National Science Challenges

BUILDING BETTER HOMES, TOWNS AND CITIES

HE KĀINGA WHAKAMANA TANGATA, WHAKAMANA TAIAO

# Size Matters

# The Context of Functional, Affordable, Accessible and Buildable Small Homes

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Report for the FAAB Small Homes Programme

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Functional, Accessible, Affordable, Buildable Small Homes
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Every effort has been made to ensure the soundness and accuracy of the opinions and information expressed in this report. While we consider statements in the report are correct, no liability is accepted for any incorrect statement or information.

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# Executive Summary

Smaller households in Aotearoa NZ have increased at a proportionally faster rate than households with four or more people living in them. Households with one resident increased by 127,300 (or 41%) between 2019 and 2023 and accounted for 64% of the total increase in all households over the same time period. Households with two residents increased by 79,000 households (or 14%) over the same timeframe and account for a further 40% of total growth. Yet our housing stock tends to be large, new builds are costly and unaffordable for small households with modest incomes, and remain stubbornly inaccessible.

FAAB Small Homes research programme recognises that if such a transformation is to be achieved, the interface between size, build costs and affordability, and accessibility/functionality needs to be addressed. That focus is all the more pressing when:

- 'Tiny homes' are being promoted as a way of reducing building costs;
- The mainstream development sector has been looking at apartments with small footprints to attract modest income first home buyers; and
- The legislation around residential building continues to leave accessibility and functionality as a discretionary design option.

This report is designed to contextualise some of the contradictory dynamics that drive dwelling size and the interface between dwelling size, cost and functionality. It demonstrates that while the issue of dwelling size is an international preoccupation, its regulation and determinants vary. Concerns around crowding, public health and moral hygiene tend to inform minimum sizes. But those are mediated by concerns around affordability, under-occupation and dwelling size being a cultural indicator of success and social status. All these concerns have long histories reflected in policy and practice. More recently, dwelling size has become highlighted in debates around resource use and life cycle costs and the recognition that functional, accessible dwellings are critical in the context of population ageing and ensuring that people with disabilities can optimise their familial, community, social and economic participation.

Unlike many jurisdictions Aotearoa NZ does not have a regulatory requirement to build accessible housing, although it does have a longstanding and internationally acclaimed accreditation system in LifeMark. Requirements and guidelines in selected overseas jurisdictions (England, Ireland, Australia, Canada, Finland and Norway) are summarised in Annex B.

In an effort to engage the construction industry, many jurisdictions have segmented responses around notions of visitability, universal design, adaptability or wheelchair accessible. This approach has been strongly criticised in a number of jurisdictions including

in Ireland where Leonard has argued that visitability has replaced the commitment to universal design. In doing so, it is arguable the disability threshold remains stubbornly in place. It is also arguable that the experience, desires and home-making of individuals and households has become marginalised by over-technocratic, obscure, elaborate and de-humanising approaches to building homes. It is in this context, that the FAAB Small Homes research project has been working with households, housing providers, health and disability service providers, seniors, local authorities, and the construction industry to identify ways to address the need for accessible, buildable and affordable homes with small footprints.

# 1 Introduction

In 2023 the Ministry of Housing and Urban Development (HUD) released its long-term insights briefing (LTIB) to Government focusing on the challenge presented by our ageing population. Based in a wide body of research, much of it delivered through the Building Better Homes and the Ageing Well National Science Challenges respectively, the LTIB highlighted that Aotearoa New Zealand (NZ) needed to make four key shifts:

- More affordable housing;
- Diversified tenure choices including alternative or intermediate tenures;
- Increased diversity and functionality in the housing stock; and
- Neighbourhoods, towns, and cities designed to support people's access to amenities.[1]

The FAAB Small Homes research programme addresses the first and third of these shifts by delivering research designed to help move Aotearoa NZ:

- From a housing stock and new builds that are often too large, unaffordable and with limited functionality and accessibility which require costly modifications to meet the needs of people over their life-course;
- To actively using new builds to transform the housing stock over time by providing accessible, functional housing across all dwelling sizes and typologies.

FAAB Small Homes recognises that if such a transformation is to be achieved, the interface between size, build costs and affordability, and accessibility/functionality needs to be addressed. That focus is all the more pressing when:

- 'Tiny homes' are being promoted as a way of reducing building costs;
- The mainstream development sector has been looking at apartments with small footprints to attract modest income first home buyers; and
- The legislation around residential building continues to leave accessibility and functionality as a discretionary design option.

# 2 Key Questions and Context

Three key questions arise on the interface between dwelling size, cost and functionality. Those are, firstly, how small can a dwelling be, if it is to be accessible, functional and homely? Secondly, what are the barriers to generating a stock of FAAB small homes? Thirdly, will FAAB small homes cost less?

[1] Ministry of Housing and Urban Development, 2022

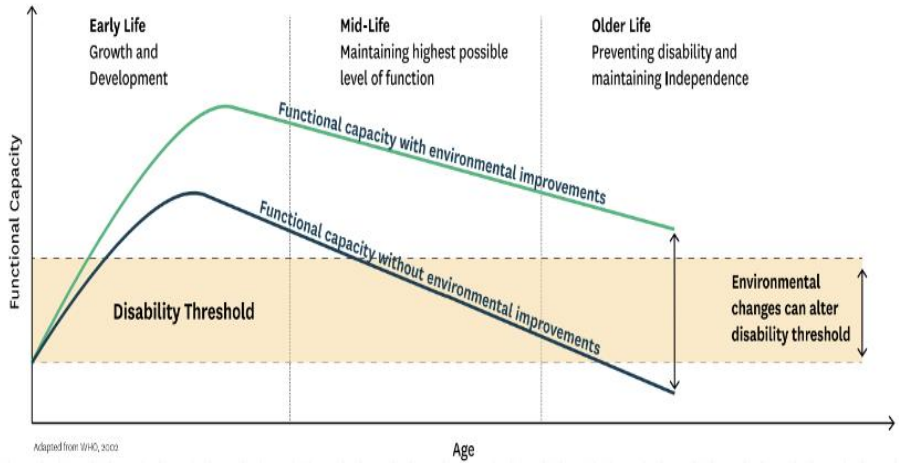


[UNCLASSIFIED]

These questions have largely been at the periphery of research into building costs and affordability as well as the research around accessibility and building functionality. Answering them requires a recognition that Aotearoa NZ exhibits some unique conditions. New Zealand boasts a world-renowned voluntary accreditation system (Lifemark) to guide the design and build of new dwellings which can adapt across the life cycle and personal capacity and need. Accessibility and functionality are explicitly excluded from the legislation that sets out the performance requirements of Aotearoa NZ's new builds. That exclusion means that our new homes typically fail to adapt to our future of increasingly longer lives and an ageing population.

The economic, social and personal costs of inaccessible, poorly functioning and costly to modify stock has been recognised by advocates and housing researchers for many years. Despite the evidence, there has been little traction on policy, legislation, and practice, particularly compared to thermal and energy performance requirements, until recently.[2] There has been some, albeit hesitant, movement: HUD has identified accessibility and functionality as critical to our housing and urban futures, the Retirement Commission has recognised that functional, affordable housing has impacts on retirement living standards and incomes, and the Office for Seniors includes accessible housing in *Better Later Life – He Oranga Kaumātua 2019 to 2034*. They all note that dwellings are at the centre of a deep desire to make homes which, in turn, provide people with agency and connected to family, friends and community.[3] It is internationally recognised that housing, like any environment, can enable us or disable us across our life cycles. This has been succinctly expressed diagrammatically in the disability threshold (Figure 2.1).[4]

**Figure 2.1 The Disability Threshold**




[2] James, *et al*., 2018

[3] Saville-Smith, 2019; Office for Seniors, 2019

[4] Saville-Smith *et al*., 2007 and Ministry of Housing and Urban Development, 2022

Similarly, here and overseas there have been arguments that small dwellings can:

- Provide more affordable dwellings;
- Provide dwellings better fitted to smaller household sizes and an ageing population;
- Deliver lower and more affordable energy consumption and reduce operating costs including repairs and maintenance;
- Deliver more effective land use and reduce carbon; and
- Increase urban intensification and the productivity of urban areas.

For typically sized dwellings, promoting accessible housing is consistent with domestic and international research showing that accessible design has minimal impacts on building costs and delivers significant societal benefits.[5] What is less clear is whether the benefits claimed for small homes and the benefits associated with accessible dwellings can be realised simultaneously or are in fundamental contradiction.

# 3 The Focus and Structure of this Report

The FAAB Small Home's research programme focuses on the production and availability of small homes, considers their build costs and prices, and explores ways in which function and accessibility[6] can or cannot be delivered in small homes of about 45-70m$^2$. This report on the findings of the FAAB Small Homes research is concerned with the issues of size, cost and price. It also considers the way in which different guidelines around universal design, functionality and accessibility address issues of dwelling size. In particular this report reviews the extent to which those guidelines explicitly or implicitly address those issues.

The remainder of this report is structured as follows:

- Section 4 deals with the matter of dwelling size and its social and economic embeddedness.
- Section 5 considers the demand for small dwellings.
- Section 6 comments on accessibility and dwelling size with particularly reference to Lifemark in Aotearoa NZ and the review of accessibility requirements and guidelines in selected jurisdictions overseas presented in Annex B.

[5] See James, *et al*., 2018 for a recent review of the literature.

[6] Functional, accessible homes "mitigate the effects of compromised mobility, limited sight and hearing, or cognitive issues" (HUD, 2022) associated with disability and age (both young and old) and optimize independence.

# 4 Matters of Size

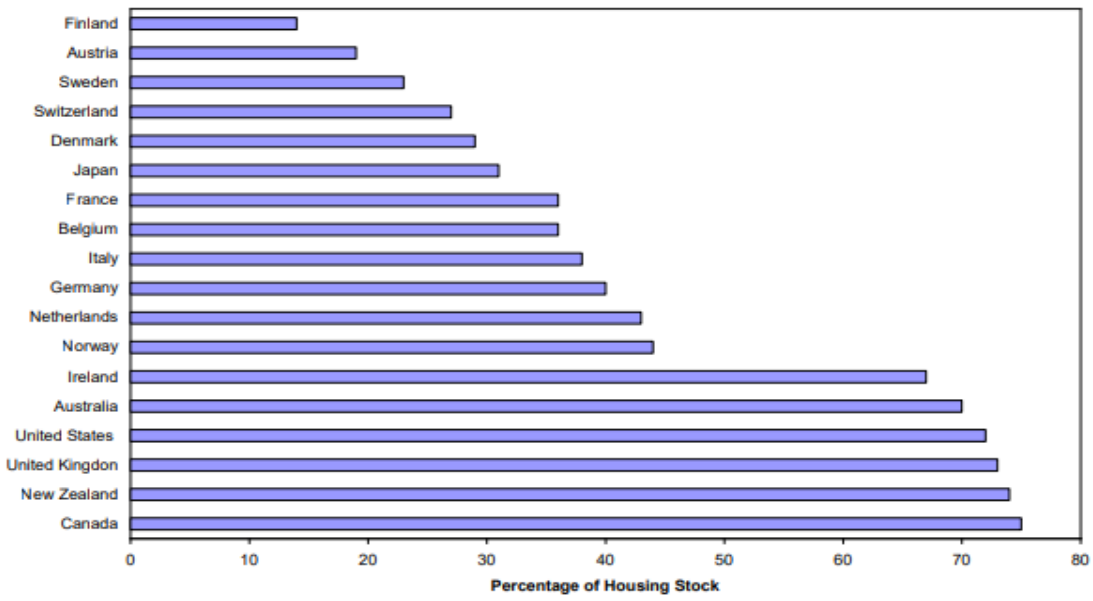
The preoccupation with size, in particular the desire, and sometimes requirements, for larger spaces has had a long history. In Britain, indoor space for dwellings has been subject to specification as far back as the seventeenth century and New Zealand has had a raft of legislation and regulation with dwelling size since colonisation.

The concern with size in Aotearoa NZ and overseas has three separate, albeit intertwined, strands. The first strand is around size as a symbol of success. The second strand relates to size as driving perceptions of cost-effectiveness, value-for-money and over-and under-consumption. The final strand relates to the policy and public anxiety around the connections between space, health and well-being.

## Space as a Symbol of Success

There has been a considerable popular and researcher interest here and overseas around the rise of what was beginning to be referred to in the latter decade of the 20th century as the McMansion.[7] That is, the building of dwellings which in footprint and number of rooms generate increasing amounts of space per person and might suggest that the functionality requirements of individuals have been exceeded. The McMansion tendency is particularly evident in North America, the United Kingdom and Ireland, and Australasia (Figure 4.1).

**Figure 4.1 Proportion of Housing Stock ≥5 Rooms by Country - 1st Decade 21st Century[8]**




[7] Miller, 2012
[8] Saville-Smith, James *et al.*, 2009

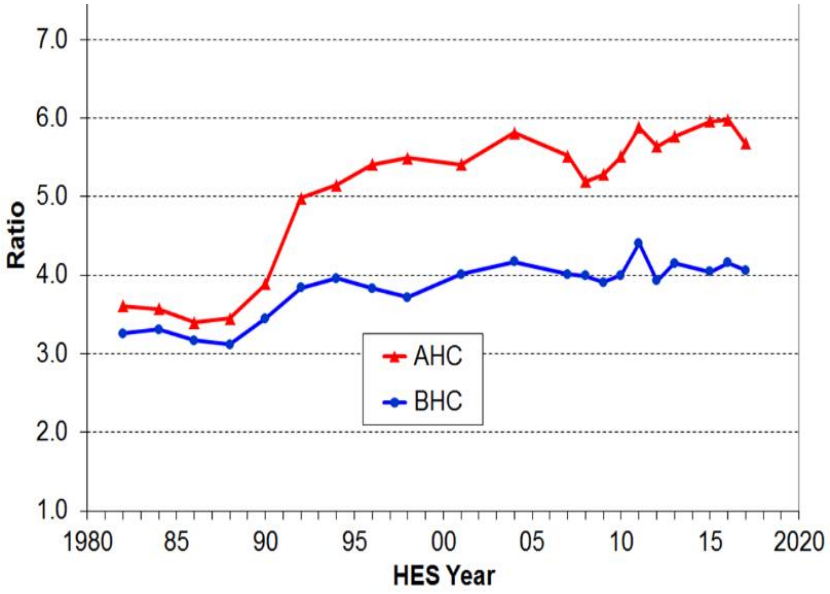


[UNCLASSIFIED]

McMansions are style and fashion led, rather than design led. They are dwellings which are built *en masse,* albeit for a specific and minority segment of the new build housing stock. They are destined for those than can afford display rather than a desire for either the unique or modest functionality. They are often marketed as 'executive homes'. It is notable that the larger dwellings sit in a cluster of countries that experienced increasing inequality in the late 20th century, while those countries retaining an explicitly egalitarian narrative have tended to retain comparatively smaller homes. Figure 4.2 sets out shifts in inequality in Aotearoa NZ from the 1980s through to 2018 and shows that inequality shifts have been strongly associated with increased housing costs over the period.[9]

The attraction to larger new builds is not associated with size alignments to increasing household size, as the discussion in Section 5 demonstrates. Rather, it is associated with space being used to express economic success, status and exclusivity among those households that can afford it and a desire in the building industry to realise an 'exclusivity premium'.

**Figure 4.2 Inequality 1982-2017 Before Housing Costs (BHC) and After Housing Costs (AHC)**




Larger new builds over this period saw a falling away of low-cost new builds by the construction industry[10] and the increasing practice of applying residential covenants to preserve exclusivity.[11] Residential covenants typically, although not exclusively, include minimum dwelling sizes which are typically of larger size than the existing stock and new builds outside covenant developments. The use of covenants has become widespread (Figure 4.3). In Auckland it has climbed from about 9 percent of new struck residential titles in 1980 to 55 percent in 1917 (Figure 4.4).[12]

[9] Perry, 2018
[10] Saville-Smith (ed), 2019
[11] Fredrickson, 2018
[12] Fredrickson, 2018



[UNCLASSIFIED]

**Figure 4.3 Proportion of all titles with land covenant by territorial authority 2017**

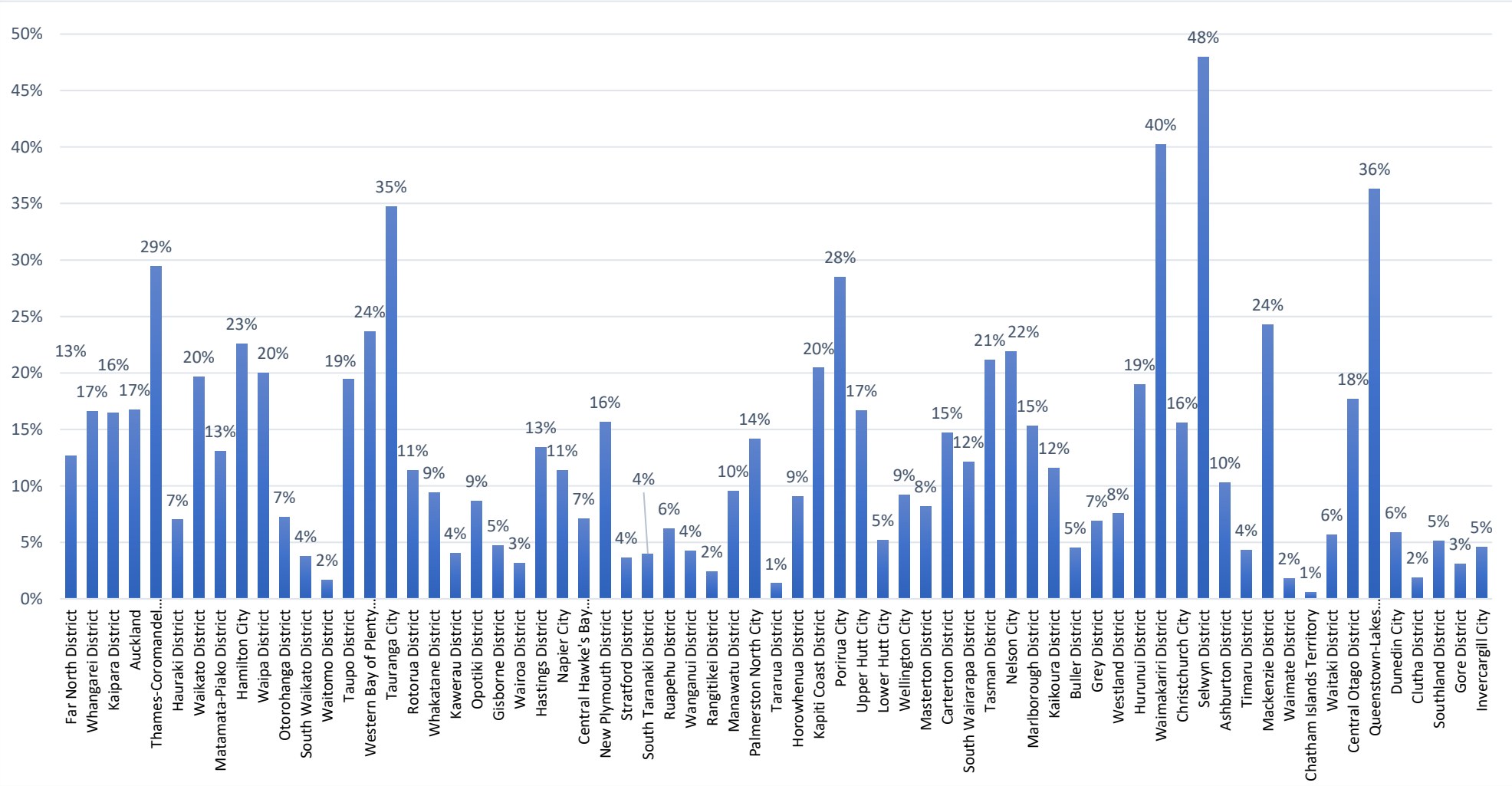
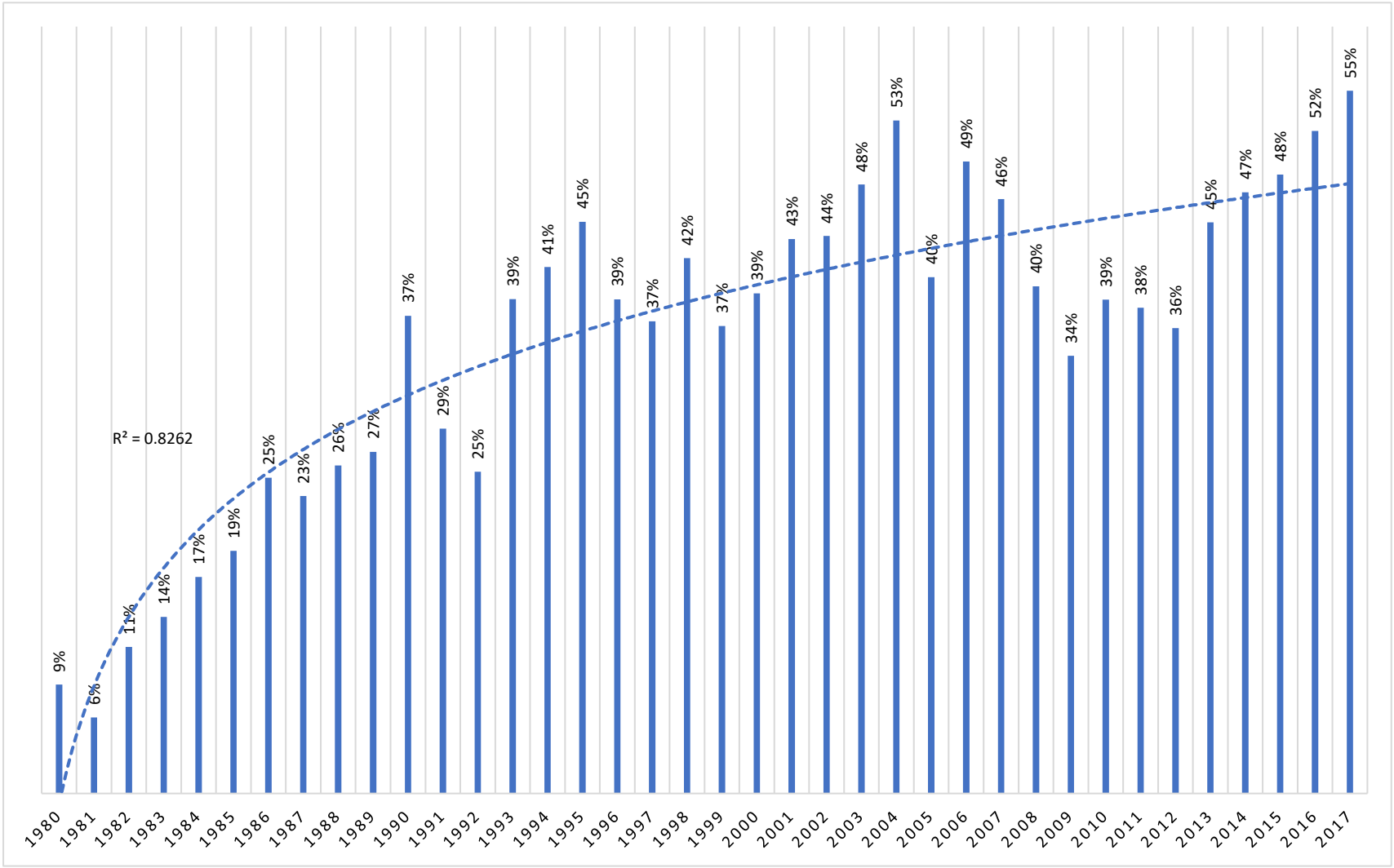


**Figure 4.4 Proportion of Auckland's New Residential Titles Under Residential Covenant 1980-2017**






[UNCLASSIFIED]

The importance of large dwelling sizes as a signifier of success has long been demonstrated internationally in the construction of palatial residences for social and economic elites in hierarchal societies across historical epochs. What is perhaps less recognised or acknowledged is that there has also been a long history of portraying some occupants of residential space as 'undeserving' or even immoral. These narratives have focused on some aspect of 'under-occupancy'. That is, where, usually according to some formula, the dwelling size and especially bedroom numbers are deemed to be in excess of the occupancy need of the resident household.

There are a number of renditions of this narrative. One rendition, both in Aotearoa NZ and overseas, has focused on senior owner occupiers and their continued occupation of what is frequently described as family homes as children move out of their parental home to compose new households. This is frequently portrayed as the actions of 'a selfish generation' 'over-consuming' housing and locking out their children and future generations from the housing stock, the benefits of owner occupation and housing wealth. Seniors rattling around in homes too big and too onerous for them to manage is the motif of that narrative.[13]

The second rendition of the 'under-occupancy' narrative also focuses on portraying the burden on others generated by certain households living in dwellings deemed to be too large for them. This rendition has had a long and varied history. In Aotearoa NZ, there have been periods in which central Government has allowed building permits or consents to be deferred for dwellings deemed to be outside the floor sizes needed by the 'average' family. In May 1974 until 1975, the Labour Government allowed permits for single unit dwellings above 140 m² and multi-units above 93 m² to be deferred up to eighteen months. In 1968, the National Government's Economic Stabilisation Act, enabled building permits for work of certain value to be deferred. This continued into the 1970s. Local authorities were prevented from approving applications for building permits valued in excess of $60,000 without the consent of the Minister of Works and Development. Government mortgages as well as state and council housing have traditionally had limits on size as well as new-build price.[14]

The preoccupation with crowding, discussed later, had its mirror in allocative practices which focused, albeit often implicitly, on fitting households to dwellings to ensure that all bedrooms were used by permanent residents.[15] In part these preoccupations reflected concerns about value-for-money and operating costs. (The relationship between size and cost is discussed later). However, there is also a sub-text in which households needing

[13] Thomson, 1989; Saville-Smith, 2019

[14] Department of Statistics, 1975: 505

[15] See Clark and Deurloo, 2006, for a rendition of this in international journals as ageing population structures saw senior household sizes reduce without downsizing. Saville-Smith (2019) also comments on this rendition in the context of arguments around downsizing.

housing assistance are treated as inappropriately subsidised while the 'subsidies' of McMansions associated with their unaccounted environmental and infrastructure costs tend to be ignored.

Making low-income households accountable for under-occupancy has perhaps been most starkly epitomised in England and Wales with the imposition of an under-occupation penalty on the Housing Benefit in the social rented sector.[16]

A 'spare bedroom tax' or the Removal of the Spare Room Subsidy was introduced on April Fool's Day 2013 and constituted a claw-back on the Housing Benefit of 14% for one room deemed as spare and 25% for two-rooms deemed as spare. Administered by the Department for Work and Pensions (DWP), the calculation of a 'spare room' had departmental discretion, but its application, and the nature of exceptions became increasingly complicated as the bedroom tax was repeatedly challenged, including in the courts. The core rules embedded the necessity to share a room for couples, children aged under 10 years old, and young people of the same sex under 16 years old. Sharing was limited to two people. Discretion was possible around a period of exemption from the clawback for people recently bereaved.

Discretion has been increasingly utilised after a series of reports that bedroom taxes were being applied to people facing shocks and circumstances beyond their control including parents who find themselves with a so-called 'spare' room after the death of a child.[17] Legal challenges and commentary around the impacts for seniors, disabled people and single parents have remained significant sources of criticism of bedroom taxes. Those criticisms have been amplified by evaluations which suggest that fiscal savings as well as shifts from larger homes to smaller homes were overstated in forecasting and modelling. In contrast, there is some evidence that bedroom taxes may being accepted by residents and funded out of already squeezed incomes and reductions in living standards.[18]

The potential for net cost, rather than net benefit, from the application of these under-occupancy penalties suggests that the fundamental cultural anxiety around under-occupancy or over-consumption is embedded implicitly in ideas around which households are deserving and which households are not deserving of space.

## Size, Cost Effectiveness and Value-for-Money

This is not to suggest that size and affordability are unconnected. Low-income households are less likely to be able as owner occupiers or as renters to access larger dwellings. The exception in Aotearoa NZ is found among senior owner occupiers who have become early owners and have become mortgage-free. Notably, for many of these households, downsizing to smaller dwellings typically releases little equity without an associated

[16] Gibbons *et al*., 2020
[17] Jarvis, 2020
[18] Gibbons *et al*., 2020

degradation in tenure to, for instance, unit title or occupation rights to a retirement village dwelling.[19]

There is evidence of direct material connection as well as popular and industry narratives. Larger dwellings require more materials, although the construction industry and developers often portray themselves as dependent on scale (multiple small dwellings) or larger dwellings to command higher prices which provide a better return on their expenditure on land. While this narrative is widespread, it needs to be treated with caution as a representation of the dynamics of developments and development economics. The latter are not straightforward. As Murphy shows, there is a feedback loop between prevailing dwelling prices and the price developers are prepared to pay which is captured in the process of residual land valuation. There is not a linear, determinative relationship by which land determines dwelling size and dwelling value or price.[20]

In popular commentary, particularly where house prices are rising, finance is easily and cheaply available[21] and building costs are perceived to be expensive,[22] there tends to be a conflation between 'buying bigger' and 'buying a bargain'.

Under those conditions, additional space is treated as a marginal cost which can deliver greater amenity for lower square metre costs. Group house builders have been adept at promoting their products in that way. In reality, however, that rendition overstates the bargain presented by larger dwelling sizes. In particular it is often associated with a longstanding but erroneous belief that build costs persistently and rapidly climb and drive house prices.

As Figure 4.5 shows, the real costs of low-cost housing construction remained relatively stable from 1950 to 2000, although nominal prices saw persistent rises from the 1980s.[23] In both nominal and real costs, the drop in construction prices in the first years of the 21st century were attached to the increases in floor sizes in the stock deemed to be low-cost. That is, it represents the cost of house size inflation in the lower end of the construction market rather than increased building costs. Around 37% of the increase in the total price of a low-cost dwelling is attributable to changes in floor area specification.

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[19] Saville-Smith, 2019; Saville-Smith *et al*., 2009
[20] Murphy, L., 2020
[21] See Rehm, 2016,.
[22] Perceptions of expensive building costs, especially in relation to building materials, have preoccupied both popular and public policy commentary for a number of years. This prompted the Labour Government's request to the Commerce Commission investigation build costs and the conditions which might drive those upwards. See New Zealand Commerce Commission, 2022.
[23] See Chapter 3 prepared by Dr Michael Rehm, Dr William Cheung, Ian Mitchell and Dr K. Saville-Smith in Saville-Smith (ed), 2019.

**Figure 4.5 Low-cost dwelling construction nominal and real prices (excluding section price) 1950-2017[24]**

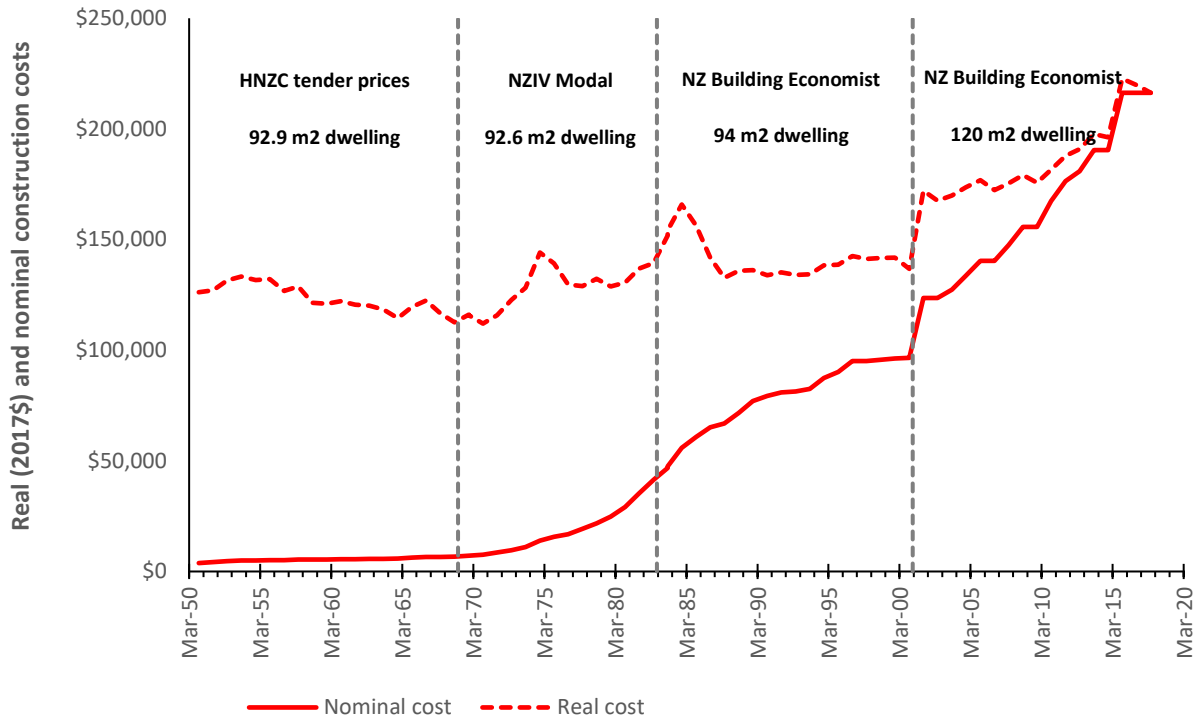
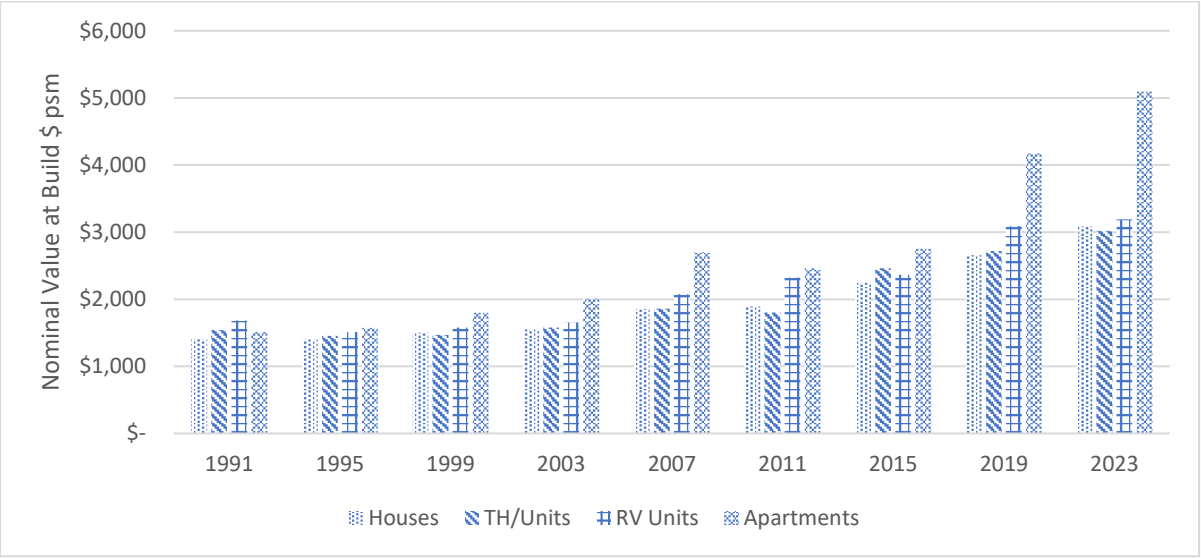



Figure 4.6 shows, the per square metre constructed value of dwellings assessed for building consents. The increased difference between the build cost of apartments by square metre and other typologies may reflect a number of interacting drivers including the cost of apartment building construction, especially as they increase in height, as well as a shift in consumption associated with declining affordability of townhouses, units and houses, changes in apartment size, and changing requirements from financiers around securing their lines of finance into apartment developments.[25] Irrespective of those considerations, differences in per metre cost appear not to be as distinctly different as popular commentary has often suggested. Houses, typically of larger size than townhouses (TH) and multi-units, retirement village (RV) units and apartments, show similar square metre value as other typologies with the exception of apartments in 2007 and from about 2015.

[24] See Chapter 3 prepared by Dr Michael Rehm, Dr William Cheung, Ian Mitchell and Dr K. Saville-Smith in Saville-Smith (ed), 2019.

[25] The valuation of residential builds determines the levy applied to builds through the consenting process. This can prompt a desire to diminish the value of builds to diminish levy liabilities. On the other hand, there are other reasons why developers might wish to increase their estimates of build values.

**Figure 4.6 Average Build Value Per Square Metre Calculated from Building Consents for Residential Buildings 1991-2023 (Building Consent Data)**




The 'build bigger' for 'a bargain' motif is interpreted by some as increased size being affordable. Under conditions of house price increase, low interest rates, and rising incomes the tension between price point and affordability could easily become muted. However, the impact of size on affordability is implied in Figure 4.5 and evident in Table 4.1.

**Table 4.1 National Housing Affordability 1960-2013**[26]

| Year | House price to median household income ratio | | % of median household income required to service a 25-year mortgage using the estimated low-cost new house price | | |
|---|---|---|---|---|---|
| | House price incorporating average section price | House price incorporating lower quartile section price | Mortgage Interest Rates | House price incorporating average section price | House price incorporating lower quartile section price |
| 1966 | 3.1 | 2.8 | 5.7% | 19% | 17% |
| 1971 | 3.7 | 3.3 | 7.2% | 26% | 23% |
| 1976 | 3.4 | 2.9 | 10.0% | 29% | 25% |
| 1981 | 3.3 | 2.9 | 14.9% | 40% | 36% |
| 1986 | 3.6 | 2.9 | 19.2% | 56% | 44% |
| 1991 | 4.2 | 3.6 | 13.7% | 47% | 40% |
| 1996 | 5.2 | 4.2 | 10.4% | 46% | 38% |
| 2001 | 5.5 | 4.3 | 8.2% | 42% | 32% |
| 2006 | 7.3 | 5.5 | 9.6% | 61% | 46% |
| 2013 | 7.4 | 5.6 | 5.8% | 45% | 34% |

[26] See Chapter 3 prepared by Dr Michael Rehm, Dr William Cheung, Ian Mitchell and Dr K. Saville-Smith in Saville-Smith (ed), 2019.

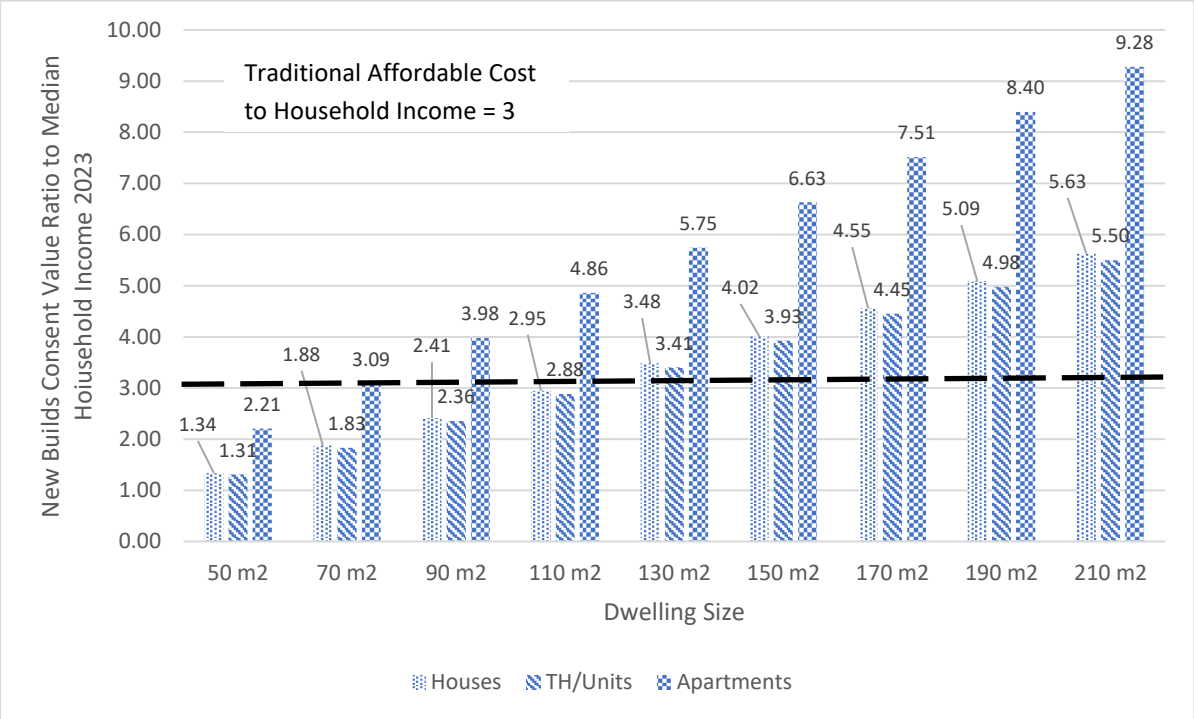


[UNCLASSIFIED]

Table 4.1 shows the affordability of dwellings nationally relatively to median household incomes in relation to average section and lower quartile section prices. The impact of land prices flowing into housing affordability is clear. Notably, the impact of interest rates is variable. The interest rates in 2013 were similar to those in 1966, but the affordability was significantly higher with a house price on a lower quartile section having an income ratio in 1966 of 2.8 compared to 5.6 in 2013.

While a multitude of measures are applied to define affordable housing prices, a widespread rule-of-thumb has been that affordable house prices constitute three times household income. Using that rule-of-thumb, the impact of size on affordability is evident in Figure 4.7. Figure 4.7 shows the value of new build construction for different typologies in 2023 using each typology's average psm. That value does not, of course, represent the total price of a dwelling because it includes only the value of the construction rather than costs associated with acquisition of land or house prices. Notwithstanding, Figure 4.7 does show how size can shift the affordability of build value for new builds. The build value of new construction for each typology by that typology's average psm would generate a ratio more than three times household median incomes in 2023 if the square meterage was 130 square metres or more.

**Figure 4.7 2023 Ratio Build Value of Building Consents for Residential Buildings 2023 to Median Household Income (Average Build Value by Typology by Floor Size & Median Household Income)[27]**




Under those circumstances, while there may be some increased amenity associated with increased dwelling size, there may also be an issue with affordability. Construction Industry

[27] Customised data extract, Building Consent Data, StatisticsNZ

sites continuously advise of price and size shifts evident in the building consents data maintained by StatisticsNZ. Recent reporting shows there has been some build price and build size response in residential building consents, but it is muted (Tables 4.2 and 4.3).[28]

**Table 4.2 Residential Building Consent Value (psm) (Statistics NZ Building Consent Data)**

| Region | $ per m² in 2022 | $ per m² Jan-Aug 2023 |
|---|---|---|
| Northland | $2,855 | $3,490 |
| Wellington | $3,072 | $3,412 |
| Otago | $3,252 | $3,409 |
| Bay of Plenty | $2,898 | $3,353 |
| Auckland | $2,908 | $3,219 |
| Hawke's Bay | $3,029 | $3,199 |
| Tasman | $2,795 | $3,137 |
| Waikato | $2,767 | $3,127 |
| Nelson | $3,106 | $3,019 |
| Gisborne | $2,655 | $2,880 |
| Marlborough | $2,637 | $2,857 |
| Canterbury | $2,469 | $2,855 |
| Manawatu-Whanganui | $2,650 | $2,814 |
| West Coast | $2,538 | $2,772 |
| Taranaki | $2,583 | $2,745 |
| Southland | $2,574 | $2,694 |
| **New Zealand** | **$2,820** | $3,145 |

**Table 4.3 Average Dwelling Size Building Consents m² 2020-2023**

| Region | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| Southland | 186m2 | 178m2 | 183m2 | 180m2 |
| Marlborough | 192m2 | 193m2 | 178m2 | 175m2 |
| Tasman | 179m2 | 177m2 | 172m2 | 168m2 |
| Otago | 168m2 | 168m2 | 163m2 | 159m2 |
| Northland | 180m2 | 177m2 | 171m2 | 156m2 |
| Taranaki | 168m2 | 164m2 | 168m2 | 154m2 |
| Manawatu-Whanganui | 164m2 | 172m2 | 166m2 | 148m2 |
| Waikato | 170m2 | 171m2 | 159m2 | 146m2 |
| Canterbury | 163m2 | 156m2 | 148m2 | 145m2 |
| Nelson | 167m2 | 162m2 | 144m2 | 138m2 |
| Hawke's Bay | 158m2 | 148m2 | 162m2 | 137m2 |
| Auckland | 148m2 | 146m2 | 135m2 | 134m2 |
| Wellington | 133m2 | 132m2 | 120m2 | 132m2 |
| Bay of Plenty | 154m2 | 157m2 | 156m2 | 131m2 |
| West Coast | 159m2 | 151m2 | 138m2 | 126m2 |
| Gisborne | 175m2 | 132m2 | 120m2 | 124m2 |
| **New Zealand** | **156m2** | **154m2** | **145m2** | 141m2 |

[28] https://www.canstar.co.nz/home-loans/how-much-to-build-a-new-house-in-nz/



[UNCLASSIFIED]

There is another dimension around larger dwellings that is not well recognised by consumers. That relates to operating costs as well as building repairs and maintenance across a dwelling life cycle. Perhaps the implications of size for repair and maintenance costs have been ignored because of the longstanding tradition in Aotearoa NZ of under-investing in repairs and maintenance and the decoupling of house price from dwelling condition. What is clear, however, is that there is a substantial liability in relation to dwelling repairs in the New Zealand housing stock. The larger the dwelling, the larger that under-investment becomes, although the condition of dwellings are often poorer in smaller houses because of the lower incomes of the households living them.[29] Similarly, the day-to-day costs of energy tends to be higher for larger dwellings, both in total and on a psm basis.[30]

## Crowding, Space, Public Health and Moral Hygiene

As the previous discussion shows, there has been a drive to larger dwellings which come from both larger dwellings being used to express success but also the desire for a bargain conveyed through lower psm. Larger dwellings have also been promoted through concerns about public health and moral hygiene. This is evident in the jurisdictions whose building legacies have been framed by Britain, Ireland, North America and Australasia. In Aotearoa NZ, the reaction against densely populated slums and tenements, was a critical factor in the emergence of the suburban model of housing during the late nineteenth and twentieth centuries. The suburban model of detached or semi-detached villas surrounded by suburban lots emerged in Britain, Canada, Australia and the United States as well, but Aotearoa NZ has been recognised as particularly captured by that model.[31]

Public commentary emerging from the colonial and Victorian periods onwards, both in Aotearoa NZ and overseas, has long associated a lack of space and crowding with vulnerability to child maltreatment, sexual abuse and immorality. More recently, large scale overseas research has tended to confirm that popularly believed association. A study of Western Australian over half a million children born 1990-2009 found the risk of allegations of child sexual abuse increased by 23%-46% in more crowded households although “the highest level of overcrowding was associated with a 40% increased risk of substantiated sexual abuse.” The authors of that study also cite associations found in research pertaining to other parts of Australia as well as Canada and the United Kingdom.[32] Crowding has been implicated in sexual abuse among siblings in Israel,[33] as well as being identified as compromising child development in research arising out of and contextualising the Christchurch longitudinal child development study.[34] Anxieties around public health, morality and housing space became manifest in Aotearoa NZ in the 1947 Housing

[29] White *et al*., 2024.
[30] Riggs, *et al*., 2023.
[31] Saville-Smith in Judd *et al*., 2020.
[32] Cant *et al*., 2019.
[33] Golan, 2023.
[34] O’Connor, 2020.



[UNCLASSIFIED]

Improvements regulations[35] and various subsequent, non-statutory, guidelines such as those released by the Auckland Council in 2019 and HUD in 2021 (Table 4.4, Table 4.5).[36]

**Table 4.4 HUD Guidelines for New-Build Social Housing Receiving Government Funding**

| Area specified for size guideline | One Bedroom Dwelling Maximum 2-person occupancy | Two Bedroom Dwelling Maximum 4-person occupancy |
|---|---|---|
| Single storey minimum gross floor area | 50m$^2$ | 70m$^2$ |
| Combined kitchen/living/dining | 27m$^2$ | 36m$^2$ |
| Bedroom | 1x10m$^2$ | 1x10m$^2$ + 1x9m$^2$ |
| Storage linen | 0.6m (W) x 0.6m (D) | 1.2m (W) x 0.6m (D) |
| Storage general | 0.6m (W) x 0.6m (D) | 0.6m (W) x 0.6m (D) |
| Hot water cupboard | 0.7m (W) x 0.8m (D) | 0.7m (W) x 0.6m (D) |
| Bedroom wardrobe | 1.2 (W) x 0.6 (D) | 1.2 (W) x 0.6 (D) |
| Minimum ceiling height | 2.4m | 2.4m |
| Maximum ceiling height | 3m | 3m |

**Table 4.5 Auckland Council Minimum Recommended Floor Areas by Typology and Spaces**

| Area specified for size guideline | Studio | 1 bed | 2 bed |
|---|---|---|---|
| Living | 11m$^2$ | 20 m$^2$ | 24 m$^2$ |
| Kitchen & dining | 5.10 m$^2$ | 10.8 m$^2$ | 13.20 m$^2$ |
| Bedrooms | 9 m$^2$ | 9 m$^2$ | 9 m$^2$ x2 |
| Bathrooms | 3m$^2$ | 3m$^2$ | 3m$^2$ |
| Laundry | 0.84 m$^2$ | 0.84 m$^2$ | 1.26 m$^2$ |
| Wardrobe | 0.70 m$^2$ | 1 m$^2$ | 2.18 m$^2$ |
| Entry | 0.36 m$^2$ | 0.36 m$^2$ | 0.36 m$^2$ |
| Balcony | 5 m$^2$ | 5 m$^2$ | 8 m$^2$ |
| Minimum internal net floor area | 30 m$^2$ | 45 m$^2$ | 62 m$^2$ |
| Minimum total floor area | 35 m$^2$ | 50 m$^2$ | 70 m$^2$ |

Aotearoa NZ's Home Improvement Regulations 1947 required living/kitchen areas to be no less than 9m$^2$ for existing dwellings and no less than 14m$^2$ for new dwellings. Bedsitting rooms for one person required a minimum of 11m$^2$ or a minimum of 14m$^2$ for two people. Stand- alone kitchens were sized at a minimum width of 1.5m and floor area of 4m$^2$. Similar specification of size minima were applied to bedrooms and interior heights. These varied according to assumptions about the age of people using bedroom space and, in relation to heights, whether ceilings were sloped or not. More recently, HUD has introduced voluntary, non-statutory guidelines around both dwelling sizes and the allocation of space within social housing dwellings receiving some amount of Government funding (Table 4.4).[37] Those

[35] Parliamentary Counsel Office, 2021,

[36] Apartments have drawn particular attention among jurisdictions regarding acceptable dwelling size. Annex A provides an example of size specification in Ireland.

[37] Ministry of Housing and Urban Development, 2021.

guidelines provide an added resource to the guidelines around size promulgated by the Auckland Council (Table 4.5)[38] and Kāinga Ora respectively. Notably, HUD does not support development of studio units, since it is considered that they do not offer "adequate delineation of private and sleeping spaces."

# 5 Demand for Small Dwellings

The number of New Zealand households has continued to increase. Data from Statistics New Zealand's Household Economic Survey (HES) estimates the number of usually resident households increased from 1,680,000 in 2019 to 1,877,500 in 2023, an increase of 197,500 households (or by 12%). The growth in the number of households has not been the same across all household types or household sizes.[39]

The HES surveys show that Aotearoa NZ has experienced change in the demographic characteristics of its households over the last four year. Smaller households have increased at a proportionally faster rate than households with four or more people living in them. Households with one resident increased by 127,300 (or 41%) between 2019 and 2023 and accounted for 64% of the total increase in all households over the same time period. Households with two residents increased by 79,000 households (or 14%) over the same timeframe and account for a further 40% of total growth.

Households with one usual resident dominated growth between 2019 and 2023 and increased by 127,300 households (or by 41%) and accounted for 64% of the total growth in households. Households with two usual residents also accounted for a large proportion of total growth increasing by 79,000 (or by 14%). The number of larger households declined with those with four usual residents falling by 2,300 and those with five or more by 16,600 households.

Figure 5.1 presents the number of households nationally by the number of usual residents living in that household between 2019 and 2023. One person and other household compositions dominated the growth between 2019 and 2023. The "all other household" category is a broad composite group of households which unfortunately the household economic survey categories do not allow it to be broken down into any significant subgroups.

[38] Auckland Council, 2019.

[39] Although the survey results are robust, it is important to remember the statistics are based on a survey which has a sample of 14,100 households. Consequently, there will be some sample error in the data particularly for survey results for smaller regions and demographic groups.

**Figure 5.1 Change in the number of households between 2019 and 2023 by number of usual residents.**

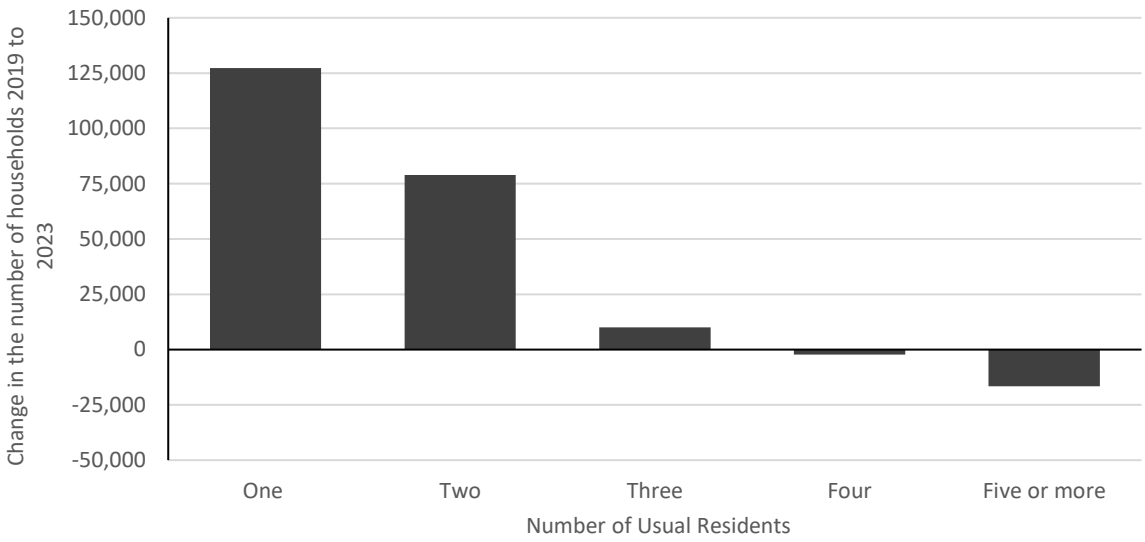



Figure 5.2 presents the trend in number of usual residents living in a household as a proportion of total households in 2019, 2021, and 2023.[40] As a proportion of total households:

- Households with one usual resident increased from 18.6% in 2019 to 23.5% in 2023, an increase of 4.8 percentage points;
- Households with two usual residents increased from 32.8% in 2019 to 33.5% in 2023, an increase of 0.8 percentage points;
- Households with three, four and five or more usual residents all declined by 1.5, 2.0, and 2.1 percentage points respectively.

The change in household size has also had an impact on the composition of households. Figure 5.3 presents the change in the number of households by household composition between 2019 and 2023.[41] Figure 5.4 presents the change in the number of households by household composition and number of usual residents between 2019 and 2023.[42] Table 5.1 sets out the number of households by household size and household composition. Figure 5.4 sets out the extent of change in household composition by household size.

[40] Customised data extract HES Surveys 2019, 2021 and 2023 StatisticsNZ
[41] Customised data extract HES Surveys 2019, 2021 and 2023 StatisticsNZ
[42] Customised data extract HES Surveys 2019, 2021 and 2023 StatisticsNZ.

**Figure 5.2 Household size as a proportion of total households in 2019, 2021, 2023.**

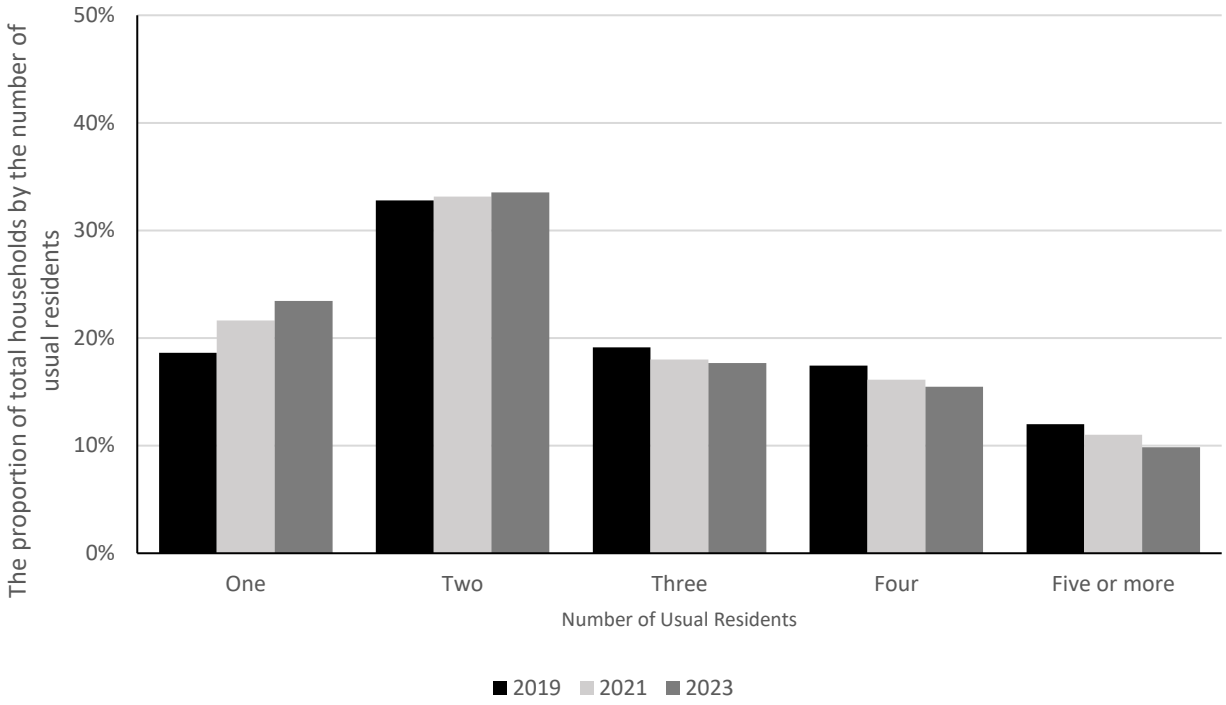
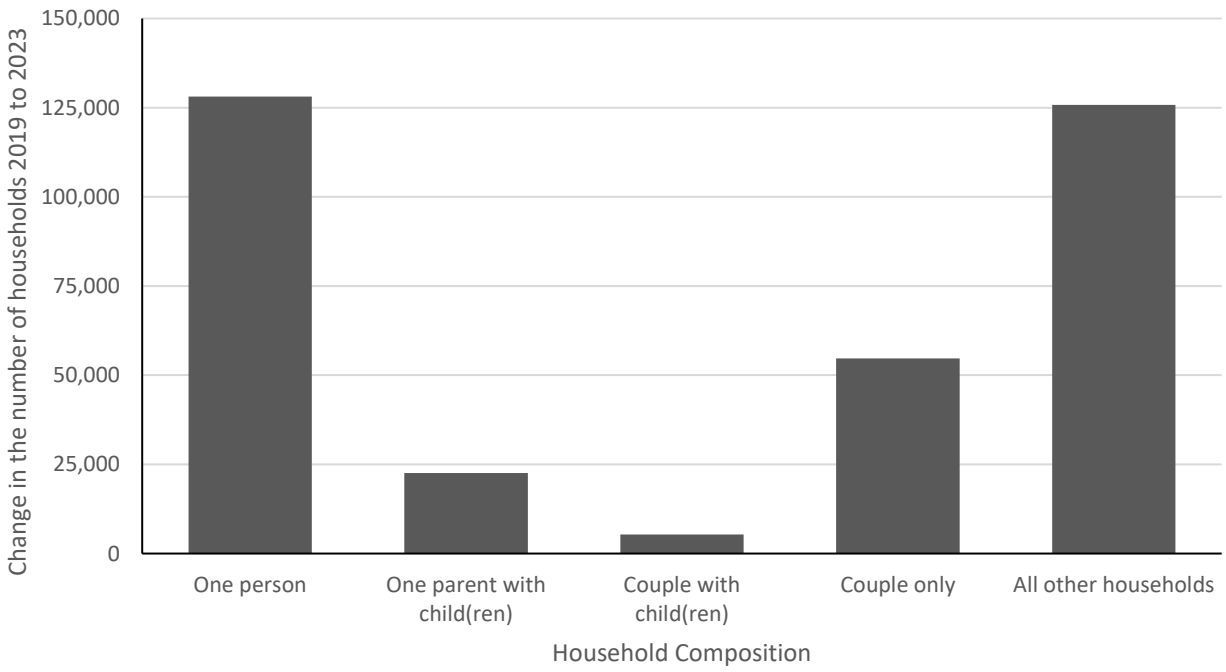



**Figure 5.3 The change in the number of households by household composition between 2019 and 2023**






[UNCLASSIFIED]

**Table 5.1 Number of households by number of usual residents and household composition between 2019 and 2023**

| Household Composition by Year | Number of usual residents | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5+ | total |
| **2019** | | | | | | |
| One person | 311,100 | - | - | - | - | 311,100 |
| One parent with child(ren) | - | 67,100 | 43,300 | 13,300 | 7,900 | 131,600 |
| Couple with child(ren) | - | 400 | 206,900 | 214,200 | 100,100 | 521,800 |
| Couple only | 1,000 | 443,300 | - | - | - | 444,300 |
| All other households | 1,000 | 39,900 | 71,500 | 65,400 | 93,500 | 271,200 |
| Total | 313,200 | 550,800 | 321,700 | 292,900 | 201,400 | 1,680,000 |
| **2021** | | | | | | |
| One person | 388,400 | - | - | - | - | 388,400 |
| One parent with child(ren) | - | 73,300 | 50,000 | 16,300 | 9,000 | 148,900 |
| Couple with child(ren) | - | 900 | 198,100 | 210,400 | 101,100 | 510,600 |
| Couple only | S | 479,500 | - | - | - | 479,900 |
| All other households | - | 42,400 | 75,600 | 63,500 | 88,000 | 269,900 |
| Total | 389,200 | 596,200 | 323,800 | 290,200 | 198,200 | 1,797,700 |
| **2023** | | | | | | |
| One person | 439,200 | - | - | - | - | 439,200 |
| One parent with child(ren) | - | 80,700 | 47,000 | 18,800 | 7,500 | 154,200 |
| Couple with child(ren) | - | - | 218,000 | 209,200 | 99,200 | 527,100 |
| Couple only | 800 | 498,200 | - | - | - | 499,000 |
| All other households | - | 80,200 | 102,700 | 98,500 | 115,500 | 397,000 |
| Total | 440,500 | 629,800 | 331,700 | 290,600 | 184,800 | 1,877,500 |
| **Change 2019 to 2023** | | | | | | |
| One person | 128,100 | - | - | - | - | 128,100 |
| One parent with child(ren) | - | 13,600 | 3,700 | 5,500 | -400 | 22,600 |
| Couple with child(ren) | - | - | 11,100 | -5,000 | -900 | 5,300 |
| Couple only | -200 | 54,900 | - | -! | - | 54,700 |
| All other households | -1,000 | 40,300 | 31,200 | 33,100 | 22,000 | 125,800 |
| Total | 127,300 | 79,000 | 10,000 | -2,300 | -16,600 | 197,500 |



[UNCLASSIFIED]

**Figure 5.4: The change in the number of households by household composition and number of usual residents between 2019 and 2023**

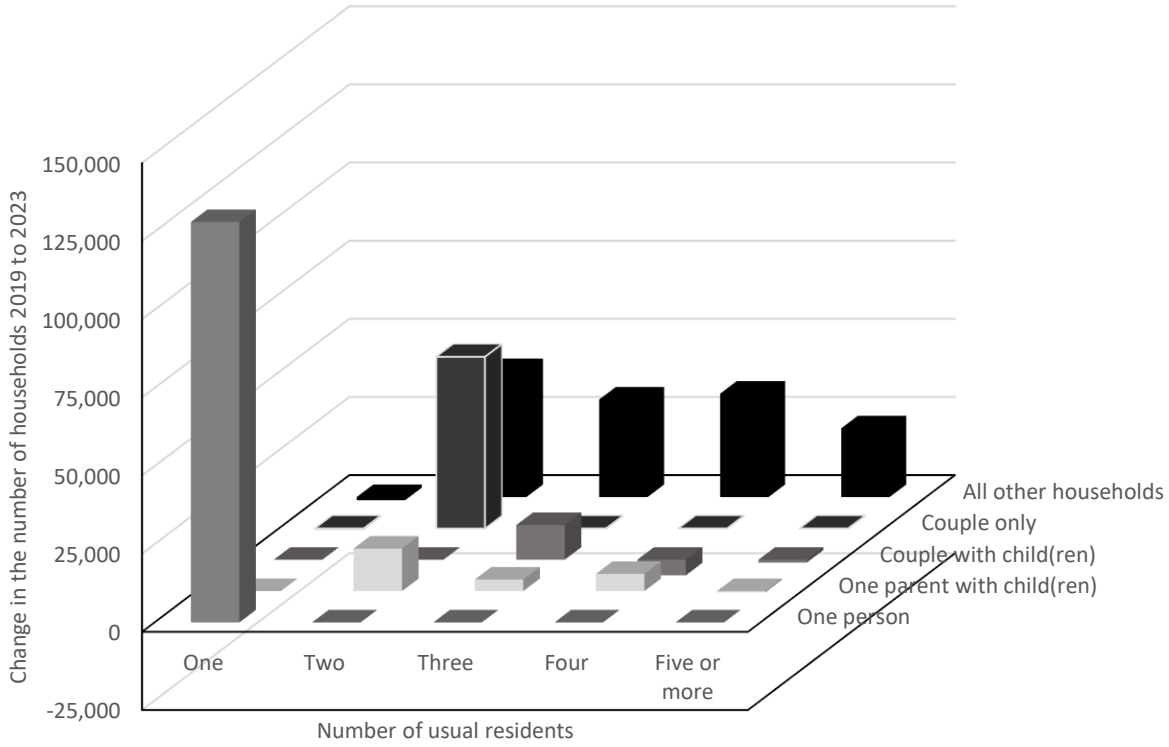



Table 5.2 shows a strong association between household incomes and household compositions and presents the trend in median household incomes by household composition between 2019 and 2023.[43]

**Table 5.2 The trend in median household incomes by household composition between 2019 and 2023**

| Household Composition | Median household incomes | | | |
|---|---|---|---|---|
| | 2019 | 2021 | 2023 | $ change 19 to 23 |
| One person | $29,400 | $35,400 | $39,100 | $9,700 |
| One parent with child(ren) | $50,600 | $60,400 | $65,100 | $14,500 |
| Couple with child(ren) | $120,000 | $127,600 | $150,200 | $30,200 |
| Couple only | $80,300 | $95,400 | $107,100 | $26,800 |
| All other households | $121,700 | $126,100 | $150,800 | $29,100 |
| Total | $84,700 | $91,400 | $100,800 | $16,100 |

[43] Customised data extract HES Surveys 2019, 2021 and 2023 StatisticsNZ.

The results from 2019 to 2023 HES surveys suggest there has been robust growth in household incomes between 2019 and 2024. This is less evident in one person households and households with one parent and children. While robust household income growth has provided some cushioning to increased housing costs, it has not been uniformly distributed across households. Households paying more than 30% of their gross household income in housing costs increased by 44,300 between 2019 and 2023.

**Table 5.3 The number of households paying 30% or less, more than 30%, 40% and 50% in gross household income by household composition in 2019 and 2023**

| Household Composition by Year | Housing costs as a % of gross household income | | | | Total House-holds |
|---|---|---|---|---|---|
| | 30% or less | More than 30% | More than 40% | More than 50% | |
| **2019** | | | | | |
| One person | 212,300 | 98,800 | 65,100 | 43,500 | 311,100 |
| One parent with child(ren) | 72,500 | 59,100 | 38,500 | 25,600 | 131,600 |
| Couple with child(ren) | 419,700 | 102,100 | 53,700 | 35,200 | 521,800 |
| Couple only | 377,200 | 67,100 | 40,400 | 28,600 | 444,300 |
| All other households | 209,900 | 61,300 | 31,800 | 20,000 | 271,200 |
| Total | 1,291,700 | 388,300 | 229,500 | 152,900 | 1,680,000 |
| **2023** | | | | | |
| One person | 296,500 | 142,700 | 90,300 | 58,700 | 439,200 |
| One parent with child(ren) | 85,900 | 68,300 | 45,800 | 27,500 | 154,200 |
| Couple with child(ren) | 417,900 | 109,200 | 55,400 | 34,100 | 527,100 |
| Couple only | 432,200 | 66,800 | 34,900 | 19,900 | 499,000 |
| All other households | 212,200 | 45,700 | 23,200 | 13,800 | 257,900 |
| Total | 1,444,900 | 432,600 | 249,600 | 154,000 | 1,877,500 |
| **Change 2019 to 2023** | | | | | |
| One person | 84,200 | 43,900 | 25,200 | 15,200 | 128,100 |
| One parent with child(ren) | 13,400 | 9,200 | 7,300 | 1,900 | 22,600 |
| Couple with child(ren) | -1,800 | 7,100 | 1,700 | -1,100 | 5,300 |
| Couple only | 55,000 | -300 | -5,500 | -8,700 | 54,700 |
| All other households | 2,300 | -15,600 | -8,600 | -6,200 | -13,300 |
| Total | 153,200 | 44,300 | 20,100 | 1,100 | 197,500 |

One parent and one person households have been particularly vulnerable to unaffordable housing costs. The number of one person households paying more than half their gross household income in housing costs increased by 15,200 households (or 35%) between 2019 and 2023. These one parent households accounted for 38% of all households paying more than half their gross household income in housing costs. One parent households also pay a significant proportion of their household income in housing costs. In 2023, 27,500 households (or 18%) of all one parent households were paying more than 50% of their household income in housing costs.

Small households (two residents or less) have dominated the growth in total households across all regions (Table 5.4).[44] Households with one resident accounted for 81% of total growth in Auckland Region, 85% of total growth in Taranaki, 87% of total growth in Manawatu Whanganui, 81% of total growth in Otago and 70% of total growth in Southland. Households with 5 or more residents declined in most regions except for Waikato, Gisborne/Hawkes Bay, Canterbury and Otago.

**Table 5.4 Regional growth in the number of households by number of residents as a proportion of total growth between 2019 and 2023**

| Region | One Resident | Two Residents | Three Residents | Four Residents | Five or more Residents |
|---|---|---|---|---|---|
| Northland | 46% | 58% | -12% | 7% | 0% |
| Auckland | 81% | 17% | 39% | -15% | -21% |
| Waikato | 54% | 43% | 4% | -5% | 4% |
| Bay of Plenty | 50% | 59% | 8% | -16% | -1% |
| Gisborne/Hawkes Bay | 64% | 62% | -25% | -6% | 5% |
| Taranaki | 85% | 4% | 30% | -2% | -17% |
| Manawatu Whanganui | 87% | 33% | -39% | 32% | -14% |
| Wellington | 63% | 36% | 4% | 16% | -19% |
| Nelson/Tasman/ Marlborough/West Coast | 42% | 60% | 27% | 13% | -41% |
| Canterbury | 60% | 48% | -5% | -7% | 3% |
| Otago | 81% | 43% | -28% | 0% | 3% |
| Southland | 70% | 9% | 24% | 20% | -21% |

Households with one or two residents tend to have lower household incomes than larger households and have a higher proportion paying more than 30% of their gross household income in housing costs when compared to other household sizes. Consequently, over time as these household increase in number there is likely to be a higher number of households paying a higher proportion of their gross income in housing costs.

[44] Customised data extract HES Surveys 2019, 2021 and 2023 StatisticsNZ

The change in the structure of households towards a higher proportion of smaller households with fewer people living in them may also have a flow on impact onto demand for different dwelling typologies. As the number and proportion of smaller households increase, demand for smaller dwellings may also increase. These trends are generally consistent across the different regions around New Zealand, however the proportion of growth by number of residents in a household varies by region. In all regions, growth between 2019 and 2023 was dominated by households with two or less residents.

**Table 5.5 Average New Build Dwelling Size ($m^2$) by Typology 1991-2023**

| Year | All Dwellings | Houses | TH/Units | Apartments |
|---|---|---|---|---|
| 1991 | 139 | 153 | 107 | 100 |
| 1992 | 151 | 164 | 118 | 98 |
| 1993 | 159 | 172 | 125 | 105 |
| 1994 | 164 | 181 | 132 | 106 |
| 1995 | 171 | 185 | 139 | 145 |
| 1996 | 172 | 184 | 140 | 120 |
| 1997 | 162 | 178 | 125 | 99 |
| 1998 | 157 | 177 | 106 | 91 |
| 1999 | 163 | 183 | 114 | 106 |
| 2000 | 174 | 192 | 124 | 99 |
| 2001 | 178 | 198 | 112 | 121 |
| 2002 | 176 | 206 | 121 | 93 |
| 2003 | 185 | 209 | 116 | 111 |
| 2004 | 180 | 214 | 117 | 96 |
| 2005 | 191 | 218 | 116 | 107 |
| 2006 | 191 | 215 | 111 | 104 |
| 2007 | 196 | 214 | 120 | 148 |
| 2008 | 197 | 217 | 122 | 118 |
| 2009 | 195 | 217 | 116 | 102 |
| 2010 | 200 | 216 | 116 | 109 |
| 2011 | 192 | 212 | 109 | 131 |
| 2012 | 197 | 215 | 117 | 142 |
| 2013 | 192 | 214 | 113 | 97 |
| 2014 | 187 | 213 | 110 | 111 |
| 2015 | 179 | 209 | 115 | 104 |
| 2016 | 182 | 209 | 118 | 118 |
| 2017 | 177 | 207 | 115 | 99 |
| 2018 | 170 | 201 | 119 | 98 |
| 2019 | 158 | 194 | 109 | 94 |
| 2020 | 156 | 192 | 110 | 104 |
| 2021 | 154 | 195 | 109 | 97 |
| 2022 | 145 | 193 | 109 | 93 |
| 2023 | 140 | 184 | 107 | 98 |

Declining household sizes have not been reflected in the housing stock in Aotearoa NZ (Table 5.5) Although dwelling sizes tend to be associated with dwelling typologies (houses, townhouse/units and apartments), the trend has broadly been upwards with a little retraction over the last few years in which construction and land costs, along with increased interest rates, have seen some change and size volatility.[45]

[45] Customised data extract, Building Consent Data, StatisticsNZ.

# 6 Accessibility & Dwelling Size

The discussion demonstrates that while the issue of dwelling size is an international preoccupation, its regulation and determinants vary. Concerns around crowding, public health and moral hygiene tend to inform minimum sizes. But those are mediated by concerns around affordability, under-occupation and dwelling size being a cultural indicator of success and social status. All these have long histories. More recently, dwelling size has become highlighted in debates around resource use and life cycle costs and the recognition that functional, accessible dwellings are critical in the context of population ageing and ensuring that people with disabilities can optimise their familial, community, social and economic participation.[46]

Unlike many jurisdictions, Aotearoa NZ does not have a regulatory requirement to build accessible housing, although it does have a longstanding and internationally acclaimed accreditation system in Lifemark.[47] Lifemark identifies dimensions in particular areas within dwellings – turning circle, landings, doorway widths, spaces around beds and so forth. Some have argued that this requires expansion of the footprint of dwellings typically delivered through residential construction, especially group home designs.[48] Others argue, however, that: small homes can also be accessible homes; and small homes can be adaptable and functional. Research findings arising from other outputs in this programme indicate pathways forward in relation to both of those. Lifemark Aotearoa provides a relatively simple star-based method to guide accessibility performance (Figure 6.1).

**Figure 6.1 Lifemark's Accessibility Star-Rating System[49]**

[46] Saville-Smith and Saville, 2012.
[47] https://www.lifemark.co.nz/official-star-rating/
[48] Page and Curtis, 2011.
[49] See https://faabsmallhomes.goodhomes.co.nz/publications/



[UNCLASSIFIED]

The array of regulated sizes around residential sizes has become more elaborated and prescriptive where jurisdictions have introduced accessibility or 'universal design' requirements around residential stock, particularly new builds. Annex B summarises those requirements for selected jurisdictions:

- England
- Canada
- Australia
- Finland
- Ireland
- Norway.

Even a cursory review of Annex B shows how rapidly accessibility guidelines, requirements and specifications can become complicated and how obscure the impacts on dwelling size of those requirements can be. Multiple and cross-cutting specifications, agency responsibilities, degrees of discretion can present, in and of themselves, a barrier to building small affordable dwellings that are accessible, functional and allow people to make themselves a home.[50]

In an effort to engage the construction industry, many jurisdictions have segmented responses around notions of visitability, universal design, adaptability or wheelchair accessible. This approach has been strongly criticised in a number of jurisdictions including in Ireland where Leonard has argued that visitability has replaced the commitment to universal design.[51] In doing so, it is arguable that the disability threshold remains stubbornly in place. It is also arguable that the experience, desires and home-making of individuals and households have become marginalised by over-technocratic, obscure, elaborate and de-humanising approaches to building homes. It is in this context, that the FAAB Small Homes research has been working with households, housing providers, health and disability service providers, seniors, local authorities, and the construction industry to identify ways to address the need for accessible, buildable and affordable homes with small footprints.

[50] See Barrett *et al*., 2024, for research into the meaning of and construction of home in Aotearoa NZ.
[51] Leonard, 2022.

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# Annex A: Space Standards for Irish Apartments 2018

These Irish standards[52] apply to private and public developments and relate to:

- Bedroom area
  - Single bedroom should be at least 7.1m$^2$
  - Double bedroom at least 11.4m$^2$
  - Main bedroom should be at least 13m2 in a dwelling designed to accommodate three or more persons
- Separate kitchen
  - Min 6.5m$^2$
- Floor to ceiling height
  - Min 2.4m
  - 3m recommended for ground floor units. Ground floor apartments must have a minimum floor to ceiling height of 2.7m
  - Recommend 2.7m for other units where this would not necessitate a reduction in the number of floors
- Maximum 12 apartments per floor

| **Dwelling Capacity** | **Minimum Gross Floor Area m$^2$** | **Min. Main Living Room m$^2$** | **Aggregate Living Area m$^2$** | **Aggregate Bedroom Area m$^2$** | **Bathroom m$^2$** | **Storage m$^2$** |
|---|---|---|---|---|---|---|
| **Studio** | 37 | 30m2 (comb. Living/dining /bedspace) | 30m2 (comb. Living/dining /bedspace) | 30m2 (comb. Living/dining /bedspace) | 4m2 | 3 |
| **1 bed 2 person** | 45 | 11 | 23 | 11 | 5m2 | 3 |
| **2 bed 3 person** | 63 | 13 | 28 | 20 | 6m2 | 5 |
| **2 bed 4 person** | 73 | 13 | 30 | 25 | 7m2 | 7 |

[52] Government of Ireland, 2018.



[UNCLASSIFIED]

# Annex B: Accessibility and Size Requirements and Guidelines Overseas

This material summarises material in the referenced document – Because of the technical nature of the material this is sometimes verbatim. As this is simply a summary and to avoid clumsy and confusing presentation, verbatim detail has not be separated with quotation marks.

## England

In England, size specifications are found in relation to all dwellings and then again according to various levels of accessible outcome from visitable to full accessibility for wheelchair users.

1. Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Development, (2015) Technical housing standards – Nationally described space standard https://www.gov.uk/government/publications/technical-housing-standards-nationally-described-space-standard
    - Internal space standards for all new dwellings across all tenures
    - "The requirements of this standard for bedrooms, storage and internal areas are relevant only in determining compliance with this standard in new dwellings and have no other statutory meaning or use."
    - Standard gross internal areas are organized by storey height to account for the extra circulation space needed for stairs to upper floors and deal separately with 1 storey dwellings (typically flats) and 2 and 3 storey dwellings (normally houses)
    - Where a one bedroom one person unit has a shower room instead of a bathroom the floor area may be reduced from 39m$^2$ to 37m$^2$
    - In order to provide 1 bedspace a single bedroom has a minimum floor area of 7.5m$^2$ and is at least 2.15m wide
    - A dwelling with 2 or more bedspaces has at least one double (or twin) bedroom
    - In order to provide 2 bedspaces a double (or twin) has a minimum floor area of 11.5m$^2$
    - One double (or twin) bedroom is at least 2.75m wide and every other double/twin is at least 2.55m wide
    - Any area with a headroom of less than 1.5m is not counted within the Gross Internal Area unless used solely for storage (if the area under the stairs is to be used for storage, assume a general floor area of 1m$^2$ within the Gross Internal Area
    - Any other area that is solely used for storage with a headroom of 900-1500mm (e.g. under the eaves) is counted at 50% of its floor area
    - Any area with a headroom lower than 900mm is not counted

- A built in wardrobe counts towards Gross Internal Floor Area and bedroom floor area requirements, but should not reduce the effective width of the room below the minimum widths.
- A built in wardrobe area in excess of 0.72m$^2$ in a double/twin and 0.36m$^2$ in a single bedroom counts towards the built in storage requirement
- Minimum floor to ceiling height is 2.3m for at least 75% of the Gross Internal Area
- GIAs for 1 storey dwellings with 5 or more bedspaces include enough space for 1 bathroom and one additional WC (or shower room). GIAs for 2 and 3 storey dwellings include enough space for one bathroom and one additional WC (or shower room). Additional sanitary facilities may be included without increasing the GIA provided all aspects of the space standard are met

| **Minimum gross internal floor areas and storage m$^2$** | | | | | |
|---|---|---|---|---|---|
| # Bedrooms | # Bedspaces (persons) | 1 storey dwellings | 2 storey dwellings | 3 storey dwelling | Built in storage |
| 1b | 1p | 39 (37) | | | 1.0 |
| 1b | 2p | 50 | 58 | | 1.5 |
| 2b | 3p | 61 | 70 | | 2.0 |
| 2b | 4p | 70 | 79 | | 2.0 |
| 3b | 4p | 74 | 84 | 90 | 2.5 |
| 3b | 5p | 86 | 93 | 99 | 2.5 |
| 3b | 6p | 95 | 102 | 108 | 2.5 |
| 4b | 5p | 90 | 97 | 103 | 3.0 |
| 4b | 6p | 99 | 106 | 112 | 3.0 |
| 4b | 7p | 108 | 115 | 121 | 3.0 |
| 4b | 8p | 117 | 124 | 130 | 3.0 |
| 5b | 6p | 103 | 110 | 116 | 3.5 |
| 5b | 7p | 112 | 119 | 125 | 3.5 |
| 5b | 8p | 121 | 128 | 134 | 3.5 |
| 6b | 7p | 116 | 123 | 129 | 4.0 |
| 6b | 8p | 125 | 132 | 138 | 4.0 |

2. Park, J. 2017 One Hundred Years of Housing Space Standards: What now? *Levitt Bernstein*. Available: https://www.levittbernstein.co.uk/now/one-hundred-years-of-space-standards-what-now/
   - NDSS internal space calculations for Level 2 (accessible and adaptable dwellings)
     - Each bedspace/person has a value of 9m2. This is made up of 2m2 of living/dining/kitchen space, 0.5m2 of storage space and 4m2 of bedroom space (the difference between the size of a single and a double or twin bedroom) (90)
     - The remaining 2.5m2 is attributable to extra circulation and partitions.

- Each bedroom adds a further 4m2.
- This allows the different spatial implications of various combinations of single and double/twin bedrooms to be reflected in the minimum Gross Internal Areas (90)
- 2b3p to 2b4p – add 9m2
- 2b4p to 3b4p – add 4m2
- b4p to 3b5p – add 13m2 (9+4)
- 3b5p to 3b6p – add 9m2
- 3b6p to 4b6p – add 4m2
- 3b5p to 4b6p – add 13m2 (9+4)
- Each bathroom has an incremental value of 5m2 and each WC/cloakrooms or shower, 3m2

3. Scott, Bethany (2023) Minimum Space Standards for New Homes (2023 Update), *Urbanist Architecture,* https://urbanistarchitecture.co.uk/minimum-space-standards/#:~:text=These%20include%20the%20following%3A,smaller%20than%204.64%20square%20metres
   - The national space standards are an optional requirement
     - Up to local councils to decide whether they adopt the standards
   - Adopted by the London Plan so all London councils must adhere to it
   - Requirements are the bare minimum that should be seen as acceptable
4. HM Government, The Building Regulations 2010: Access to and Use of Dwellings. Approved Document Volume 1: Dwellings. 2015 edition https://www.gov.uk/government/publications/access-to-and-use-of-buildings-approved-document-m
   - Applies to building work carried out in England and on excepted energy buildings in Wales as defined by the Welsh Ministers (Transfer of Functions) (No 2) Order 2009
   - Applies to newly erected dwellings and dwellings undergoing material alteration.
   - Does not apply to the extension of a dwelling.
   - M4 (2) (Accessible and Adaptable Dwellings) and M4 (3) (Wheelchair User Dwellings) are optional requirements, and only apply where a new development is required to meet the relevant optional requirement to obtain planning permission.
   - Where no condition is imposed dwellings are only required to meet Category M4 (1) Visitable dwellings.
   - Only one category should be utilized
     **M4 (1) Visitable Dwellings**
     - New building must make reasonable provision for most people incl wheelchair users to approach and enter dwellings and access habitable rooms and sanitary features on the entrance storey
     - Reasonable provision is met if the dwelling complies with the following
       - Within the curtilage of the dwelling, or building containing the dwelling it is possible to approach and gain access to the dwelling

    - Possible to approach and gain access to a dwelling or building containing a dwelling from the most likely point of alighting from a car
    - A disabled person who is able to walk can access any dwelling in a building containing more than one dwelling
    - Visitors can access and use habitable rooms and a WC within the entrance storey of a dwelling (or the principal storey where the entrance storey does not contain a habitable room)
    - Where habitable rooms and a WC are provided on the entrance storey access between them is step-free
    - Wall-mounted switches and socket outlets in habitable rooms are reasonably accessible to people who have reduced reach
- Approach routes
    - Should be level, gently sloping, where necessary ramped
    - On steeply sloping plots steps can be used
    - All external parts of the approach route have a suitable ground surface
    - Approach route a minimum of 900mm wide with a max crossfall of 1 in 40
    - Where a driveway forms all, or part of the approach route an additional 900mm width should be provided so a wheelchair can pass a parked car
- External ramps forming part of an approach route
    - Individual flights for gradients up to 1:15 are not more than 10m long
    - Individual flights for gradients up to 1:12 are no more than 5m long
    - Every flight has a min clear width of 900mm
    - Every flight has a top and bottom landing
    - Every landing is a minimum of 1200mm long and clear of the swing door or gate
- External steps
    - Uniform steps with minimum rise of 75-150mm and minimum going of 280mm
    - Maximum rise of 1800 between landings
    - Minimum clear width of 900mm per flight
    - Every flight with 3+ risers has a suitable handrail to one side, 850-1000mm above pitch line of flight and extending 300mm beyond top and bottom nosings
- Principal communal entry door
    - Clear opening width of 775mm
    - Accessible threshold
    - Ground surface/entrance flooring does not impede wheelchairs
- Lift access (or suitable stairs)
    - Clear landing minimum 1500mm long and 1500mm wide in front of lift door at every floor level
    - Minimum clear door opening width 800mm
    - Car minimum 900mm wide 1250mm deep

    - Tactile indication to confirm floor selected provided on or next to the lift call button
    - Doors have a dwell time of 5 seconds after door has fully opened
    - Stairs meet requirements of Part K for a general access stair
- Private entrances
    - Minimum clear opening width of 775mm
    - Accessible threshold
    - Where a step is unavoidable the rise is a maximum 150mm and aligned with outside face of the door threshold
- Circulation and internal doorways
    - Every door (on the entrance storey) to a habitable room and containing the WC should have a minimum clear opening of 750mm
    - Any localized obstruction such as a radiator should be no longer than 2m in length and the corridor is not reduced below 750mm width at any point
    - A standard 826mm door leaf up to 44mm thick will be deemed to meet the requirement for a clear opening width of 775mm
- A stepped change of level on the entry floor should be avoided where possible
- WC
    - A room (WC/cloakroom or bathroom) containing a WC is provided on the entrance storey, or where there are no habitable rooms on the entrance storey on the principal storey or the entrance storey
    - Clear space to access the WC
        - Minimum 750mm$^2$ in front of WC
        - Minimum of 850mm of clear access provided for oblique transfer or;
        - Minimum of 900mm clear access provided for frontal transfer
    - Basins should not project into access zones
    - Door to the room opens outwards and has minimum clear opening width of 750mm
- Services and controls
    - Switches and sockets (lights, plugs, jacks, doorbells etc) serving habitable rooms have their centre line 450-1200mm above floor level
    - Consumer units are mounted so that switches are 1350-1450 above floor level

**M4 (2) Accessible and Adaptable Dwellings**

- Only applies when planning conditions require compliance
- Will be met where a new dwelling makes reasonable provision for most people to access a dwelling and incorporates features that make it potentially suitable for a wide range of occupants incl. older people, those with reduced mobility and wheelchair users.
- Reasonable provision is made if the building complies with the following criteria

    - Within the curtilage of the dwelling, or the building containing the dwelling it is possible to approach and gain step-free access to the dwelling, any associated parking space and communal facilities intended for occupant use
    - Step free access to the WC and other accommodation on the entrance storey and to any associated outdoor space connected to the entrance storey
    - Wide range of people including older people, disabled people and some wheelchair users are able to use the accommodation and its sanitary facilities
    - Features are provided to enable common adaptions to be carried out later to enhance accessibility and functionality
    - Wall mounted switches, sockets and other controls are easily accessible to those with compromised reach
- Approach
    - Should be safe, convenient and adopt the shallowest gradient that can reasonably be achieved
    - Step free regardless of the storey on which a dwelling is located
    - Where it is not possible to achieve a step free approach route to the principle, private entrance, a step free route to another private entrance should be provided
    - Where communal ramped approach is provided and has a rise of over 300mm a stepped route should be provided
    - Private parts of the approach route have a minimum clear width of 900mm or 750mm where there are localized obstructions
    - Communal parts of the approach route (excl stairs) should have a minimum clear width of 1200mm or 1050 where there are localised obstructions
    - Any localized obstruction does not occur near to or opposite a doorway, or at a change of direction, and is no more than 2m long
    - Gradient for a ramp between 1:20 and 1:12
    - Length of each flight meets gradient requirement
    - Flights with a private approach route have a min clear width of 900mm
    - Flights with a communal approach route have a min clear width of 1200mm
    - Every flight has a top and bottom landing
    - Intermediate landing provided (min 1200mm and clear of any gates/doorways) between flights and any change of direction
- External steps
    - Uniform, with a rise of 150-170mm and a ‘going’ of between 280 and 425mm
    - Max rise of flights between landings is 1800mm
    - Clear minimum width of 900mm per flight

    - Top, bottom and intermediate (where necessary) landings minimum clear length of 900mm
    - Every flight with 3+ risers has a gripable handrail to one side (both sides where the flight is 1000mm wide or more)
    - Handrail 850-1000mm above the pitch line of the flight and extends 300mm beyond top and bottom nosings
- Parking
    - Where parking is within the private curtilage of a dwelling, but not within a carport or garage, at least one space is a standard parking bay that can be widened to 3.3m
    - Where communal parking is provided to blocks of flats at least one standard parking bay is provided close to the communal entrance of the core of each block. Parking bay minimum clear access of 900mm to one side with a dropped curb
    - Entrance to the principal (or where necessary alternate) private entrance is step free
    - Parking space suitable surface, level or gently sloping where necessary, gradient as shallow as the site permits
- Principal communal entrance
    - Level landing minimum of 1500mm$^2$ directly outside the entrance and clear of the swing of the door
    - Landing covered to a depth of 1200mm and width of 900mm
    - Lighting provided using fully diffused luminaries activated by a dusk till dawn timer or motion detection
    - Entrance door/gate minimum clear opening of 850mm
    - Where double doors or a gate are used the main (or leading leaf) provides the minimum clear opening width
    - Minimum 300mm opening nib provided to the leading edge of the door
    - The reveal on the leading side of the door maximum depth of 200mm
    - Threshold is accessible
    - Where there is a lobby or porch doors are a minimum of 1500mm apart
    - Ground surface/entry flooring does not impede wheelchair mobility
    - Any door entry controls located 900-1000mm above finished ground level and 300mm away from any projecting corner
- Communal Lifts
    - Every passenger lift that gives access to the dwellings should comply with the following
    - Clear landing minimum 1500mm$^2$ directly in front of every lift door on every level
    - Lift is equivalent to or meets relevant requirements for a type 2 lift
    - Car minimum of 1100mm wide and 1400mm deep
    - Doors have a minimum clear opening width of 800mm

    - Landing car controls are 900-1200mm above finished ground level and 400mm from inside of the front wall (measured horizontally)
    - Initial dwell time of 5 seconds after the doors begin to close
- Stairs
    - Principal communal stairs should meet requirements of part K
- Private entrances
    - Level external landing with minimum width and depth of 1200mm
    - Landing is covered for a minimum width of 900mm and a minimum depth of 600mm
    - Lighting is provided which uses fully diffused luminaries activated by a dusk to dawn timer or motion sensor
    - Door has a minimum clear opening width of 850mm
    - Threshold is accessible
    - Where there is a lobby or porch the doors are at least 1500mm apart and there is at least 1500mm between door swings
- Doors and Halls
    - Minimum clear width 900mm halls and landings
    - Doors that open inward have a minimum clear width of 750mm
    - A minimum 300mm nib is provided to the leading edge of every door on the entrance storey
- Stairs/changes of level
    - Access to all rooms and facilities on the entrance storey is step-free
    - Level changes within every other storey are avoided where possible
    - Allowance for a stair lift to be fitted between the entrance level and other storeys
    - The stairs from the entrance storey to the storey above (or below) has a minimum clear width of 850mm (when measured 450mm above the pitch line of the treads)
    - All stairs meet the provisions for part K
- Living, kitchen and eating areas
    - Within the entrance storey there is a living area (living room; or dining room; or combined kitchen and dining room)
    - A minimum 1200mm clear space in front of and between all kitchen units and appliances
    - Glazing to the principal area of the principal living area starts a minimum of 850mm above floor level or at the minimum height necessary to comply with part K for guarding windows
- Bedrooms
    - Every bedroom should provide a minimum of 750mm clear access from the door to the window
    - At least one double bedroom has a clear access zone a minimum of 750mm to one side and the foot of the bed

    - All single and queen bedrooms can provide a clear access zone of 750mm wide to one side of each bed
- Sanitary facilities
    - All walls, ducts and boxings to the WC/cloakroom, bathroom and shower room should be strong enough to support grabrails, seats and other adaptions that can support a load of up to 1.5kN/$m^2$.
- WC facilities on the entrance storey
    - Every dwelling has a room on the entrance storey that provides a WC and basin
    - In a two or three storey dwelling with one to two bedrooms
        - Minimum 750$mm^2$ in front of WC
        - Minimum of 850mm of clear access provided for oblique transfer or;
        - Minimum of 900mm clear access provided for frontal transfer
        - Basins should not project into access zones
        - Door to the room opens outwards and has minimum clear opening width of 750mm
    - In a two or three storey dwelling with three or more bedrooms the room with a WC and basin
        - Provides an installed level access shower or potential level access shower
        - Door opens outwards
        - See diagrams 2.5 and 2.6 for detail
- Bathrooms
    - Every dwelling has a bathroom that contains a WC a basin and a bath located on the same floor as the double (principal) building
    - Meets the provisions of diagram 2.5
    - Provision for a level access shower provided if not provided elsewhere
- Services and controls
    - Consumer units mounted so switches are between 1350mm and 1450mm above floor level
    - Switches, sockets, stopcocks and controls have their centreline between 450mm and 1200mm above floor level and 300mm (horizontally) from an inside corner
    - Handle to at least one window in the principal area located between 450mm and 1200mm above floor level unless fitted with a remote opening device within this height range
    - Handles to all other windows 450mm to 1400mm above floor level unless fitted with remote opening device w/in this range
    - Boiler timer controls and thermostats are mounted between 900mm and 1200mm above floor level on the boiler or

- Separate controls are mounted in another accessible location in the same height range

**Optional Requirement M4 (3) Wheelchair User Dwelling**

- Optional requirement M4 (3) will be met when a new dwelling makes reasonable provision at completion or a point following completion for a wheelchair user to live in the dwelling and use any associated private outdoor space, parking and communal facilities that may be provided for the use of the occupants. Reasonable provision is met when
  - Within the curtilage of a dwelling or of the building containing the dwelling a wheelchair user can approach and gain step free access to every private entrance to the dwelling and to every associated private outdoor space, parking space and communal facilities for occupant's use
  - Access to the WC and other accommodation on the entrance storey is step free and the dwelling is designed to have step-free access to all other parts
  - Sufficient internal space to make accommodation within the dwelling suitable for a wheelchair user
  - The dwelling is wheelchair adaptable, so that key areas such including bedrooms, sanitary facilities and kitchens could be altered to meet the needs of a wheelchair user
  - Wall mounted switches, controls and sockets are accessible to people with a reduced reach.

# Canada

CSA Group (2023) CSA/ASC B652:23 National Standard of Canada, Accessible Dwellings
https://www.csagroup.org/store/product/csa-asc%20b652%3a23/

- Requirements and recommendations to make dwellings accessible to people with physical, cognitive or sensory disabilities
- Supports principles of universal design
- Aims to facilitate accessibility
- New homes and alterations
- Covers detached houses, semidetached houses, houses with a secondary suite, duplexes, triplexes, townhouses, row houses and boarding houses, apartments or condominiums, and communal residential dwellings (e.g., hotels/motels, hostels, dormitories, care facilities).
- Covers residential multi-unit buildings with shared external elements
- General Recommendations and Requirements
  - Recommended that all multi-unit residential building projects contain accessible units
    - Number and size of accessible dwellings should be proportional to the number and size of all dwellings being provided

    - Location of stacked accessible dwellings should be distributed between floors and offer different views
- Recommended that accessible single-family, townhouses, or triplex dwellings (etc.) that are part of a development be proportionately distributed to provide choice of a street, corner or middle dwelling.
- Distribution of accessible dwellings should consider proximity to amenities (car parks, elevators etc.)
- Where an accessible dwelling has more than one storey a means of accessible access between stories is required
    - Raised or sunken floor levels not permitted within a storey unless accessible access to all levels is provided
- Regardless of whether the dwelling is intended for a person with a disability, every inhabitant must have access to
    - Nourishment (e.g., kitchen and dining areas)
    - Cleaning/personal hygiene (e.g., bathroom, toilet and laundry)
    - Rejuvenation (e.g., bedroom, lounge/living, den/family room)
    - These requirements apply to new dwellings and home modifications
- A person with a disability must be able to access all bedrooms, regardless of whether a designated accessible bedroom is provided on the main level
- Main entry to a visitable dwelling should be accessible, but where this is not possible an alternate accessible entry (rear/side/garage) may be provided
- Accessible access requirements
    - Accessible paths of travel require a width of at least 1200mm for the interior environment, except for home alterations where 1000mm is acceptable
    - Accessible exterior paths require a minimum width of 1500mm except for home alterations where 1000mm is accepted.
    - Access to main entrance from the driveway, garage or sidewalk requires an accessible pathway (1500mm) or a ramp
    - If access to the main floor is 600-900mm above ground level, provision of a long ramp (10-20m) is likely required
- Where an accessible dwelling has a patio, balcony or outdoor amenity space access via an accessible path or ramp is required
    - Access to outdoor spaces requires a clear floor space of 1800mm for new construction or 1500mm for home alterations
    - T-turns require at least 1800mm by 1200mm by 1200 for new construction and 1500mm by 1000mm by 1000 for alterations
    - Where there is no yard or grassy area, provision of a service dog relief area is recommended
    - Recommended that patios, balconies or decks be covered
- Clear floor spaces
    - Recommended that clear floor or ground spaces to accommodate someone who uses a mobility device include

    - A minimum of 820mm by 1390mm for a stationary area
    - A 1800mm turning diameter for new construction
    - A 1000mm turning diameter for alterations
    - Minimum 1800mm by 1200mm by 1200 for new construction and 1500mm by 1000mm by 1000 for alterations
    - Where possible a minimum of 1800mm is recommended for all appliances
    - For larger assistive mobility devices clear floor area of 2100mm by 2100mm recommended
    - For mobility scooters clear floor area of 3150mm by 3150mm recommended
- Knee and toe clearances
    - Counter heights and work surfaces (or a portion thereof) should be provided with a knee clearance with a surface height of 730-860mm;
    - Minimum clearance height of 820mm wide;
    - 685mm-730mm at the underside of the front edge;
    - Have minimum toe clearance of 820mm wide, 230mm deep, 230mm high;
    - Minimum of 1390mm deep floor space to allow for a clear approach
- Recommended that all operating controls (light switches, thermostats, doorbells, powerpoints, appliances etc.,) be accessible
    - Controls required to be adjacent to and centred on either the length or the width of a clear floor space of 820 mm by 1390 mm
    - Required to be 400mm-900mm from the floor
    - Required to be 900mm-1100mm from the floor when reading a display is required (eg., thermostat; intercom)
    - Clear floor area of 1800mm by 1800mm in front of all operating controls
    - Controls are required to be operable by one hand using a closed fist or method that does not require tight grasping or pinching of the wrist
    - Operating controls require colour contrasting from background
- Reach ranges
    - An individual should be capable of reaching an appliance or control without having to reach more than 500mm
    - Highest forward reach 1100mm from floor (req)
    - Highest side reach over an 860 mm high obstruction 1100 mm from the floor (req)
    - User's actual reach range should be accounted for
- Visual displays
    - Devices with visual display screens are required to be capable or supplementing information with tactile and/or auditory information
    - Require colour contrasting with background screen
    - Require positioning to obtain low or no glare

    - Where reading is necessary operating controls require illumination to a level of at least 200lx
- Floor or ground surfaces (leasing up to, going into and running through an accessible dwelling) are required to be
    - Secure and stable
    - Slip resistant
    - Produce minimal glare or reflection
    - Not have strong visual patterning
    - With the exception of ramps, be level except when sloping towards a drain at not more than 1:50 (2%)
- Carpets/carpet tiles
    - Should have a low, firm and level pile and loop
    - Have maximum combined pad and carpet height of 13mm
    - Be secure
    - Be backed or underlaid with firm materials
- Thresholds and transitions
    - A rise of 0-6mm may be vertical
    - A rise of 7-13mm should be bevelled but no steeper than 1:2
    - A rise of 13-50mm should not be steeper than 1:12
    - The site design should avoid changes in level between the main entrance and the exterior circulation route, parking, or passenger pick-up area.
    - Where changes in level are unavoidable, the area should be graded and designed to provide a gradual slope not exceeding a ratio of 1:20 (5%) over an extended distance.
- Gratings and floor vents are required to be
    - Located on the outside edges or along walls of the accessible path of travel on the interior
    - Located outside of the accessible path of travel except where required for drainage along the exterior
    - Not permit the passage of a sphere more than 13 mm in diameter
    - Placed so that the long dimension of the opening is perpendicular to the primary direction of travel
- Headroom clearances (req)
    - Minimum 2030mm doorways
    - Minimum 2100mm all other spaces
- Objects protruding more than 100mm from a wall are required
    - To be cane detectable at or below 685mm from the floor or
    - Have their undersides at least 2100mm from the floor
- Lighting
    - Required that all spaces leading up to, leading into, and located within the dwelling are capable of being illuminated in their entirety to at least 50 lx at the floor level.
    - Recommended that lighting levels be uniform between rooms and spaces

    - Recommended that task lighting be placed to avoid shining directly into a user's face
- Windows
    - Accessible opening device (req)
    - Minimum sill height (except in bathrooms) 750mm from floor (req)
- Exterior route
    - Maximum running slope (excluding ramps) 1:20 (req)
    - Maximum cross slope 1:50 (req)
    - Include no drop-off or a slope leading from the edge not steeper than 1:20 (req)
    - If the vertical drop is between 75 and 600 mm deep, have edge protection with a minimum height of 100 mm (req) or;
    - Provide a compliant handrail if the vertical drop is greater than 600 mm (req)
    - Routes with a gradual slope that is less steep than 1:20 (5%) do not have to follow the specifications for ramps; however, people still benefit from sloped pathways designed similar to that of ramps when level landings at regular intervals and handrails are provided
    - Some people find steps safer than a ramp. Both ramps and steps can be provided
- Parking
    - Accessible parking spaces permit an adjacent side access aisle at least 2000 mm wide, an adjacent rear access aisle at least 2000 mm long by 4600 mm wide, or a combination thereof.
    - Minimum of 4600mm wide by 6600mm long for side access or 2600mm wide by 8600mm wide for rear access (req)
    - An accessible path of travel must be provided from the parking space/garage to main dwelling entrance
    - Garages must be designed to accommodate at least one accessible parking space.
    - Automated garage door recommended.
    - Recommended that parking spaces are covered.
    - Accessible signage required for complexes (e.g. townhouses, apartments) that share a common car parking area.
    - Pedestrian routes that border parking areas should be designed so that parked cars do not encroach on clear width.
- Garages
    - Must have illumination on a motion sensor
    - Where provided have controls that meet accessibility requirements
    - Maximum force of 65N required to manually stop doors or a safety sensor to halt doors when an obstruction is sensed (req)
    - Garage door clear opening of at least 2440mm wide by 2440mm high

    - Minimum interior dimensions of 6100 mm wide by 9150 mm long can allow manoeuvring around most vehicles
    - Recommend garages are designed to provide additional storage space
    - A larger double-car garage door (4875 mm wide by 3000 mm high) will provide flexibility for drive-in and back-in options, and permit alternate access aisle configuration
- Carports
    - Must provide a minimum of 4600mm wide by 6600mm long for side access or 2600mm wide by 8600mm wide for rear access
    - Must have a clear height at the vehicle entrance of at least 2440 mm
- Height allowances
    - The clearance from the pavement to the underside of any ceiling structure or hanging object must be at least 2750 mm (3000 mm for short-term accommodations) along the vehicular route; and at the accessible parking space
- Exterior amenities
    - Exterior amenities immediately serving the accessible dwelling (e.g., patios, balconies, decks) must be accessible in accordance with the guidelines of the Standard
    - Covered balconies, patios or deck entries recommended.
- Ramps
    - Must have a running slope with the ratio between 1:15 (6.66%) and 1:20 (5%)
    - Must have a maximum distance of 9000mm between level landings
    - Must have a cross slope no greater than 1:50
    - Must have a minimum clear width of 1200mm (except for home alterations where 1000mm is acceptable)
    - On ramps or landings that are not at grade or by a wall a curb with a minimum height of 100mm or; a raised barrier or rail with its lower edge not more than 100 mm from the ramp or landing surface must be provided.
    - Must be illuminated to at least 100 lx where interior and 50 lx where exterior
    - Ramps with gradients below 5% recommended where possible
    - Recommend curved ramps are avoided
- Handrails
    - Ramps must have handrails on both sides that
        - Resist a force of at least 1.3 kN applied in any direction
        - Have a graspable cross-section that is either circular with an outside diameter of 30 to 40 mm; or elliptical with an outside perimeter between 100 and 125 mm, with the largest cross-sectional dimension not more than 45 mm
        - Be free of any sharp or abrasive elements

    - Have a continuous gripping surface, without interruption by newel posts or other obstructions that interrupt a handhold
    - Have at least 50 mm clear space between the handrail and the wall and underneath the handrail for a smooth wall surface
    - Have at least 60 mm clear space between the handrail and the wall and underneath the handrail for a rough wall surface
    - Are continuous on the ramp and around landings
    - Are luminance (colour) contrasted with their surroundings
    - Maintain a minimum clear width of 1000 mm between the rails
    - Have a height between 860 and 920 mm, measured from the ramp surface to the top of the rail
    - Have horizontal extensions beyond the top and bottom of the ramp at least 300 mm long, that are returned to the post, floor or ground, or wall, and, if returning to the post, must be cane-detectable within 685 mm from the floor or ground
- Landings
    - Level landings must be provided at the top and bottom of each ramp segment
    - Level landings must be provided at all changes in direction along the ramp
    - Level landings must be at least 1800 mm long by 1800 mm wide at the top and bottom or at a change in direction
    - Level landings must have intermediate landings with a length not less than 1800 mm and be as wide as the ramp serving it, but not less than 1200 mm, in the case of a linear ramp
    - Where a level landing meets a slope change, it must have a 50 ± 10 mm-wide luminance (colour) contrasted and slip-resistant strip equal to the width of the ramp
    - Must be illuminated to at least 100 lx where interior and 50 lx where exterior
- Stair treads and risers
    - Must have uniform riser heights and tread depths
    - Must have risers not more than 180 mm
    - Must have runs not less than 280 mm deep, measured from riser to riser
    - Must have treads that are slip-resistant
    - Must not have open risers
    - Must be illuminated to at least 50 lx at the tread
    - Landings that are colour contrasted to stairs are recommended
- Stair nosings
    - Must not project more than 38mm
    - Where projecting, must be sloped to the riser at an angle greater than 60° to the horizontal
    - Must not have abrupt undersides

    - Must have a radius of curvature at the leading edge of the tread not more than 13 mm
    - Must have a horizontal strip 50 ± 10 mm deep that colour contrasted with the tread and riser; is slip-resistant; and extends the full width of the tread
- Stair handrails
    - Handrails must be provided on both sides
    - Must be of uniform height, from 860 to 1070 mm, measured vertically from the leading edge of the tread to the top of the handrail
    - Must be continuous around landings less than 2100 mm in length unless the landing is intersected by an alternative path of travel or a door opens onto it
    - Must be continuous where located on the inside edge of the stairs
    - Must have horizontal extensions that
        - at the top of stairs, extend at least 300 mm parallel to the floor surface
        - at the bottom of the stairs, continue to slope for a distance equal to the depth of one tread and then extend horizontally for 300 mm parallel to the floor surface
        - return back to the post, floor, or wall
- Exterior stairs
    - Must be designed to avoid water accumulation
    - Must have landings designed to drain water from their surfaces while not being steeper than a ratio of 1:50
- Doors and doorways
    - Must have a minimum clear opening width of 860mm
    - Must have a level, clear, and unobstructed manoeuvring area that extends for the full height of the door and is not less than
        - 600 mm beyond the latch-side on the pull side
        - 300 mm beyond the latch-side on the push side (
        - 300 mm on each side of a sliding door
        - The width of the path of travel serving the door
        - Minimum 1200 mm for interior spaces
        - Minimum 1500 mm for exterior spaces
    - Where there are two doors in a series, the distance between the two doors must be at least 1390 mm plus the width of any door swinging into the space
    - Thresholds must be no more than 13mm high
    - When over 6mm high thresholds must be bevelled at a slope not steeper than a ratio of 1:2
    - Door handles must be operable with a closed fist (lever handles/u-shaped levers)

    - Door handles must be mounted between 900-1100mm from the floor
    - Where D-shaped handles are used, allow for sufficient clearance (35 to 45 mm minimum) in between the door and the handle to support grasping or use by someone with a closed fist
    - Recommend doors or doorframes are colour contrasted with their surroundings
    - Recommend landings of at least 2250 by 2250 mm at dwelling entrances to accommodate larger mobility devices
- Power assisted doors
    - Roughed-in electrical shall be provided for the future installation of a power-assisted door at the bathroom, main entrance, and garage entrance
    - Where provided power doors
        - Must take 3 seconds or more to move from a closed to fully open position, except when a safety sensor is installed
        - Must remain fully open for a minimum of 5 seconds
        - Must require a force of not more than 65 N to stop door movement, except when the door is equipped with a safety sensor that automatically stops the door if there is an obstruction in the path of movement
    - Controls
        - Controls must located along the accessible path of travel
        - Controls must be clearly visible before reaching the door
        - Controls must be adjacent to a clear floor area of 820 by 1390 mm
        - Controls must be not less than 600 mm and not more than 1500 mm from the latch edge of the door, where the door swings outward
        - Controls can be lowered to less than 400mm where designed to be operated by a foot
- Accessible interior path of circulation
    - A horizontal interior accessible path of travel must have a clear width at least 1200 mm
    - Except:
        - For home alterations a minimum of 1000 mm is acceptable
        - For short indentations up to 600 mm in length, the width must be at least 860 mm
        - For doorways, the width must be at least 860 mm
    - Where an accessible dwelling has more than one storey, a means of accessible access between stories shall be provided
        - Where an elevating device is provided it must comply with Appendix E of ASME A17.1/CSA-B44 for elevators and service lifts; CAN/CSA-B613 for platform lifts within a dwelling; or CAN/CSA-

B355 for an elevating device whose change in level is not more than 7000 mm for an enclosed runway; or 2500 mm for an unenclosed runway

- Emergency egress
    - At least one accessible access to the exterior must be available from each floor level
    - On the entry level, this accessible access to the exterior shall be a door.
    - On a lower or upper level, this accessible access shall be provided by a patio, deck, or balcony served by an accessible path of travel; or an elevator or lift device with the means to remain operable during a power outage.
    - Provincial/territorial and local regulations and by-laws may apply
- Bathrooms
    - At least one bathroom in an accessible dwelling must comply with all provisions
    - In a visitable dwelling showers and bathtubs are exempt from provisions
    - Must be able to accommodate a turning circle of at least 1800mm diameter
        - Turning circle may overlap with door swings and knee and toe clearances
        - The turning circle may overlap the shower
    - Recommended that doors be inward swinging or sliding
    - Floors must
        - Be secure and stable
        - Be slip-resistant (when dry or wet)
        - Produce minimal glare or reflection
        - Not have strong visual patterning
        - Provide colour contrast from the walls
    - Wall reinforcing must
        - Have solid wood or plywood backing around the walls surrounding a bathtub, from the bathtub rim to the underside of the ceiling or a maximum of 2050 mm above the finished floor
        - Have solid wood or plywood backing around the walls surrounding a shower, from the shower base to the underside of the ceiling or a maximum of 2050 mm above the finished floor
        - Be capable of supporting grab rails and accessories and resist a force of at least 1.3 kN applied in any direction
        - Reinforcing could be eliminated where walls are constructed of a material (e.g., concrete, masonry) capable of supporting 1.3 kN force
    - Illumination
        - Minimum 300lx (general)

        - Vanity lighting must be mounted between 300 and 500 mm perpendicular to the mirror at the side, and at a minimum 1000 and 1700 mm above the finished floor
        - Vanity lighting must be dimmable between 50 and 300 lx
        - Shower and bath illumination must be waterproof
        - Shower and bath illumination must be dimmable between 25 and 200 lx at the base
        - Shower and bath illumination must have a minimum of one fixture centred in the shower or bathtub ceiling
    - Electrical outlets
        - Accessible bathrooms must have a GFCI receptacle located on a side wall adjacent to the sink not more than 150 mm from the front edge (not on the wall behind), or on the front fascia where there is a vanity
        - Accessible bathrooms must have a GFCI receptacle located beside the toilet not more than 150 mm from the front edge of the toilet and 300 to 600 mm above the finished floor
        - Providing an electrical outlet beside the toilet allows for future device applications such as seat lifts, bidets, etc.
        - Consider providing rough-in electrical boxes and cap plates for a future call system in the bathroom near the toilet
    - Bathroom accessories and fixtures must colour contrast with the surroundings
- Toilets
    - Must have a lateral transfer space adjacent to the toilet on at least one side that is at least
        - 900 mm wide, measured from the closest edge of the toilet seat
        - 1500 mm long, measured from the wall behind the toilet
    - Toilet must be located 460-480 mm from the adjacent side wall when measured from the centre line of the toilet
    - Must have a seat height 430-485 mm above the finished floor
    - Must have a seat lid or toilet tank provided for balance and backrest
    - Must not include spring-loaded features
    - Must have a flush activator that is operable with a closed fist and is within 350 mm from the transfer side of the toilet
    - A toilet paper dispenser must be
        - Located directly beside the toilet
        - Within 300 mm of the front edge of the toilet
        - 600-750 mm above the finished floor
- Grab bars (where installed)
    - Support a minimum load of 1.3 kN applied vertically or horizontally

    - Must be 30 to 40 mm in diameter, or with a cross-section measuring no more than 50 mm across and 100 mm in circumference
    - Must have a space of 35 to 45 mm between the grab bar and the wall
    - Must have a minimum clearance of 305 mm with no protrusions extending beyond 40 mm above the grab bar
    - Must be manufactured of corrosion-resistant material
    - Fold down grab rails must comply with the above and
        - Maintain their upwards position when folded up
        - Where a top and bottom rail are present, the space between the bottom and top rail shall not exceed 120 mm to prevent entrapment.
- Sinks
    - Must comply with area allowances
    - Must be mounted with the centreline at least 460 mm from a side wall
    - Must not consider the dip of the overflow in determining knee and toe clearance
    - Must have faucets operable with a fist
    - Must have water supply and drainpipes under sinks that are insulated, fully protected, or otherwise configured to protect against contact
    - Where the sink is installed in a countertop, there shall be no 90° angles on the front edge profile
    - Recommended that the edges of the countertop be bullnose or rounded
    - Mirrors shall be installed with the bottom edge not more than 1000 mm above the finished floor
- Showers
    - At least one shower in an accessible dwelling must
        - Have an interior clear area of at least 900 by 1500 mm
        - Have a clear and unobstructed floor area in front of the shower at least 900 mm deep and the same width as the shower
        - Have a slip resistant floor
        - Have a slope between 1% and 2% toward the drain
    - Showerhead
        - Must provide a handheld head (provision of both a fixed and detachable showerhead recommended)
        - Must be protected with a mixing valve that limits the water temperature to a maximum of 49 °C
        - Must be provided with a hose at least 1800 mm long
        - Must allow use in a fixed position
        - Must be adjustable between 860 and 2030 mm from the floor
        - Must not obstruct the use of the grab bars
    - Threshold
        - Must be no more 13 mm high

        - Must be bevelled at a maximum slope of 1:2 if above 6mm
        - Level entry recommended
    - Grab bars
        - Vertical grab bar must be provided at the entrance to the shower
        - Must include either a horizontal and vertical grab bar or an L-shaped grab bar adjacent to the shower seat or bench
        - Must comply with other provisions for grab bars
    - Faucets and controls
        - Must be mounted on the back wall above the grab bar
        - Must be located between 300 mm from the inside corner of the wall and the center of the back wall or not more than 300 mm from the front edge of the seat
        - Must be located not more than 1100 mm from the floor
    - Shower seat (recommended)
        - Should not be spring loaded
        - Should be located on the side wall with the vertical grab bar
        - Should be at least 400 mm wide or greater to extend the full depth of the shower (less a space allowed for the shower curtain)
        - Should be installed with its top 435-485 mm from the floor
        - Should carry a minimum load of 1.3 kN
        - Should be smooth with a non-slip surface having no rough edges.
    - Where a shelf or alcove provided it should be within 300mm reaching distance of the shower seat.
- Medicine cabinet
    - Must be adjacent to a minimum clear floor area of 820 by 1390 mm (which may include the knee clearance at the sink)
    - Must be located within a horizontal reach of not more than 500 mm
    - Must have the bottom shelf located not more than 1000 mm from the floor
    - Must have compliant doors and hardware
    - Must me illuminated to 200lx min.
- Kitchen
    - Must Comply with specifications for area allowances
    - Must comply with specifications for knee and toe clearances
    - Must have a minimum clear floor area of 820 by 1390 mm directly in front of kitchen fixtures and appliances; and to the one side where drawers or doors open
    - Recommended that the kitchen does not have doors or any barriers to entry.
    - Minimum clear opening width of 860mm for any doors
- Floors must
    - Be secure and stable

    - Be slip-resistant (when dry or wet)
    - Produce minimal glare or reflection
    - Not have strong visual patterning
    - Provide colour contrast from the walls
- Illumination
    - Must provide 300lx for the general kitchen space and 750lx for countertops and sinks
    - Must comply with specifications for illumination (e.g. measures to reduce glare etc.)
- Appliances, outlets and controls
    - Must comply with specifications for reach range and height
    - Must include switches and outlets on the front face of counters
    - Must include side wall outlets where applicable
    - If a rangehood is provided it must be operable from a seated position or by remote control
    - Recommend that safety features such as automatic shut-off or cool to touch be considered
- Fridge (where provided)
    - Must be counter-depth
    - If an over under style fridge is provided, the freezer shelf height must be no more than 1100mm from the floor
- Cooktop (where provided)
    - Must have controls that are located in front of or beside the hot surface
    - Gas burners must operate with automatic ignition
    - Must be installed flush or level with the countertops
    - Must comply with knee and toe clearances
        - Underside of the knee clearance must be insulated, fully protected, or otherwise designed to prevent contact
        - The underside of the knee clearance must be configurated with a 400mm wide countertop adjacent to it at the same level
        - Have a rangehood that is a minimum of 710mm above the surface (if provided)
- Counters
    - At least one section of counter must have a compliant counter surface height and knee and toe clearances
        - Must be at least 820 mm wide by 600 mm deep
        - Must have no sharp or abrasive surfaces under it
        - Surface height of 730-860mm
        - Minimum clearance height of 820mm wide;
        - 685mm-730mm at the underside of the front edge;
        - Have minimum toe clearance of 820mm wide, 230mm deep, 230mm high;

        - Minimum of 1390mm deep floor space to allow for a clear approach
        - Must resist a minimum load of 1.3 kN applied vertically at the front edge of the counter
        - Must have heat-resistant surface material
        - Must have no 90° edges
- Sink
    - Counter or rim height (whichever is higher) must be 730-860mm
    - If the sink is adjustable the counter or rim height must be between 740 and 1040mm
    - Must have a centreline of at least 460mm from a side wall. Must have faucets that comply with fitting specifications (lever, operable with a closed fist etc.)
    - Water supply pipes and drainpipes underneath must be fully insulated, fully protected or otherwise designed to protect against contact
- Storage
    - Must comply with area allowances and knee and toe clearances
    - Provide both open and closed storage options
    - Closed storage
        - Must comply with specifications for fittings/handles
        - Must be drawer style when located under counter surfaces
        - Overhead shelves must be 300mm deep and a maximum of 1100mm from the floor (or able to drop down manually or automatically)
        - Base cabinets must provide a toe space at least 150mm deep and 230mm high
- Oven (when provided) must
    - Be built into the walls with controls located 1200-1400mm above the floor
    - Have a pull-out heat resistant shelf located underneath or adjacent to the oven, with a depth of at least 250mm
    - Side swing doors recommended
- Microwave (where provided)
    - Must be positioned on a work surface a maximum of 860mm above the finished floor level
    - Must have a clear counterspace of at least 400mm adjacent to the latch side opening of the door
- Dishwasher (where provided)
    - Must be a single door or drawer type
    - Must meet specifications for knee clearance on at least one side
    - Must have controls located at the top or front of the door
- Bedrooms

- Must provide an accessible path of travel to the bed on at least three sides
- Bedroom features such as cabinets, closets, etc. must be served by clear floor space compliant with the specifications
- Recommend designing all bedrooms to be accessible to allow for participation in daily life and provide choice
- Consideration should be made for situations where more clearance might be needed for an assistive mobility device to get around a bed on either side, where a lift might be in use, or to access an emergency exit route.
- Illumination
    - Adult general 100-300lx
    - Adult task (desk, reading, table etc.) 500 lx
    - Child general 500lx
    - Child task (desk, reading table etc.) 800lx
- Floors
    - Must colour contrast with walls
- Windows
    - Must provide at least one operable window
    - Sill height must not be higher than 750mm from the finished floor
    - Should be positioned so that people with limited dexterity can approach without obstruction and easily open it.
- Electrical
    - Must comply with relevant provisions for operating controls
    - Must, at a minimum, provide one switch (light, fan etc.) by the bed 550-650mm above finished floor height
    - Must have two walls with a minimum of two quad receptacle outlets per wall
    - Outlets must be placed at a minimum distance of 600mm from the corner of the room and a maximum distance of 2080mm between each outlet
    - Recommend placing an outlet on the ceiling to provide for the installation of a future lift
    - Electrical spacing reqs are designed to permit use from the bed – consider reach ranges within 600mm from the edge of the bed to the outlet or switch
- Outlet connections
    - Must provide at least one outlet for computer use/communications
    - Must be 400-1100mm above finished floor level
    - Must be a maximum of 600mm from the edge of the bed
    - Must be placed in a location where access will not be impeded by furniture

- Laundry
    - At least one laundry room must
        - Be serviced by an accessible path of travel
        - Comply with area allowances and clear floor space
        - Comply with minimum door opening width of 860mm
        - Have a floor slope of no more than 2% to permit drainage
        - Be illuminated to 200lx in general areas
        - Be illuminated to 300lx for countertops/equipment
    - Recommend the laundry be situated near a bedroom for convenience and to prevent user fatigue
    - Recommend a turning circle in laundry rooms
    - Sink
        - Must comply with general specifications for clear floor spaces for a person using an assistive device
        - Must provide a counter or rim height (whichever is higher) of 730-860mm
        - Must comply with general specifications for knee and toe clearances
        - Must provide faucets which comply with general specifications for operating controls
        - Must have a mixing valve that limits water temperature to a maximum of 49 degrees
        - Must have a rear offset drain that is fully insulated or configured to protect against contact
    - Washer and dryer
        - Must have front operated controls operable with a closed fist
        - Must be installed side by side (**not** stacked)
        - Have front mounted doors that open away from each other
    - Folding surface (where provided)
        - Must be at least 820mm wide and 600mm deep
        - Must have a surface height 730-860mm
        - Must comply with general provisions for toe and knee clearances
        - Must have no 90 degree edges
        - Must not have sharp or abrasive surfaces underneath it
        - Must have an outlet that is no more than 150mm from the front or side edge
    - Storage
        - Must comply with general specifications for area allowances and knee and toe clearances
        - Must include shelving at least 300mm deep and located 400-1100mm above the finished floor
        - Recommend shelving be at least 600mm wide

        - Recommend drop down options for overhead shelving if provided
- Closets
    - Must have interior lighting
    - Must have at least one shelf or hanging rod that is
        - Installed no more than1100mm above floor level or
        - Able to be dropped down manually or automatically
        - Recommend sufficient storage space is provided for aids such as shower chairs, walkers, transfer benches, commode chairs, and wheeled mobility devices.
- Home automation
    - Must comply with general specifications for area allowances
    - Must comply with general specifications for operating controls
    - Recommend that home automation features be hardwired in case of internet malfunction, or provided with an alternative means of remaining operative when offline
    - Recommend providing a back-up generator or power supply
- Service rooms (e.g. garbage disposal, mailboxes, mechanical or electrical equipment) and spaces (where provided)
    - Must comply with general specifications for accessible paths of travel
    - Must comply with general specifications for clear floor space
    - Must comply with general specifications for operating control, unless they are solely being used by service professionals
    - Recommend that in a multi-unit dwelling service rooms/spaces be located on the main level
- Alerts and signal devices
    - Must be equipped to provide both auditory and visual signals
    - Recommend additional devices in all rooms and spaces where the inhabitant is known to have low or no hearing or hardwired devices compatible with vibration alert systems

# Australia

1. Understanding the NCC: Building Classifications, Commonwealth of Australia and the States and Territories of Australia 2022, published by the Australian Building Codes Board. https://www.abcb.gov.au/sites/default/files/resources/2022/UTNCC-Building-classifications.PDF

   Class one Building
        - A Class 1a building is a single residential dwelling
            - Detached house; or one of a group of attached dwellings being a town house, duplex, terraced house etc.

- When attached they must be separated by a wall with fire-resisting and sound insulation properties.
- Cannot be located above or below any other dwelling or class of building other than a garage.

- A Class 1b building is a boarding house, guest house or hostel
  - Have a floor area less than 300 m2
  - Typically less than 12 people living in it.
  - Includes 4 or more single dwellings located on one allotment which are used for short-term holiday accommodation.

Class 2 Building

- includes more than one dwelling, each of which is generally solely occupied by one or more people to the exclusion of others
  - Apartment building  multi-unit residential apartments where people live above or below one another
  - Also referred to as a sole occupancy unit (SOU)
  - Part of a building for occupation by an owner/s, lessee, or tenant, to the exclusion of any other owner/s, lessee, or tenant
  - Include a residential apartment of flat, self-contained unit, suite of rooms in a hotel or motel, shop in a shopping centre.

2. Liveable Housing Design Standard, Commonwealth of Australia and the States and Territories 2022, published by the Australian Building Codes Board https://ncc.abcb.gov.au/sites/default/files/resources/2023/livable-housing-design-20230406.pdf
   - Intended as a set of minimum necessary provisions
   - Adapted from the 'Silver' level requirements of the Livable Housing Design Guidelines (LHDG), fourth edition, 2017
   - Adjustments have been made in order to convert the LHDG — which was drafted as a voluntary guideline — into a document suitable for use as a regulatory standard
   - Provisions of the Standard are designed for application to Class 1a buildings (houses and the like) and Class 2 sole-occupancy units (apartments)
   - To be used in conjunction with the National construction code
   - Overridden by State requirements

**Dwelling access**

- A continuous path to the entrance door must be provided from
  - The pedestrian entry at the allotment boundary from the ground level of the adjoining land; or
  - Garage or carport; or
  - A car parking space within the allotment provided for the exclusive use of the occupants of the dwelling

- Access must be
    - Via a pathway that:
        - Has no steps;
        - Has a maximum gradient of 1:14 in the direction of travel (excluding ramps);
        - Has a maximum crossfall of 1:40;
            - Has a minimum width of 1000 mm;
            - Connects to a code compliant entrance door
    - Or provided directly from an attached garage or carport
        - Does not need to be through the main entry door but the door must have a minimum opening width of 820mm
        - Must be step free
        - must be free of obstructions, including structural elements such as columns or engaged brick piers that would otherwise reduce the space for free movement.
- Any gates along the path must have a minimum clear opening width of 820mm
- Ramps
    - The interval between landings must not be more than
        - 9 m for a 1:14 gradient;
        - 15 m for a 1:20 gradient;
        - A length determined by linear interpolation for ramps with a gradient between 1:14 and 1:20.
    - The minimum width of the ramp must be maintained at 1000 mm between any handrails and/or kerbs (if provided) at each side of the ramp.
    - At each end of a ramp there must be a landing that is
        - Minimum 1200 mm long;
        - At least as wide as the ramp to which it connects;
        - Level, or has a gradient not more than 1:40 if a gradient is necessary for drainage.
    - The access path may incorporate one step ramp with
        - Maximum height 190 mm;
        - Maximum gradient 1:10;
        - A width of at least 1000 mm or equivalent to that of the access path, whichever is the greater;
        - Maximum length of 1900 mm
- Parking Space
    - Where provided at least one car parking space must have
        - A minimum unobstructed space of 3200 mm wide by 5400 mm long;
        - A gradient not more than 1:33 for bitumen, or 1:40 for any other surface material.

**Dwelling Entrance**

- Clear opening width
    - At least one entrance door to the dwelling must have a minimum clear opening width of 820mm
        - An 820 mm clear opening width, for a single swinging door, can generally be achieved using an 870 mm door leaf
- Threshold
    - The threshold of at least one entrance door must be
        - Level
        - Have a sill height not more than 5 mm if the lip is rounded or bevelled;
        - Have a ramped threshold that
            - Does not extend beyond the depth of the door jamb;
            - Has a gradient not steeper than 1:8;
            - Is at least as wide as the minimum clear opening width of the entrance door;
            - Does not intrude into the minimum dimensions of a landing area
    - Where the above requirements cannot meet weatherproofing requirements external entrance doors with a raised sill must
        - Have no lip or upstand greater than 15 mm within the sill profile;
        - have no more than 5 mm height difference between the edge of the top surface of the sill and the adjoining finished surface
- Landing area
    - An accessible entrance door must have a minimum space of 1200 mm x 1200 mm on the external (arrival) side of the door that is
        - Unobstructed (except for a gate or screen door);
        - Level; or
        - Have a maximum gradient of 1:40 f necessary for drainage
- Weatherproofing for external step free entrance
    - Weatherproofing for an external step-free entrance must be provided in accordance with one or a combination of the following
        - Where the external surface is concrete or another impermeable surface, a channel drain that meets the requirements of Volume Two H2D2 is to be provided for the width of the entrance.
        - Where the external trafficable surface is decking or another raised permeable surface, a drainage surface below the trafficable surface is to be provided that meets the requirements of Volume Two H2D2
            - Drainage gaps in the trafficable surface are no greater than 8 mm: or
            - In a designated bushfire area as permitted by AS 3959

- A roof covering minimum area of 1200 mm by 1200 mm, where the area is provided with a fall away from the building not greater than 1:40

**Internal Doors and Corridors**

- Minimum clear opening width of 820mm applies to a doorway or path of travel to any of the following
    - Habitable room on the entry level
    - Laundry on the entry level
    - Attached garage or carport Forming part of the access path
    - Sanitary compartment on the entry level
    - Room containing a shower
- Threshold of an internal doorway must
    - Be level; or
    - Have a height not more than 5 mm if the lip is rounded or bevelled; or
    - Have a ramped threshold that
        - Does not extend beyond the depth of the door jamb;
        - Has a gradient not steeper than 1:8;
        - Is at least as wide as the minimum clear opening width of the doorway it serves.
- Corridor width
    - Minimum width of 1100mm (measured from opposing walls) if connected to a door subject to minimum clear opening width requirements

**Sanitary Compartment**

- Location
    - There must be at least one sanitary compartment on the entry level
    - Where more than one room containing a toilet is provided only one needs to to be compliant
- Circulation space
    - For a toilet pan located in a separate sanitary compartment, there must be a clear width of not less than 900 mm between the finished surfaces of opposing walls either side of the toilet pan
    - For a room containing a toilet pan, any fixed obstruction, such as a basin or a vanity unit, must be located at least 450 mm from the centreline of the toilet pan normal to the front face of the cistern
    - A clear minimum circulation space of 1200 mm by 900 mm must be provided from the front edge of the toilet pan (applies to both a separate sanitary compartment and a sanitary compartment combined with a bathroom)

**Shower**

- At least one shower must provide a hobless and step free entry

- A lip of 5mm maximum height can be included for the purpose of water retention
- Hobless and step free entry
- The shower meeting this criteria is not required to be located on the entry level

**Reinforcement of Bathroom and Sanitary Compartment Wall**

- Reinforcing in accordance with Clause 6.2 must be provided to any
    - Sanitary compartment that is subject to requirements
    - Bathroom containing a shower subject to requirements
    - Bath (if provided), other than a freestanding bath where the bath is located in a room that also contains a shower subject to requirements
- Reinforcement requirements need not be complied with if the walls of the room are constructed of concrete, masonry or another material capable of supporting grabrails without additional reinforcement
- Where the wall supporting the reinforcement includes a cavity slider, it must be designed and constructed in way to support loads imposed by reinforcement, linings and the future provision of handrails
- Reinforcing constructed in accordance with the requirements must be provided for
    - Walls surrounding a bath in a room subject to requirements
        - The width of the bath to internal corner
        - 450mm on each side of the centreline to the bath
        - 900mm from the top of the bath
    - Shower walls (for a shower subject to requirements)
        - 600mm-1850mm from the base of the shower
        - 900mm wide
    - For a wall adjacent to and within 460 mm of the centreline of a toilet pan;
        - 600mm minimum from the edge of the toilet pan
        - 1000mm minimum from the floor
    - For a wall behind a toilet pan where
        - No wall adjacent to and within 460 mm of the centreline of a toilet pan is provided
        - A window sill or a door encroaches on the area required to be provided with reinforcing
        - Where the toilet pan is not provided in a corner of the bathroom.
            - 1200mm from floor level
            - 500mm on each side of the centreline of the toilet
- Reinforcing need only be provided across the available width of the wall where a wall in a sanitary compartment or room containing a shower
    - Is narrower than the width of the area required to be provided with reinforcing;

    - Terminates at a window sill lower than the height or the area required to be provided with reinforcing.
- Reinforcing required in a sanitary room must be constructed using one of the following materials:
    - A minimum of 12 mm thick structural grade plywood, or similar.
    - Timber noggings with a minimum thickness of 25 mm
    - Light gauge steel framing noggings or metal plate in accordance with the NASH Standard.

CC 2022 Volume Two and ABCB Housing Provisions Standard, Commonwealth of Australia and the States and Territories 2022, published by the Australian Building Codes Board

- To take effect in Oct 2023 with the exception of Tasmania where it does not take effect until October 2024
- A Class 1a dwelling should be designed such that it is
    - Easy to enter;
    - Easy to navigate in and around;
    - Capable of easy and cost effective adaptation;
    - Responsive to the changing needs of occupants.
- A Class 1a building must be provided with
    - A continuous and step-free path to a dwelling entrance door from either the
        - Pedestrian entry at the allotment boundary; or
        - An appurtenant garage or carport; or
        - A car parking space provided for the exclusive use of the occupants of the dwelling;
    - At least one level and step-free entrance door into the dwelling from the access path
    - Internal doors and corridors on the ground or entrance level which facilitate unimpeded movement between spaces;
    - A sanitary compartment that
        - Facilitates independent access and use;
        - Is located on the ground or entry level; and (e)
    - A shower that facilitates independent access and use;
    - Reinforcing of the walls of the sanitary compartment, shower and bath (where installed, other than a freestanding bath) subject to requirement, to facilitate future installation of grabrails, or the like, in a way that minimises the removal of existing wall linings

3. NCC 2022 Volume One: Building Code of Australia, Commonwealth of Australia and the States and Territories of Australia 2022, published by the Australian Building Codes Board

- Covers the design and construction of smaller scale buildings including houses, small sheds, carports and some associated structures
    - Class 2 to 9 buildings
- The NCC is given legal effect through State and Territory, or other statutory authority, building and plumbing legislation
- The dates of adoption of the NCC are determined by State and Territory building and plumbing administrations.
- Part G7 Livable housing design does not take effect until 1 October 2023.
    - For Tasmania, Part G7 does not take effect until 1 October 2024.
- G701 Only applies to a Class 2 Sole Occupancy unit
- Each sole-occupancy unit in a Class 2 building must be provided with
    - at least one level and step-free entrance door into the sole-occupancy unit from an accessible part of the floor on which it is located;
    - internal doors and corridors which facilitate unimpeded movement between spaces;
    - a sanitary compartment that
        - facilitates independent access and use;
        - is located on the entry level of the sole-occupancy unit;
        - a shower that facilitates independent access and use;
        - the walls of a the liveable sanitary compartment, liveable shower and a bath (where installed, other than a freestanding bath)are constructed so as to facilitate future installation of grabrails, or the like, in a way that minimises the removal of existing wall linings
    - Each sole-occupancy unit in a Class 2 building must comply with the ABCB Standard for Livable Housing Design, except for Part 1
        - Part 1 of the ABCB Standard for Livable Housing Design requires a step-free access path from a parking space or property boundary, to the dwelling entry door. For Class 2 buildings, this requirement is already addressed by Part D4 and the Disability (Access to Premises—Buildings) Standards 2010
    - For a Class 2 building, common areas are to be accessible
        - From a pedestrian entrance required to be accessible to at least 1 floor containing sole-occupancy units and to the entrance doorway of each sole-occupancy unit located on that level.
        - To and within not less than 1 of each type of room or space for use in common by the residents, including a cooking facility, sauna, gymnasium, swimming pool, common laundry, games room, individual shop, eating area, or the like
        - Where a ramp complying with AS 1428.1 or a passenger lift is installed
            - to the entrance doorway of each sole-occupancy unit;
            - to and within rooms or spaces for use in common by the residents.

        - These requirements only apply where the space referred to is located on the levels served by the lift or ramp
- Access to buildings
    - An accessway must be provided to a building required to be accessible
        - from the main points of a pedestrian entry at the allotment boundary;
        - from another accessible building connected by a pedestrian link;
        - from any required accessible carparking space on the allotment.
    - In a building required to be accessible, an accessway must be provided through the principal pedestrian entrance, and
        - through not less than 50% of all pedestrian entrances including the principal pedestrian entrance;
        - In a building with a total floor area more than 500 m2 a pedestrian entrance which is not accessible must not be located more than 50 m from an accessible pedestrian entrance
    - Where a pedestrian entrance required to be accessible has multiple doorways
        - if the pedestrian entrance consists of not more than 3 doorways at least 1 of those doorways must be accessible;
        - if a pedestrian entrance consists of more than 3 doorways at least 50% of those doorways must be accessible.
    - Where a doorway on an accessway has multiple leaves (except an automatic opening door), one of those leaves must have a minimum clear opening width of 850 mm
- Accessible car parking spaces
    - For Class 1b and 3 buildings the number of accessible carparking spaces required is to be calculated by multiplying the total number of carparking spaces by the percentage of
        - accessible sole-occupancy units to the total number of sole-occupancy units; or
        - accessible bedrooms to the total number of bedrooms.
        - the calculated number is taken to the next whole figure

241/2017 Government Decree on the Accessibility of Buildings

https://ym.fi/documents/1410903/35099218/Accessibility+of+Buildings.pdf/56f06cd3-4a27-6ee3-e553-e35731ffa70b/Accessibility+of+Buildings.pdf?t=1680607572789

- Entered into force January 2018
- Applies to the construction of a new administrative, service, office, business, warehouse, production and residential building subject to permit under section 125 of the Land Use and Building Act (132/1999)
- Only sections 2–4 apply to the construction of a detached and semi-detached house

- Also applies to the repair and alteration work of the common spaces of a multi-storey residential building, an office building, warehouse etc., extension or increasing the gross floor area, and alteration of the intended use of a building under section 125 of the Land Use and Building Act.
- Sections 2–5, 8, 10 and 11 apply to the measures referred to above carried out in a warehouse and production building
- Section 2 External passageway leading to a building
    - Minimum width 1200mm
    - Smooth, hard non-slippery surface that leads to the building from the boundary of the plot or building site and from the space and area that serve the use of the building
    - Maximum gradient 5%
    - Where steps are included a ramp or lifting device must also be provided for wheeled walkers and wheelchairs
    - Exclusions are made for a detached house, semi-detached house or townhouse if providing an accessible passageway would be impossible considering the site and elevation differences
    - External ramp (if provided)
        - Easily visible
        - Smooth, hard, non-slippery surface
        - Minimum width 900mm
        - If unconnected to a fixed structure has a protective edge minimum 50mm high
        - Horizontal landings at least 1500mm must be provided at the top and bottom
        - Maximum gradient 5%
        - If the elevation difference is <1000mm the maximum gradient is 8%
            - In such case the elevation difference of a continuous ramp may not be more than 500 mm, after which there shall be a horizontal intermediate landing with a length of at least 2,000 millimetres
            - External ramps with a gradient >5% are only permitted if they can be maintained to a condition comparable to an indoor ramp
            - Handrails must conform to the Land use and Buildings Act
    - Parking spaces (if provided)
        - An adequate number, but at least one, must be provided for the use of a person with a disability
        - Minimum width 3600mm
        - Minimum length 5000mm
        - Applies to multi-storey buildings, not to a detached house, semi-detached house or townhouse

- Section 3 Building Entrance
    - Landing must be provided outside the entrance
        - Minimum 1500mm by 1500mm
    - The distance of the opening side of the outside door of a building from the inside corner of the wall or other fixed obstacle outside the door shall be at least 400mm
- Section 4 Doors
    - The minimum clear width of the door and opening in a passageway inside a building, the door leading from the staircase to a dwelling and the door of the toilet/washing facility is 850 mm
    - Minimum width of doors and opening to rooms, necessary spaces serving residence and spaces serving the use of the building is 800 mm
    - No level difference or threshold unless necessary to address noise, humidity etc.
        - Maximum threshold height 20mm
        - Must be designed for easy navigation with a wheelchair or wheeled walker
- Section 5 Internal passageways
    - Passageways serving common spaces of a multi-unit residential building shall be easily noticeable and have a smooth and non-slippery surface
    - If the passageway has a width of less than 1,500 millimetres, a turning space with a diameter of at least 1,500 millimetres must be provided at least every 15 metres
- Section 6 Other spaces in the building
    - A residential building 3 storeys or more, shall have a turning space with a diameter of at least 1,300 mm in the hallway and kitchen of the dwelling.
    - A dwelling that is intended for service housing or supported housing of a person with mobility and functional impairment shall, irrespective of the number of storeys in the building, have a turning space with a diameter of at least 1,500 millimetres in the hallway and kitchen.
    - The dimensions of the dwelling shall also in other respects be such that they enable the use of assistive devices and the provision of assistance.
- Section 7 Connections between different levels in a residential building
    - In addition to stairs, a residential building shall also be equipped with a lift if entry to a dwelling in the building is on the third floor or higher, the entrance floor level included.
    - If the entrance to the building is between floor levels, the lower of them is considered the entrance floor level.
    - The cabin of the lift must be at least 1,100 millimetres wide on its door side, and at least 1,400 millimetres deep
    - Exemptions made for a retrofit lift in an existing building where alternate dimensions are required to preserve essential attributes of a building

- Section 9 Toilet and washing facility
    - A residential building three or more storeys shall have
        - At least one toilet and washing facility in each dwelling which has a free space with a diameter of at least 1,300 millimetres.
        - Fixtures and fittings placed with respect to the free space so that a person with mobility impairment can use them.
        - Can be equipped to be suitable for use by a person with mobility impairment.
    - A dwelling that is intended for sheltered housing or supported housing of a person with mobility or functional impairment shall have
        - At least one toilet and washing facility which has a free space with a diameter of at least 1,500 millimetres.
        - Fixtures and fittings placed with respect to the free space so that a person with mobility impairment can use them.
        - On one side of the toilet seat there shall be a free space of at least 800 millimetres.
        - The toilet and washing facility shall be such that it can be equipped to be suitable for use by a person with mobility impairment
    - For a building with dwellings intended for residents by students, or people aged 18-29 at least 5% and no less than one of the dwellings shall have a toilet and washing facility which has
        - At least one toilet and washing facility which has a free space with a diameter of at least 1,500 millimetres.
        - Fixtures and fittings placed with respect to the free space so that a person with mobility impairment can use them.
        - On one side of the toilet seat there shall be a free space of at least 800 millimetres.
        - The toilet and washing facility shall be such that it can be equipped to be suitable for use by a person with mobility impairment

# Finland

1. The National Building Code of Finland: Housing Design, Regulations and Guidelines 2005, Ministry of the Environment, Department of Housing and Building
    - A building must conform with its purpose and be capable of being repaired, maintained and altered, and, in so far as its use requires, also be suitable for people whose capacity to move or function is limited.
    - Regulations and guidelines concern residential buildings as well as sites and building plots for these.
    - Regulations and guidelines also concern apartments and habitable rooms in other buildings as well as other spaces and areas serving these, used for housing

- A habitable room is a room primarily intended to be used constantly for living. For instance, a hall, corridor, bathroom or any such room is not regarded as a habitable room
- Habitable room
    - Minimum net room area of a habitable room should always be 7 m2
    - Space lower than 1600 mm is not included in the net room area.
    - Minimum room height of a habitable room should be 2500 mm.
        - Minimum height in a one-family house is 2400 mm.
        - The room height of a small part in a habitable room may be less than 2500mm, but not below 2200 mm.
    - A habitable room should have a window with an opening of at least 1/10 of the net room area.
        - Placement should be appropriate in respect of light and a pleasant environment.
        - The window in a room or a part of the window should be openable
        - The window in a habitable room should be in direct contact with the open air.
        - Natural light to some of the habitable rooms in an apartment may be arranged through another space defined by a luminous cover or some other light penetrating building element
- Apartment
    - Minimum net floor area 20m2
    - Apartments should have enough space for resting, pastime and leisure activities, eating and cooking, bathing as well as for any necessary maintenance and storage connected with living.
    - There should be appropriate facilities for clothes maintenance and storage of personal property as well as bicycles, prams and outdoor recreational equipment in apartments or for the use of the apartment
    - Require a toilet and basic equipment sufficient for taking care of personal hygiene and for cooking
    - Minimum floor height in a multi-storey block is 3000mm

# Ireland

1. Building Regulations 2022, Technical Guidance Document M, Access for People with Disabilities, Department of the Housing, Local Government and Heritage, Government of Ireland https://www.gov.ie/en/publication/78e67-technical-guidance-document-m-access-and-use/#current-edition
    - Should be read in conjunction with the Building Regulations, 1997, to 2022 and other documents published under these Regulations
    - Application



[UNCLASSIFIED]

    - Construction of new buildings and to extensions and material alterations to buildings.
    - Existing buildings where a material change of use takes place
    - Buildings build after 1992
    - Change of use of existing buildings may not be appropriate in all cases (e.g. historic buildings, physical or site constraints, would interferre with/require movement of a load bearing structure etc.) in which case alternative approaches based o the principles of the guidelines may be acceptable
- **Applies to work, or change of use that commences after the first of January 2024**
    - Non Application
        - Part M does not apply to works connected to alterations or extensions of existing dwellings provided such works do not create a new dwelling.
- To satisfy the requirements all buildings
    - Must be designed and constructed so that people of all abilities can access and use a building, its facilities and environs
    - Elements of the building do not constitute a harm to people, particularly those with vision, hearing or mobility impairments

**Access** (individual dwelling houses and individual apartments. Does not apply to common areas)

- **Guidance for common areas for apartments – Section 1**
- **Guidance for common areas for duplex buildings – Section 3**

- Access route to a dwelling
    - The point of access is the entrance at the boundary of the dwelling plot; or
    - The point at which a visitor to a dwelling would normally alight from a vehicle within the boundary, prior to approaching a dwelling where
        - The distance between the point of access at the boundary and the dwelling entrance is >30m
        - The site gradient is such that the relative finished levels between the boundary access and dwelling entrance do not allow for the provision of an appropriate level gently sloped path or ramp
    - Clear minimum width of 900mm at at least one point of access
        - Access route should maintain a width of at least 900mm
        - Firm, even, slip resistant surface suitable for wheelchairs and mobility aids
    - The approach may, in whole or part, form part of an onsite driveway
        - Minimum width 3600mm wide
    - A raised kern at least 100mm high should be provided on any open side of the approach, where the adjacent ground is not graded to the approach
    - Minimum height of headroom for the approach is 2100mm.
        - Underside of stairs, ramps etc. under 2100mm are enclosed
    - Level gradient of 1:50 or less
    - Where site access does not accommodate level access flattest gradient possible should be used
        - Gradient of 1:20 preferred
        - A gradient steeper than 1:50 but less steep than 1:20 should be used
- Ramped access

- Should be designed to have the minimum gradient possible
- A gradient steeper than 1:20 but no more than 1:12 is considered to be a ramp
- Level landings should be provided between ramp flights or changes of direction
    - Gradient of 1:50 or less
    - Minimum 1200mm long excluding door swing of any gates that may open onto it
    - Where the gradient is between 1:20 and not exceeding 1:15 maximum of 10m length between level landings
    - Where the gradient is between 1:15 and 1:12 maximum of 5m length between level landings

- Stepped access
    - Where it is not practicable to provide, level, gently sloped or ramped access a stepped approach may be used
        - Minimum unobstructed width of 900mm between handrails
        - Maximum rise of a flight between landings is 1800mm
        - Provides top and bottom landings a minimum of 900mm long (excluding any door swing/obstruction)
        - Uniform rise between steps of 100-150mm
        - Uniform going, minimum 280mm
        - Use of tapered steps should be avoided
            - Where tapered steps are used they should be situated at the bottom of the stairs
        - Suitable continuous handrail on both sides of the flights and intermediate landings if the flight comprises 3 or more risers
- Accessible entrance
    - At least one main entrance to a dwelling Is accessible
        - Where the main entrance cannot be accessible, an alternative accessible entry can be provided via a compliant accessible route
    - External steps should be compliant with the guidelines for a stepped approach
    - Clear level area of 1200mm by 1200mm in front of every accessible entrance
    - Maximum threshold 15mm
    - Minimum clear opening width of the entrance door 800mm
    - Where it is not possible to provide a level entrance one or more steps may be used
- Horizontal circulation within a dwelling
    - Corridors passageways and doors to habitable rooms on the entry level or, where there are no habitable rooms on the entry level, the level containing the living room, should be step free
    - Corridors and passageways minimum unobstructed width of 900mm
        - Localised permanent obstructions such as radiators may be permitted provided the
            - minimum unobstructed width in those areas is 800mm
            - Obstruction is not opposite to a door
        - Length of any unobstructed corridor should be a minimum of 1200mm approaching a doorway

- Doors to rooms which can only be accessed by steps or stairs may have a minimum effective clear width of 750mm
- Where a stepped change of level is provided within the storey it should be located so that at least one habitable room and the WC can be accessed from the accessible entrance without having to negotiate steps

- Doorhandles
  - Located 800-1200mm above floor level (preferably 900mm)
- Vertical circulation within a dwelling
  - Where there is no habitable room on the entry level the stairway providing access to the floor with the main living room should
    - Have a minimum unobstructed width of 900mm between handrails
    - Have a maximum 1800mm rise of a flight between landings
    - Provide top, bottom and, if necessary, intermediate landings minimum 900mm long
    - Rise of a step should be uniform and maximum 175mm
    - Going of a step should be uniform minimum 280mm
    - Continuous handrail on each side of the stairs and intermediate landings where a flight comprises three or more risers
- Accessible WC
  - Provided at entry level or, where there is no habitable room on the entry level, on the floor containing the main living room
    - On the entry level
      - Should be accessible from the accessible entry and at least one habitable room
      - Step free
    - Located in a bathroom or separate WC compartment
    - Clear space of 750mm by 1200mm adjacent to the toilet
    - Size, layout and positioning should be such that a wheelchair can be fully contained in the compartment with the door closed
    - Minimum 2100mm headroom
    - Minimum clear area of 1200mm by 750mm from the door to toilet
    - Minimum 400mm clear area to each side of the centreline of the toilet
  - Accessible WC in small dwellings
    - Should only be considered where the area of the storey where the WC is located is less than 45m2
    - Minimum clear door opening width 750mm
    - Outward opening door (or sliding or folding door)
    - Minimum 450mm clear area to each side of the centreline of the toilet
    - Minimum headroom 2100 mm measured from the front of the pan
- Switches and sockets
  - Electric light switches should be level

- Equipment adjacent to the entry intended to assist in gaining entry, e.g. doorbells, entry phones, intercoms, should be located between 900 mm and 1200 mm above floor level.
- Switches and socket outlets for lighting and other equipment in accessible areas should be located between 400 mm and 1200 mm from finished floor level.
  - These requirements do not apply to dedicated socket outlets not readily accessible and used for appliances that are intended to be continuously connected in normal use

2. Government of Ireland, 2022, Design Manual for Quality Housing, Department of Housing, Local Government and Heritage https://www.gov.ie/en/publication/b3e02-design-manual-for-quality-housing/
   - Provides guidance on the design of Social Housing developments in respect of site layouts and the internal layouts of individual dwellings, principally to local authorities and Approved Housing Bodies (AHBs), and their consultants
     - All habitable rooms should be provided with a window the glazed area of which should generally exceed 10% of the floor area of the room
3. Government of Ireland, 2007, Quality Housing for Sustainable Communities, Department of Housing, Local Government and Heritage https://www.gov.ie/en/publication/60868-quality-housing-for-sustainable-communities/
   - Bedroom area
     - Single bedroom should be at least 7.1m2
     - Double bedroom at least 11.4m2
     - Main bedroom should be at least 13m2 in a dwelling designed to accommodate three or more persons
   - The recommended minimum unobstructed living room widths are
     - 3.3 metres for one bedroom
     - 3.6 metres for two bedroom
     - 3.8 metres for three bedroom dwellings
   - The minimum room widths for bedrooms are
     - 2.8 metres for double bedrooms and
     - 2.1 metres for single bedrooms

| **Space Provisions and Room Sizes Typical Family Dwellings** | | | | | |
|---|---|---|---|---|---|
| **Dwelling Type** | **Target Gross Floor Area m2** | **Min. Main Living Room m2** | **Aggregate Living Area m2** | **Aggregate Bedroom Area m2** | **Storage m2** |
| 4 bed 7 persons 3 storey | 120 | 15 | 40 | 43 | 6 |
| 4 bed 7 persons 2 storey | 110 | 15 | 40 | 43 | 6 |
| 4 bed 7 persons 1 storey | 100 | 15 | 40 | 43 | 6 |
| 4 bed 7 persons apartment | 105 | 15 | 40 | 43 | 11 |

| | | | | | |
|---|---|---|---|---|---|
| 3 bed 6 persons 3 storey | 110 | 15 | 37 | 36 | 6 |
| 3 bed 6 persons 2 storey | 100 | 15 | 37 | 36 | 6 |
| 3 bed 6 persons 1 storey | 90 | 15 | 37 | 36 | 6 |
| 3 bed 6 persons apt | 94 | 15 | 37 | 36 | 10 |
| 3 bed 5 person house 3 storey | 102 | 13 | 34 | 32 | 5 |
| 3 bed 5 person house 2 storey | 92 | 13 | 34 | 32 | 5 |
| 3 bed 5 person house 1 storey | 82 | 13 | 34 | 32 | 5 |
| 3 bed 5 person apt | 86 | 13 | 34 | 32 | 9 |
| 3 bed 4 person house 2 storey | 83 | 13 | 30 | 28 | 4 |
| 3 bed 4 person house 1 storey | 73 | 13 | 30 | 28 | 4 |
| 3 bed 4 person apt | 76 | 13 | 30 | 28 | 7 |
| 2 bed 4 person house 2 storey | 80 | 13 | 30 | 25 | 4 |
| 2 bed 4 person house 1 storey | 70 | 13 | 30 | 25 | 4 |
| 2 bed 4 person apt | 73 | 13 | 30 | 25 | 7 |
| 2 bed 3 person house 2 storey | 70 | 13 | 28 | 20 | 3 |
| 2 bed 3 person house 1 storey | 60 | 13 | 28 | 20 | 3 |
| 2 bed 3 person apt | 63 | 13 | 28 | 20 | 5 |
| 1 bed 2 person house 1 storey | 44 | 11 | 23 | 11 | 2 |
| 1 bed 2 person apt | 45 | 11 | 23 | 11 | 3 |

4. Government of Ireland, 2018, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities, Department of Housing, Planning and Local Government

**Apartment Floor area**

- Applies to all housing developments that include apartments that may be made available for sale, whether for owner occupation or for individual lease. They also apply to housing developments that include apartments that are built specifically for rental purposes, whether as ‘build to rent’ or as ‘shared accommodation’.
    - Unless stated otherwise, they apply to both private and public schemes

    - Generally does not apply to sheltered housing or student housing
- Provide a “target standard” where existing buildings are wholly or partially refurbished for residential use
- Expert architectural and planning research commissioned by the Government in 2007 indicated a general need to increase the minimum floor areas for apartment development from those specified prior to then, particularly with a view to meeting the space and amenity needs of families living in apartments.
    - This increase was achieved in 2007.
- Studio type apartments (i.e. a small unit with a combined living/sleeping area, generally provided for a single person) were introduced in the 2015 apartment guidelines update, but in very limited, specific circumstances, i.e. as part of new ‘build-to-let’ managed accommodation above a scale threshold of 50 or more units and subject to dwelling mix restrictions.
    - Potential to contribute to meeting housing need
    - Potential to enhance the viability of apartment schemes.
- The minimum size of studio apartments has been adjusted slightly to enable modular developments and a ‘mix and match’ approach between studios and the minimum size of two-bedroom apartments
    - Minimum apartment Floor areas
        - Studio apt (1 person) 37m2
        - 1 bed (2 persons) 45m2
        - 2 bed (4 persons) 73m2
        - 3 bed (5 persons) 90m2
- In relation to social housing, or purpose built housing for older people it is considered necessary that these guidelines would also make provision for a two-bedroom apartment to accommodate 3 persons. This is in line with the Quality Housing for Sustainable Communities guidance published by the Department in 2007, for application to social housing schemes
    - Option for planning authorities to consider 2 bedroom apts for 3 persons min 63m2
    - “While providing necessary variation in dwelling size, it would not be desirable that, if more generally permissible, this type of two-bedroom unit would displace the current two-bedroom four person apartment. Therefore no more than 10% of the total number of units in any private residential development may comprise this category of two-bedroom three-person apartment” (12).
    - The majority of all apartments in any proposed scheme of 10 or more apartments shall exceed the minimum floor area standard for any combination of the relevant 1, 2 or 3 bedroom unit types, by a minimum of 10% (any studio apartments must be included in the total, but are not calculable as units that exceed the minimum by at least 10%)
        - Build to rent apts excluded from this requirement due to provisions for communal facilities
- Space standards
    - Floor to ceiling height

- Min 2.4m
- Ground floor apartments must have a minimum floor to ceiling height of 2.7m
- 3m recommended for ground floor units
- Recommend 2.7m for other units where this would not necessitate a reduction in the number of floors

o Max 12 apartments per floor

| **Minimum Aggregate floor areas for living/dining/kitchen and minimum widths for main living/dining** | | |
|---|---|---|
| Apartment type | Width living/dining | Aggregate floor area living/dining/kitchen |
| Studio | 4m | 30m2 |
| One bedroom | 3.3m | 23m2 |
| Two bedroom 3 persons | 3.6m | 28m2 |
| Two bedroom 4 persons | 3.6m | 30m2 |
| Three bedrooms | 3.8 | 34m2 |

Notes: A separate kitchen should have a minimum floor area of 6.5m2; Variation of up to 5% can be applied to room areas and widths subject to overall compliance with required minimum overall apartment floor areas

| **Minimum Bedroom Widths and Floor Areas** | | |
|---|---|---|
| Type | Width | Floor area |
| Studio | 4m (comb. Living/dining/bedspace) | 30m2 (comb. Living/dining/bedspace) |
| Single bedroom | 2.1m | 7.1m2 |
| Double bedroom | 2.8m | 11.4m |
| Twin bedroom | 2.8m | 13m2 |

| **Minimum Aggregate Bedroom Floor Area** | |
|---|---|
| Type | Minimum floor area |
| One bedroom | 11.4m2 |
| Two bedroom 3 persons | 13 + 7.1m2 = 20.1m2 |
| Two bedroom 4 persons | 11.4 + 13m2 = 24.4m2 |
| Three bedrooms | 11.4 + 13 + 7.1m2 = 31.5m2 |

| **Minimum Storage and Amenity Space Requirements** | | |
|---|---|---|
| Type | Storage | Amenity |
| Studio | 3m2 | 4m2 |
| One bedroom | 3m2 | 5m2 |
| Two bed 3 persons | 5m2 | 6m2 |
| Two bed 4 persons | 6m2 | 7m2 |

| | | |
|---|---|---|
| Three bed | 9m2 | 9m2 |

5. Government of Ireland, 2022, National Housing Strategy for Disabled People 2022-2027, Department of Housing, Local Government and Heritage; Department of Health; Department of Children, Equality, Disability, Integration and Youth https://www.gov.ie/en/publication/60d76-national-housing-strategy-for-disabled-people-2022-2027/
   - The National Housing Strategy for Disabled People 2022 – 2027 (NHSDP) sets out the vision for the cooperation and collaboration of Government departments, state agencies and others in delivering housing and the related supports for disabled people over the next five years
   - For 2022, local authorities have set their targets in Local Strategic Plans including such targets as:
     - 15% of all allocations of dwellings by a local authority being allocated to disabled people and appropriate health and social care being put in place to allow people to take up their housing opportunities.
     - 10% of new dwellings in all general social housing6 developments of 10 dwellings or more being reserved for households qualified under a basis of need of disability.
     - 50% of the new pipeline delivery being reserved for disabled people in each LA being wheelchair liveable i.e. meeting the Centre for Excellence in Universal Design's UD Home recommendations.

# Norway

1. Norwegian Building Authority, 2017, The Norwegian Regulations on Technical Requirements for Building Works. Available: https://dibk.no/globalassets/byggeregler/regulation-on-technical-requirements-for-construction-works--technical-regulations.pdf

   Construction works for the general public and work buildings shall be universally designed pursuant to the provisions in the Regulation, unless the construction work or parts of the construction work is, given its function, unsuitable for people with disabilities

   - Performance standards stipulated in the regulation are mandatory
   - Includes all new housing units used for residential purposes, some conversions and change of use works (as well as public works)
   - Dwelling units in a building that is required to have a lift shall have all the primary functions on the entrance level of the dwelling unit. The entrance level shall be accessible to people with disabilities
   - In a building subject that is required to have a lift, at least 50% of the dwelling units with a gross internal area of up to 50m² meet the requirement relating to accessible dwelling units and the requirement relating to the design of bathrooms and toilets.

    - When applying for permit to build several buildings, the exemption applies to all the buildings together.
- Dwelling units in a building that does not require a lift and that have all the primary functions on the entrance level of the building, shall be accessible at the entrance level unless the pedestrian access meets the conditions for exemption
    - Requirements for lifts
        - Buildings with three storeys or more containing dwelling units shall have lifts.
        - Buildings with three storeys containing dwelling units may have a lifting platform instead of a lift. The lifting platform shall serve a maximum of six dwelling units
            - At least one lift car shall have minimum interior dimensions of 1.1m x 2.1m
            - Lifting platforms shall have minimum interior dimensions of 1.1m x 1.4m
        - Exceptions
            - small houses containing a single dwelling unit
            - where access from the entrance to the dwelling unit is not more than one storey
    - Pedestrian access ways to buildings containing dwelling units shall
        - be step-free;
        - have a gradient that is not steeper than 1:15, except for sections up to 5m long, which may have a gradient that is not steeper than 1:12;
        - have a resting platform with a minimum length of 1.5 m for every 1.0 m difference in height.
            - Exemption: buildings containing dwelling units that are not required to have a lift if the terrain is too steep to allow compliance with the gradient requirements.
        - Pedestrian access ways to buildings subject to accessible dwelling unit requirements shall have a minimum clearance width of 1.6m.
        - A minimum clearance width of 1.4m is permitted for sections up to 5m long.
        - Pedestrian access ways to buildings containing dwelling units that are required to have a lift shall also:
            - a minimum clearance width of 1.8m, except for sections up to 5m long, which may have a minimum clearance width of 1.4m;
            - have a maximum cross fall of 1:50;
            - have a solid, non-slip surface;
            - have visual and tactile demarcation; and
            - have the necessary lighting.
    - Outside amenity areas subject to universal design requirements shall:
        - be step-free;

- have a maximum gradient of 1:15, except for sections up to 5m long, which may have a maximum gradient of 1:12;
- have a resting platform with minimum dimensions of 1.6m x 1.6m for every 1m difference in height;
- have a minimum clearance width of 1.8m, except for sections up to 5m long, which may have a minimum clearance width of 1.4m;
- have maximum cross fall of 1:50;
- have a solid, non-slip surface;
- have visual and tactile demarcation.
- If there are several outside amenity areas with the same function, it is sufficient for at least one of these to have pedestrian access that complies with the requirements in the first paragraph
- Other pedestrian access ways shall have a maximum gradient of 1:10.
- If the terrain is too steep to comply with the gradient requirements a maximum gradient of 1:10 is permitted.

o Parking
  - Provide a sufficient number of standing spaces for wheelchairs, prams and similar as is suitable for the size and function of the construction work and the outside area.
  - Buildings subject to accessible dwelling unit requirements and construction works subject to universal design requirements, for which no requirements for parking are stipulated in, or pursuant to, the Planning and Building Act, shall have satisfactory vehicular access ways

o Developed outside areas
  - Steps in outside areas must be easy and safe to navigate.
  - Steps in outside area subject to universal design requirements shall also have:
    - an even gradient, and each riser shall have the same height;
    - handrails on both sides that follow the entire flight of stairs and are terminated with rounded off edges after the first and last step;
    - tactile and visual warning areas before the uppermost step;
    - an awareness area before and into the lowest step; and
    - a visually marked contrast area on the front edge of the other treads

o Entrances
  - shall be clearly visible, centrally located and easily understood in relation to access
  - shall be safe and easy to use.
  - lighting installed in entrances shall ensure the entrance and main entrance doors are visible in relation to surrounding surfaces

        - there must be a visual and tactile awareness area in front of main entrance doors
        - Entrances shall be step-free
        - there shall be a horizontal area with minimum dimensions of 1.5m x 1.5m outside main entrance doors
        - if the door is side-hinged, the area shall lie outside the swing radius of the door
        - automatic door opener
        - buttons shall be located in a position accessible to people in wheelchairs and such that impact with doors are avoided.
    - Communication routes to accessible dwelling units shall
        - be safe and usable for the expected traffic and transport
        - be easy to find and orient oneself in
        - level differences shall be clearly marked and have the necessary lighting
        - openings in floors shall be secured to ensure that people and domestic animals are not exposed to risks.
        - be step-free
        - Corridors and porticoes shall have a minimum clearance width of 1.5m. Long corridors shall have adequate space that allows two wheelchairs to pass each other.
            - Sections shorter than 5m, which have no doors, may have a minimum clearance width of 1.2m
    - Ceiling heights in dwelling units
        - Rooms for continuous occupancy shall have a minimum height of 2.4m
        - Rooms not intended for continuous occupancy shall have a minimum height of 2.2m
        - Leisure homes containing a single dwelling unit shall have a minimum height of 2.2m
        - Parts of a room may have a lower ceiling height where this does not affect the room's intended function.
        - In connection with change of use in a dwelling unit from an additional part to the main part or vice versa, ceiling height may be lower than 2.4m
    - Accessible dwelling units shall be dimensioned for wheelchairs on the entrance level
        - Rooms shall have step-free access and turning space for wheelchairs
        - Rooms shall be designed to ensure that people in wheelchairs can operate necessary functions in a satisfactory manner

        - Rooms for continuous occupancy shall have access ways with a clearance width of 0.9m to doors and windows outside furnished zones
    - Entrance halls or entrances to accessible dwelling units shall have
        - an access way with a clearance width of 0.9m outside the furnished zone;
        - space for a wheelchair turning area beyond the door's swing radius
    - Bathrooms and toilets
        - Dwelling units shall have at least one bathroom and toilet that comply with the following:
            - The size and layout must be such that there is unobstructed floor space for a wheelchair turning area in front of the toilet, a minimum of 0.9m unobstructed floor space on one side of the toilet and a minimum of 0.2m on the other side
            - There shall be an access way with a minimum clearance width of 0.9 m to the unobstructed space at the side of the toilet.
            - It shall be possible to install a step-free shower zone.
            - There shall be an access way with a minimum clearance width of 0.9m to the shower zone.
            - Walls in the shower and toilet zone shall enable the subsequent mounting of the necessary equipment.
            - Shower zones shall be step-free and minimum 1.6m x 1.3m.
            - The heights of showerheads shall be adjustable, and shower zones shall enable the mounting of the necessary equipment
    - Storage rooms and spaces
        - Dwelling units shall have adequate, suitable space for storing clothing and food.
        - Dwelling units shall have a storage space or a storage room of a minimum of 5m2 of gross internal area for bicycles, sports equipment, prams and similar.
        - Dwelling units with a gross internal area of up to 50m2 shall have storage space of at least 2.5m2 of gross internal area.
        - Dwelling units subject to accessibility requirements shall have step-free access to the storage space or storage room.
            - The required storage space or storage room shall be accessible when using a wheelchair
    - Balconies, Terraces etc.
        - Access ways to balconies, terraces, outside spaces and similar shall be step-free on the entrance level of dwelling units.
        - Level differences greater than 0.5m shall be secured with balustrades
        - Balconies, terraces and similar shall have unobstructed floor space for a wheelchair turning area.

- Waste systems
    - Facilities provided for separation of waste according to source
    - Common waste systems for residential buildings subject to accessible dwelling unit requirements shall be easily accessible, have stepfree access and have a maximum disposal height of 1.2m
- Doors, gates and similar elements
    - Easy to see and use and designed in a way that prevents harm to people, domestic animals or equipment.
    - Their width and height shall be designed for the expected traffic and transport, including escape in case of fire and shall, as a minimum, comply with the following:
        - Entrance doors and doors in communication routes shall have a minimum clearance width of 0.86m.
        - Internal doors in dwelling units shall have a minimum clearance width of 0.76m.
        - Doors to bathrooms in overnight rooms that are exempt from universal design requirements shall have a minimum clearance width of 0.76m.
        - Doors shall have a minimum clear height of 2m.
    - The maximum opening force required to open doors to, and in, access and escape routes that are designed to be opened manually shall be 30 N.
    - Automatic door opener buttons shall be installed outside the swing radius of the door.
    - Buttons shall be clearly visible and located at an operating height of between 0.8m and 1.2m above the floor.
    - Door opener buttons shall be sited at a sufficient distance from inside corners.
    - Doorsills shall be step-free.
    - Sliding doors and side-hinged doors shall have enough side clearance to allow people in wheelchairs to open and close the door (excluding doors with an automatic door opener).
- Stairs
    - Must be easy and safe to use.
    - Safe edges and handrails on both sides.
    - The upper edge of at least one handrail shall be between 0.8m and 0.9m above the floor or steps.
    - Flights of stairs shall have a regular gradient, and the risers shall be the same height for the entire length of the flight of stairs.
    - Treads in the walking line shall be a minimum of 0.25m. Treads in straight flights of stairs shall have the same tread depth.
    - Landings shall be large enough to prevent and halt falls.

- Height differences of more than 3.3m require a landing.
- Stairwells shall be well lit so that the steps are visible.
- Treads shall have a non-slip surface.
- Straight flight of stairs shall have a minimum clearance width of 0.9m and minimum clearance height of 2.1m.
    - Straight, internal flights of stairs in dwelling units shall have a minimum clearance width of 0.80 m and minimum clearance height of 2m.
- Flights of stairs that are not straight shall have a minimum clearance width of 1m
- Main flights of stairs that serve more than one dwelling unit:
    - Straight flights of stairs shall have a minimum clearance width of 1.1m and a minimum clearance height of 2.1m.
    - Handrails shall:
        - ❖ be at the same height, with an upper edge height of 0.8 m, or at two heights, with upper edge heights of 0.9m and 0.7m respectively, measured from the tread's front edge;
        - ❖ continue beyond the top and bottom steps and have rounded ends;
        - ❖ follow flights of stairs continuously, including around mid-level landings.
        - ❖ Treads shall be marked such that a minimum luminance contrast of 0.8 is attained in relation to the colour of the steps.
        - ❖ The marking on treads shall span the entire width of the step and be a maximum of 0.04m deep.
        - ❖ The depth of landings from the front edge of a step or from the bannister to the opposite wall shall be a minimum of 1.5m.
- Treads in curved flights of stairs shall have a minimum width of 0.15 m along the inside walking line.
    - In curved flights of stairs in escape routes for large numbers of people, the minimum tread width along the inside walking line shall be 0.20m.

o Balustrades

- Shall prevent falls and collisions
- Be designed to prevent climbing.
- Balustrades in flights of stairs and ramps shall have a minimum height of 0.9m above the floor or steps (incl. balustrades and bannisters on landings and mid-level landings).

- Balustrades in or on balconies, terraces, passageways and similar shall have a minimum height of:
    - 1.2m where the height difference between levels is more than 10.0m; or
    - 1.0m where the height difference between levels is up to 10m.
- If the difference in height to the terrain or underlying level is less than 3m, other acceptable safety devices can be used.
- Openings in balustrades shall be a maximum of 0.10m up to a minimum height of 0.75m.
- In balustrades over 1m, openings in the balustrades shall be maximum 0.10m up to a height of at least 0.25m below the top of the balustrade.
- The maximum horizontal distance between a building component and the balustrades affixed to its outer surface shall be 0.05m.

o Ramps
- Minimum width 0.9m
- Even, non-slip surface
- Maximum gradient of 1:15.
    - A maximum gradient of 1:12 is permitted for sections of up to 3m.
    - For each 1m of difference in elevation, there must be a horizontal resting level with a length of a minimum of 1.5m
- Handrails
    - on both sides at one height, with the upper edge 0.8m above the surface;
    - or at two heights, with the respective upper edges 0.9m and 0.7m above the surface.
    - Handrails shall visually contrast with the walls and balustrades.
    - Handrails shall be designed to provide a good grip

o Windows/glazed areas
- Glazed areas facing balconies, terraces and similar shall be protected (parapet, safety glass etc).
- Windows and other glazed areas in exterior walls more than 6.6 m above the terrain or an underlying surface shall be secured
- Glazed areas in entrances and communication routes shall be protected in the direction of traffic
- Glazed areas in entrances and communication routes where there may be a risk of collision shall be contrast-marked with glass markings that are visible on both sides and at two levels, with their centres at 0.9m and 1.5m above the floor

o Signage, controls and operating panels, handles and fitting

- Information shall be easy to read and understand. There shall be a visible contrast between text and its background, with a minimum luminance contrast of 0.8.
- Important information shall be accessible via text and sound/tactile signs.
- Operating panels shall be located at an operating height of between 0.8m and 1.m above the completed floor.
- Handles shall be placed at an operating height of between 0.8m and 1.2m, be designed with a functional grip and require an operating force that makes them easy to use.
- At least one window must be able to be operated using one hand. The handle shall require little operating force and be located where it can be reached from a sitting position.
- A sufficient number of power sockets shall be installed that can be operated by people with disabilities

2. Government of Norway, 1999, T-5/99E Accessibility for All, Ministry of Local Government and Regional Development. Available https://www.regjeringen.no/en/dokumenter/T-599E-Accessibility-for-all/id108439/ NS 3940: 2012 Calculation of areas and volumes of buildings -Not available in English