive upgrade
- 1989 MP 4122 Standards NZ commentary on NZS 4121:1985
- 1991 *Building Act (primarily section 47A)*
- 1992 The Building Regulations (including the Building Code and Compliance Documents)
- 2001 NZS 4121 upgrade
- 2004 *Building Act (primarily section 118).*

The legislative requirements have remained robust and basically intact since 1975.

1.10 Related documents

Documents related to the detail contained in this handbook include :

New Zealand

- *Building Act 2004* (references to disability and access) *:*
  Sections : 3 (b), 4 (k), 5 (b), 7, 15 (1) (m), 35 (1) (i), 67 (3), 69 (1), 103 (1) (d) (iii), 112 (1) (a) (ii), (2) (b) iii), 115 (b) (i) (A), 116A (a) (ii), 117, 118, 119, 120, 170 (b), 172 (2) (b) (i), 176 (f), 410 (1) (c) (iv), Schedule 1 (1) (af) (ag), Schedule 2, Schedule 4.
- NZ Standard 4121:2001 "Design for Access and Mobility – Buildings and Associated Facilities";
- The NZ Building Regulations1992 (incorporating the NZ Building Code and Compliance Documents)
  - D1 Access routes
  - D2 Mechanical installations for access
  - E2 External moisture (compliance document E2/AS1 only)
  - F7 Warning systems (compliance document F7/AS1 only)
  - F8 Signs
  - G1 Personal Hygiene
  - G2 Laundering
  - G3 Food preparation and prevention of contamination
  - G5 Interior environment
  - G9 Electricity
  - G12 Water supplies;
- Department of Housing and Building Guidance Documents :
  - "Accessible reception and service counters" (2007);
  - "The international symbol of access" (2007);
  - "Accessible car parking spaces" (2008).

In addition to the *Building Act 2004,* other legislation which reference section 118 of the Building Act or include requirements concerning people with disabilities:

- *Human Rights Act 1993* (section 43 (3))
- *Public Health and Disability Act 2001*
- *Disabled Persons Community Welfare Act 1975* (section 22A)
- *Fire Service Act 1975* (section 21A (3))
- *Fire Safety & Evacuations of Buildings Regulations 1992* (regulation 21)

Australia

- *Disability Discrimination Act 2006* – Australia;
- Building Code of Australia ;
- Australian Standard 1428 : "Design for Access and Mobility" :
  Part 1 2009 - General requirements for access - buildings.
  Part 2 1992 - Enhanced and additional requirements - buildings and facilities.
  Part 3 1992 - Requirements for children and adolescents with physical disabilities.
  Part 4 2009 - Tactile ground surface indicators for the orientation of people with visual impairment.

United States

- *Americans with Disabilities Act 1990* and *Architectural Barriers Act 1968;*
- Americans with Disabilities Act Accessibility Guidelines (ADAAG) 1991;
- American National Standard ANSI A117.1 – 2003 : "Accessible and usable buildings and facilities".

United Kingdom

- *Disability Discrimination Act 2005* – United Kingdom
- UK Building Regulations 2000 – Part M : "Access to and use of buildings"