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Getting Universal Design into New Builds and Major Renovations

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GETTING UNIVERSAL DESIGN INTO NEW BUILDS AND MAJOR RENOVATIONS

31 July 2016

Delivering Affordable Accessible Housing for Better Cities and Communities: Research Report

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1. INTRODUCTION

This report provides an integrated analysis of data arising from a BRANZ Levy funded research project into universal design housing. The three data sets are: thirty-three interviews with householders who were living in dwellings designed for LifeMark accreditation; survey data from sixteen builders who report having built dwellings they consider as accessible; and survey data from one hundred and eighty-six householders living in new or substantially renovated homes.

Those datasets came out of a research programme with the objective to improve the readiness of the building industry to deliver affordable and cost-effective accessibility in higher as well as lower densities by:

- Identifying the expected price structure of compliance in different build value quartiles;
- Supporting the building industry's delivery of affordable and cost-effective homes by demonstrating the benefits to householders, housing investors and the real estate industry;
- Identifying areas of regulation and product innovation that would reduce the costs of delivering universal design housing.

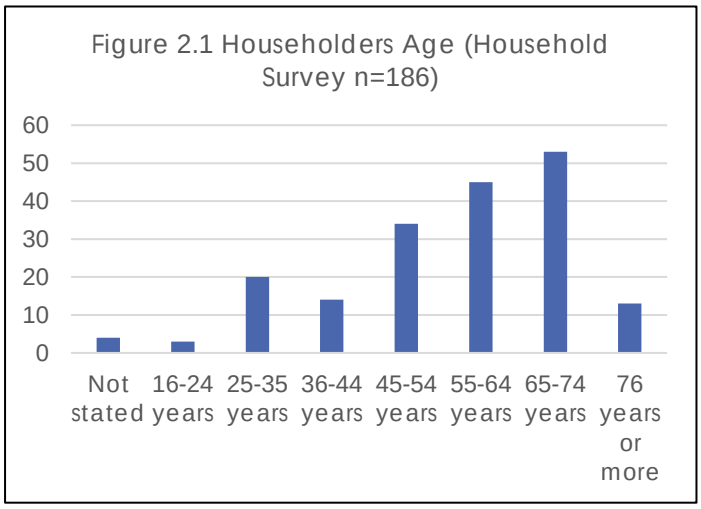
It was planned that further work would be undertaken in the form of case studies with housing providers to establish whether there are variations in the benefits, costs and difficulties associated with delivering universal design dwellings according to different tenures and neighbourhood densities and the alignment between universal design build costs, build times and market values. In particular, the research sought to identify the most challenging and most easily achieved components of accessibility at different densities. Taking a nuanced approach to accessible design in this way has proved impossible, primarily because of the low levels of awareness, responsivity and delivery of universal design in the industry. Issues of tenure and neighbourhood density as well as cost analysis are simply drowned by those larger issues. Nevertheless, it is clear that one of the most basic elements of accessibility – the level entry – is seen by the industry as the most difficult. For that reason, this research is being reviewed and possibly re-oriented to addressing that particular issue.

This report provides an analysis of the data collected and comments on the implications of that data for getting take-up of universal design in the building industry. It is structured as follows:

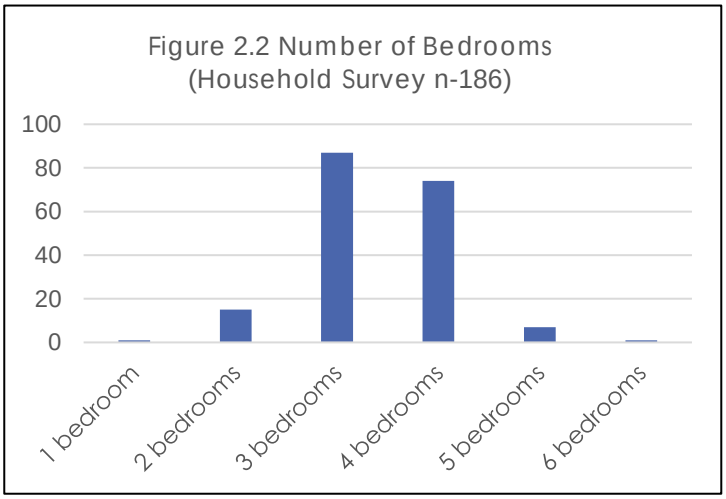
- Section 2 focuses on the experiences of householders, their dwellings, awareness of universal design and their relationship with the building industry.
- Section 3 focuses on the very few builders who responded to surveying about their delivery of universal design dwellings, the features that they associated with universal design and what features they identified as most problematic to deliver.
- Section 4 comments on the prospects around the broader adoption of universal design. It comments on the continued problems with skill within the industry and the continued failure of consumer sovereignty as a model for leveraging desired outcomes from the industry. It takes a realist approach to leveraging some change to support current activities and programmes seeking to promote universal design.

2. HOUSEHOLDERS AND ACCESSIBLE HOUSING

This section focuses on householders and draws on two datasets. The discussion starts with an analysis of the 186 householders who have had consents for new builds and major renovations. Most of these householders (78 percent) were aged 45 years or older. More than a third (36 percent), were aged 65 years or more (Figure 2.1). The skew to older ages is consistent with the national structural shift in home ownership which has seen substantial falls in the proportions of younger age groups in home ownership.

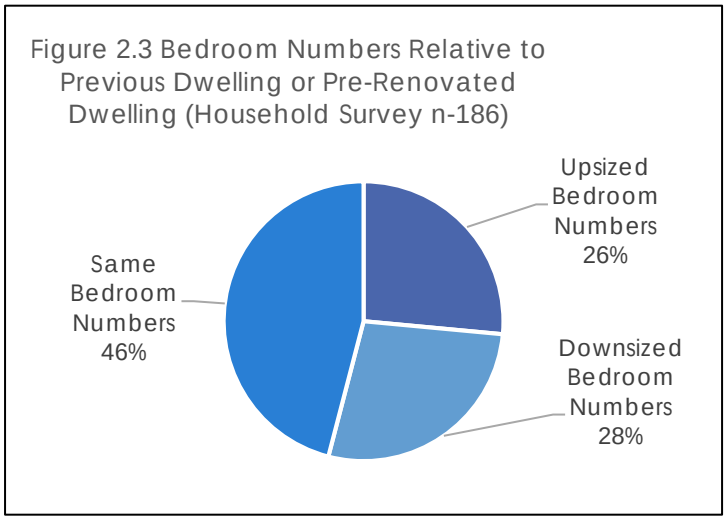


It is consistent also with New Zealand's high labour force participation rates among older people. It is notable that while all those respondents aged 76 years or more reported that they had retired from paid work, 29 percent of householders aged 65-75 years reported participation in paid work. 48 percent of dwellings were owned without a mortgage and 46 percent were owned with a mortgage. A small number of dwellings owned were owned by a family trust and one as a license to occupy. Among those of retirement age, almost 11 percent were either paying mortgages, rents or monthly fees associated with a license to occupy.



The households are relatively small with 80 percent with one or two adults and less than a quarter of households with children under the age of eighteen years. About two thirds (63 percent) of households have a total of one or two people permanently resident, although 44 percent of dwellings consisted of four bedrooms or more (Figure 2.2).

Most householders report that the number of bedrooms in their current dwelling is similar to the number of bedrooms in their previous dwellings or their current dwelling prior to renovation. There was, however, a slight



tendency towards up-sizing rather than downsizing in relation to bedroom numbers (Figure 2.3). This does not mean, of course, that the footprint or floor size of dwellings were larger or smaller. Forty-nine householders reported that their current dwelling had more bedrooms than their previous or pre-renovated dwelling while fifty-one householders reported fewer bedrooms.

Most householders reported a range of benefits associated with their new or renovated dwelling compared to their previous dwelling or unrenovated dwelling. But in some cases, the differences were not pronounced. The exception was around heating in winter. The twelve householders who reported that their previous or pre-renovated dwelling rarely or never kept them warm in winter reported that their current dwelling kept them warm in winter always or most of the time. Notably, however, eleven householders reported a reduced ability to heat. Overall, 66 percent of householders reported their home was easier to heat. The majority, nevertheless, reported their homes were warmer in winter.

Overall, 74 percent of householders reported that their homes were more comfortable. The prevalence of other benefits was not as pronounced. Less than half (48 percent) of householders reported their houses as less costly to run. Sixty percent of householders reported their homes as easier to get around and only 54 percent reported that housework was easier. The relatively muted impact on ease of movement and the large percent who reported no benefit in relation to housework must be of concern. Almost a third of householders (30 percent) reported that there was someone living in their household or regularly visiting their home who had compromised mobility. Among them, a variety of assistive mobility devices were used (Figure 2.4).

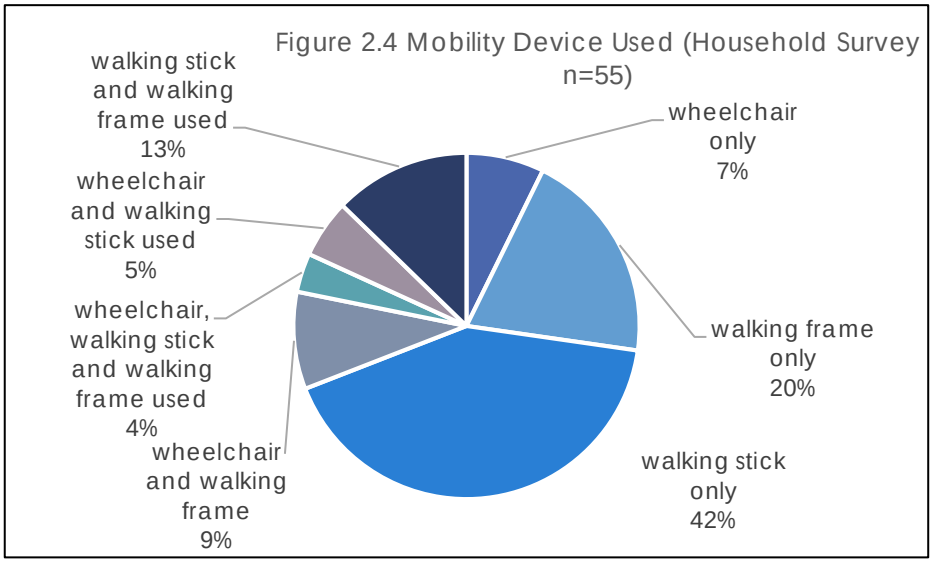
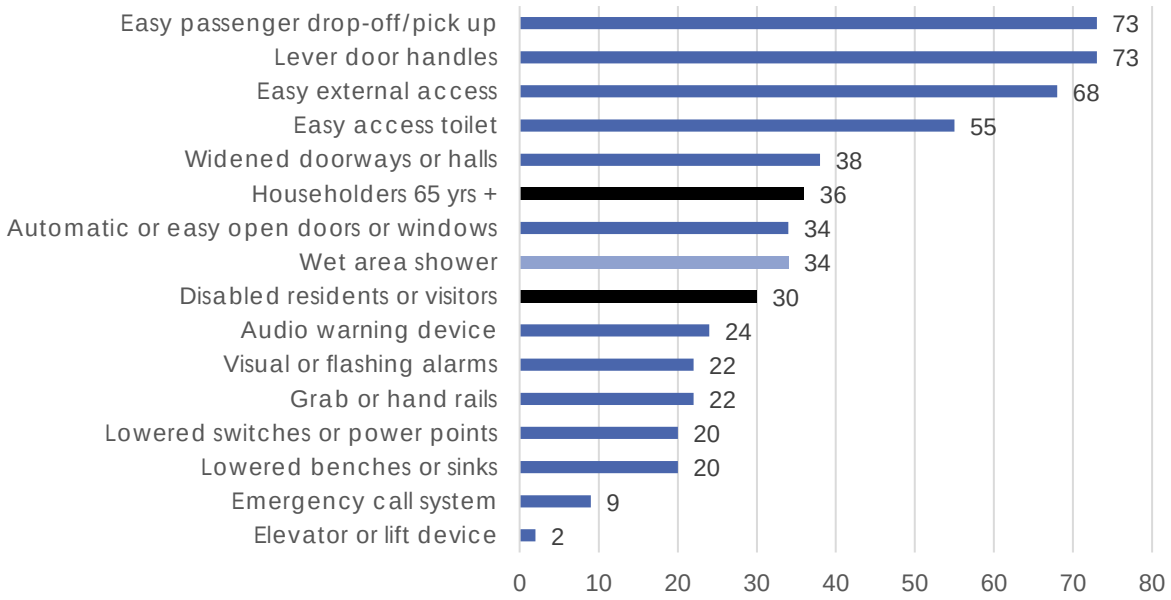


Figure 2.5 shows that opportunities for future-proofing for older age or reduced mobility in the future have largely been missed. Figure 2.5 suggests that:

- The provision of functional design features is barely comparable to the proportions of dwellings serving older or people with compromised mobility.
- The gap between provision of functional accessibility features and the proportions of people likely to need those features is even greater even if using a crude indicator of age. This suggests that some of these homes will require modification in the short rather than the medium terms if resident functionality is to be maintained.

Figure 2.5 % Dwellings with Older People, Disabled People and Reported Accessibility Features



Those amenities that tend to be incorporated into these new dwellings tend to be products that have become common in the market such as lever door handles. What is less common is design and build features such as accessible windows and wet area showers. It should also be noted that items such as easy to get at toilets may not mean accessible toilets. Householders tend to focus on ensuites rather than the configuration of bathrooms and toilets themselves.

The range of amenities reported by householders raise some issues around the safety and functionality of some of these dwellings for people with compromised mobility:

- 64 percent of dwellings with residents or regular visitors with compromised mobility ***do not*** have grab rails.
- 49 percent of dwellings with residents or regular visitors with compromised mobility ***do not*** have widened doors or hallways.
- 55 percent of dwellings with residents or regular visitors with compromised mobility ***do not*** have easy opening doors or windows.
- 93 percent of dwellings with residents or regular visitors with compromised mobility ***do not*** have lowered benches or sinks.
- 44 percent of dwellings with residents or regular visitors with compromised mobility ***do not*** have wet area showers.

- 24 percent of dwellings with residents or regular visitors with compromised mobility ***do not*** have an easy to get at toilet.

Many of those functional amenities reported against are standard in LifeMark homes and would be expected in any home claiming to be universal design. The exposure of people to homes which are not functional to a significant proportion of people is associated with:

- isolation and disconnection because of low dwelling visit-ability;
- higher dependency among residents with compromised mobility; and
- increased care and home modification costs both for private individuals and for the tax payer.[1]

Notably, only a tiny number, 7 householders, reported hearing about universal design (4 percent). Four householders reported asking for what they considered to be universal design features in their home. Those were reported by the householders as follows:

- An accessible bathroom for a wheelchair bound daughter;
- Walk-in pantry;
- Eye-level oven;
- Computer nook;
- Wide doorways;
- Wide hallways;
- Full open plan except for bathroom;
- Grab rails in shower;
- Grab rails beside toilet;
- Single level;
- Large master bedroom;
- Large bathroom.

Notably 13 householders recognised the word LifeMark and three of those reported that they asked for a LifeMark accredited design. The response to a short statement on the nature of that accreditation system was positive by the majority (58 percent) of householders with 41 percent reporting that they had no views on whether it was a good or bad idea. A number of householders commented on their own knowledge or lack of knowledge around universal design as well as their response to LifeMark as an idea:

If we had been aware of LifeMark we probably would have designed our home differently.

Know nothing about LifeMark design homes – could be interested

Made enquiry about LifeMark accredited but did not follow-up.

Our home was specifically built to include a self-contained area for my 90+ mother. The concept seems to work very well and we would do it again.

[1] For a review of relevant research and discussion of those outcomes, see Saville-Smith & James 2012.

We gave no thought at all to design features associated with disability (in our case old age) we were just thankful to have a new rebuild… However, EQC and the insurance companies … when they had the opportunity to rebuild the house [did not] make us aware of such things.

Might prefer LifeMark but would have to see one.

We were lucky to have a builder friend who advised us on door handles taps etc so we have found that very helpful.

We did design the house for retirement and it can be adapted without much change for disability.

Householders were asked to comment on their preferences around particular aspects of functional dwellings: 68 percent stated a preference for level entry with 14 percent stating a preference for a step; and, 77 percent stated a preference for open plan with few or no corridors or hallways. Table 2.1 sets out preferences around a number of other key accessibility and functionality features.

Table 2.1 Reported Preferences for Accessibility and Functionality (Household Survey n=186)

Amenity	% Very important	% Fairly important	% Not very important	% Not at all important	% No preference
A car parking space close to the entrance of your home (n=182)	58	36	4	0	2
An extra wide space in which to park your car (n=180)	41	43	8	3	4
A covered entrance with outside light (n=181)	60	32	6	2	1
A removable wall panel to make the bathroom ensuite (n=171)	15	17	32	17	19
Low level, easy to open windows (n=181)	19	41	25	7	8
Easy to reach sockets and switches (n=177)	25	53	14	3	5
Provision for house lift (n=177)	3	6	21	49	22
Taps that are easy to reach and lever rather than twist to turn on (n=181)	27	44	17	6	7
Strong walls in bathrooms and toilets to fix grab rails (n=183)	26	40	21	8	6
Ground floor toilet (n=181)	58	28	5	5	5
Living room at entrance level (n=182)	50	32	8	4	7

Around 63 percent of householders reported that they had no preference regarding an accredited accessible home such as LifeMark home, while over a third (37 percent) did have such a preference. Householders were asked to comment on this on the basis of price

equivalence. Most (48 percent) of householders believe that a universally designed home such as that accredited by LifeMark would cost more than a similarly sized house, although 5 percent reported that they believed it should cost less.

In householders' general comments around accessibility and their homes a number of issues emerged. Some of these relate to aspects of functionality which householders wished to raise. Others related to the building industry, insurance or consenting processes. Here we simply present some of the amenities and design features that householders raised without prompting, in particular the importance of:

- Easy access light fittings and bulbs.
- Grab rails which are elegant not 'institutional' looking.
- Easy to reach storage, cupboards and shelves.
- Accessible clothes lines.

The importance of warmth and cost-effective heating were also themes commonly repeated by householders participating in the survey.

The householders involved in the survey were householders whose dwellings were consented as new builds or as major renovations. In addition to those householders, in-depth interviews were undertaken with a set of householders who had acquired a LifeMark accredited dwelling. Of the 33 dwellings surveyed only nine were developed by way of the private market. Twenty-two dwellings were developed by community housing providers. The development history of the remaining two dwellings is not known. The development trajectory is reflected in the tenure with over half the dwellings rented. The remainder are in ownership. The latter include dwellings that have been commissioned by community housing providers delivering shared ownership products. There is a higher proportion of one and two-bedroom dwellings than in the national housing stock. Eighteen of the dwellings are small dwellings, seven are three-bedroom, three are four-bedroom dwellings and the remaining five dwellings have five bedrooms.

Only four of the residents in these 33 LifeMark homes had had alterations to their previous home. Those alterations are set out below (Table 2.2). Three reported getting financial assistance. All three received ACC assistance. It is notable that the most common alterations in previous homes are all standard features of LifeMark homes.

Table 2.2 Households in Accredited LifeMark Homes – Alterations to Previous Home

Alteration	Dwellings
Grab or hand rails	2
Elevator or lift device	1
Widened doorways or hallways	2
Visual or flashing alarms	1
Automatic or easy-to-open doors or windows	4
Lowered benches or sinks	2
Lowered switches or power points	2
Wet area shower	3
Easy-to-get at toilet	4
Lever door handles	4
Emergency call system	1
Easy-to-get-at driveways, ramps or street level entrances	4
Easy-to-get-at passenger drop off or pick up areas	2

When residents were asked to compare their current home with their previous home, residents overwhelming reported their current home as performing better on almost all indicators:

- LifeMark homes were found to be easier to:
  - Get around – 70%
  - Heat – 57%
  - Do housework – 67%
- LifeMark homes were found to be:
  - More comfortable – 77%
  - Less costly to run – 50%
- The positive difference made by LifeMark homes was 'a lot' for 80% of residents and 'a little' for 10% of residents.

Notably only a minority of the interviewees were aware that their home was accredited by LifeMark – 12 of 33 interviewees. When the ideas of LifeMark and universal design were explained, 27 of 33 interviewees saw it as a positive approach to housing design. Notably, two thirds of interviewees believed that the building cost of a LifeMark dwelling should be about the same or even less than the cost of a typical, similar new dwelling. Twenty-four of 33 interviewees stated a preference for a LifeMark dwelling.

Interviewees were asked to comment on their preferences around particular aspects of functional dwellings: Twenty-nine interviewees stated a preference for level entry; and, half of interviewees stated a preference for open plan to minimise hallways and optimise circulation space. Table 2.3 sets out preferences around a number of other key accessibility and functionality features.

Table 2.3 Householders in Accredited LifeMark Homes – Reported Preferences for Accessibility and Functionality

	Very important	Fairly important	Not very important	Not at all important	No preference
A car parking space close to the entrance of your home	22	5	4	1	1
An extra wide space in which to park your car	16	9	3	2	3
A covered entrance with outside light	21	5	3	2	2
A removable wall panel to make the bathroom ensuite	6	3	9	6	9
Low level, easy to open windows	18	7	2	2	4
Easy to reach sockets and switches	20	8	1	2	2
Provision for house lift	5	4	3	12	9
Taps that are easy to reach and lever rather than twist to turn on	19	6	2	2	4
Strong walls in bathrooms and toilets to fix grab rails	17	9	2	1	4
Ground floor toilet	21	5	1	1	5
Living room at entrance level	21	5	1	1	5

Both the survey and the interviews demonstrate the very low level of understanding of universal design and accreditation opportunities in New Zealand by home owners. Under those circumstances, it is unlikely that the building industry will generate universal design

or even basic accessible dwellings through the mechanism of consumer sovereignty. That is, through demand from end-users. This is the case even when households have members who are mobility impaired or are regularly visited by someone with a mobility impairment. The issue here is not simply a lack of preference for universal design – two-fifths of the householders who have undertaken a build or significant renovation are positive towards the ideas of accessible and adaptable homes. Instead, it is a deep lack of information and understanding about what an accessible home would look like and what is likely to inhibit or enable functionality.

Among householders who did have a sense of universal design or were aware of accreditation such as LifeMark, there were a range of anxieties around leveraging accessible dwellings out of the building industry. There were fears that universal design housing would be more expensive. But there was also evident a degree of misgiving around the willingness or ability of the building industry to respond to the demand for universal design even where consumers sought it.

I like the LifeMark idea but in reality it will make house builds dearer and in some cases harder to re-sale.

I think the quality of house design in NZ is appalling – I do not see why "cheap" housing has to be so ugly and nasty. Things can be "better by design".

It is very difficult to build a home outside of group builders… Many group homes are of poor quality and meet the current building codes but not those required for the future, resulting in expensive modifications for the user and the tax payer.

A new built home to new standards is more than ample. What is a LifeMark home… I am a licensed building practitioner and don't know.

I asked that the plans for our rebuild be checked with LifeMark. They said they would. After we moved in I checked with LifeMark and they did not get any plans.

Our house was purpose built for a disabled family member. We looked for a building company that was local, had experience with disabled [and] selected from five companies. I am a builder with 20 years experience (also with disabled experience) and knew what we wanted and I designed the layout to suit our section. We still had trouble getting what we wanted from the building company.

3. UNIVERSAL DESIGN SUPPLY AND THE BUILDING INDUSTRY

This section discusses the results of the builders survey. It is notable that although this self-complete survey was sent to six hundred only sixteen chose to participate. This in itself indicates low engagement around these issues. It is also notable that almost a hundred of the six hundred builders who were randomly selected from those receiving consents in 2014, could not be contacted a year later. Ninety-two questionnaires were returned as 'box closed' or 'no longer at this address'.

Between them, the participant builders reported building between 2005 and 2010 some 2,005 dwellings. There is considerable variation in build numbers. Two organisations reported built 40 dwellings, two organisations reported building 50 dwellings and four organisations built between 58 and 94 dwellings respectively. Seven organisations had built over 100 dwellings.

One of those reported building 600 dwellings and two builders reported building around 300 dwellings. Of those, less than 2 percent of buildings – 37 dwellings – were reported as accredited as LifeMark. Only a quarter of the survey participants reported building LifeMark accredited dwellings. Of these one had built 1 LifeMark accredited dwelling, one had built 6, one had built 10 and another had built 20 dwellings.

Six of the participant builders reported that they were likely to build LifeMark accredited dwellings in the year following surveying. Of those, five were in the design stages with two organisations designing 10 dwellings each and three organisations designing between 2-6 dwellings. Three builders reported that they were awaiting consent on 2, 4 and 5 dwellings respectively. Three builders reported that they had obtained consent and were ready to begin building 2, 4 and 6 dwellings respectively. Four organisations were in the process of building. The latter, together, were building twenty-three LifeMark accredited dwellings at the time of surveying. That is, among these six builders there were 77 LifeMark accredited dwellings in the pipeline.

There were a set of builders who reported that they build accessible dwellings using other standards. Indeed, over a third of participant organisations reported that approach. Of these one organisation reported building 63 accessible dwellings over the 10-year period and one reported building 200 accessible dwellings over that period. Overall, a further 276 dwellings were reported as using an alternative accessible standard. The 'standards' referred for two dwellings were cited as an ACC reviewed design and a design provided by the clients for a very disabled child. Clearly the latter are customised designs rather than a universal design.

Claims to be working with some other sort of accessible standard must be treated with care. There appears to be confusion around the notion of what is a standard and what can appropriately be used in dwellings and appropriately be characterised as accessible. A builder of 63 dwellings over 2005-2010 reported that NZS 1421:2001 was used in dwelling design. Yet that standard is specifically directed to public buildings. Another, who reported building two hundred dwellings, referred to the 'standards' set out in Master Builder's 'Future-Proof'. The latter neither provides standards not accreditation.

It was noted that none of the ten builders not already with LifeMark homes in the pipeline have plans for building accessible homes in the future. This is very much couched by the builders in terms of accessibility being a matter of consumer taste rather than seeing accessibility as part of an integral function of a dwelling. One builder reported that he would 'steer clients' towards an accreditation scheme like LifeMark. Another reported that they "always" considered accessible features when dealing with older clients and the other would design homes to be accessible or "easily modified to be accessible" if the client intended to remain in their home long-term.

This idea of 'client control' permeates the range of accessibility characteristics. The majority of builders reported the following as optional to clients but ***not provided as standard***:

- Provision of a door with a level transition at the dwelling entrance.
- Reinforced shower walls on the primary living level for future installation of grab rails and a shower seat.
- Installation of a smoke alarm that supported adaption to both audio and visual warnings.
- Reinforced toilet walls to provide a fixing surface for future installation of grab rails.

- All doorways to all rooms on the primary living level provide a minimum clear opening width of 810mm.
- A shower on the primary living level, with a level entry shower recess, minimum dimensions of 1200x1200 mm and a clear space providing for 1500mm turning.
- Light switches at the bedroom entry door and on both sides of the bed in the case of the master bedroom.
- A laundry space large enough to provide a minimum of 1050mm clearance in front of fixed benches and appliances.
- Sensor lighting from front boundary or car parking space to the front entrance.
- A clear minimum width of 1055mm for all internal passageways/corridors.
- Slip resistant flooring in the laundry.
- Slip resistant flooring in the kitchen.

The design features the majority of participants reported as providing as part of their standard design were in order of prevalence:

- An entrance door with a minimum clear opening width of 810mm.
- Lever handles on windows that can be operated one-handed.
- Lever action for all door handles.
- Push button, electronic or lever plumbing controls.
- Light switches at the top and bottom of the stairs.
- Provide space for a standard single bed on the primary living level with 800mm clear space around one side and the foot of the bed.
- A parking space with a level, slip resistant surface.
- Light switches and controls aligned with door handles at 900-1200mm above floor level.
- The main thoroughfare was not through the kitchen.
- Easy to use handles on kitchen drawers and doors.
- Slip resistant bathroom floors.
- Power-points and jacks installed at a consistent height not lower than 300mm above floor level.
- Level transition and threshold between all doorways and rooms on the primary living level.
- An external landing area that is slip resistant.

Table 3.1 sets out the accessibility facilitating features in the LifeMark accreditation and the proportion of builders reporting whether those are delivered as standard, as an option or not delivered. Around 20 percent of the builders do not build dwellings with more than one level. This should be taken into account when interpreting the delivery of features directed to accessing multi-floor dwellings. What Table 3.1 shows, however, is the very low proportions of builders reporting relatively basic features as standard such as framing able to hold handrails in bathrooms, non-slip flooring in laundries and kitchens, and flexible lighting.

Table 3.1 Builders Reporting Provision of Accessibility and Functional Features

Feature	% Standard	% Optional	% Not Provided
Multi-storey dwellings shall have the space to provide for the future installation of a 1200mm x 1200mm platform lift.	7	40	53
The dwelling entrance shall provide an entrance door with a level transition	13	73	13
A smoke alarm is installed that enables future adaptation to both audible and visual warnings.	13	67	20
Multi-storey dwellings shall have reinforced stairway walls for the future installation of a stair lift.	13	40	47
Dwellings shall have reinforced shower walls on the primary living level for the future installation of grab rails and a shower seat.	20	73	7
A pathway from EITHER the front boundary of the property or car parking space to a dwelling entrance is installed with sensor lighting for the pathway	27	60	13
ALL doorways to ALL rooms on the primary living level shall provide a minimum clear opening width of 810mm (door leaf 860mm)	27	67	7
Toilet walls are reinforced to provide a fixing surface for grab rails to be safely and economically installed in the future.	27	67	7
The laundry shall include slip resistant flooring	33	53	13
Dwellings shall have the plumbing and drainage space for the future installation of a toilet on the primary living level that includes a minimum 800mm clear space beside the toilet and a centreline of the toilet pan that is 450mm from the wall.	33	47	20
Dwellings shall have a shower on the primary living level that includes a level entry shower recess with minimum dimensions of 1200 x 1200, drainage for the shower recess located in the corner of the room, a clear space that provides for a 1500mm turning	33	61	7
ALL internal corridors or passageways shall provide a clear minimum width of 1050mm	40	53	7
Light switches are provided at the bedroom entry door and on both sides of the bed in the case of the master bedroom.	40	60	0
The laundry space or room shall be large enough to provide at least 1050mm clearance in front of fixed benches and appliances.	40	60	0
The kitchen space shall have slip resistant flooring	40	53	7
At least one car parking space actually has a minimum width of 3500mm	47	27	27
A pathway from EITHER the front boundary of the property or car parking space to a dwelling entrance is installed with a minimum clear width of 1200mm	47	40	13
The kitchen space shall have at least half of the storage space below the bench tops consisting of drawers and not cupboards. Bottom drawers shall be a minimum of 250mm from the floor.	47	53	0
Stairways shall be slip resistant and have a suitable non-slip tread.	47	27	27
The dwelling entrance shall include an external landing area that is slip resistant	53	40	7
ALL doorways to ALL rooms on the primary living level shall provide a level transition and threshold. This accepts difference in floor materials either side of the doorway	60	20	20
The kitchen space includes at least a 1200mm clearance provided in front of fixed benches, major appliances and fittings which extends to a 100mm turning circle measured up to at least 250mm above the floor	60	33	7
Stairways shall provide a minimum clear width of 900mm.	60	13	27
Stairways shall have consistent tread depth and riser height with a maximum riser height of 180mm and a minimum tread of 310mm, with no open risers.	60	13	27
The kitchen space shall have easy to use door handles on doors and drawers	63	31	6
At least one car parking space actually has a level, firm, slip resistant flat surface with a slope not exceeding 1:20	67	20	13

Light switches and other service controls (e.g. security systems, intercommunication systems, air conditioning controls) shall be horizontally aligned with door handles at 900-1200mm above finished floor level.	67	27	7
Power points, TV, phone and computer outlets are installed at a consistent height not lower than 300mm above the finished floor level.	67	33	0
The kitchen space is not a main thoroughfare in the home	67	33	0
Dwellings shall have slip resistant flooring in all bathrooms.	67	27	7
All plumbing controls shall be lever, push button or electronic.	73	13	13
There is space on the primary living level where a standard single bed (measuring 900mm x 1900mm) can fit with a minimum 800mm clear space available around one side and the foot of the bed. A clear minimum 800mm wide path is also required from the door to bed	73	20	7
Stairways shall have light switches at the top and bottom of the stairs	73	7	20
Window controls shall be lever handles and be able to be operated with one hand.	80	13	7
All door handles shall have a lever action.	80	13	7
The dwelling entrance shall provide an entrance door with a minimum clear opening width of 810mm (door leaf 860mm)	87	13	0

It is notable that a third of these builders provided features that they considered costly or difficult to deliver. Those features being:

- Provision of space for a lift or future lift.
- Bathrooms that provide disabled access and facilities.
- Installing a level transition at the entryway.

A quarter of builders stated that they did not provide some features because they felt they were too costly or difficult. Those features were:

- 800mm clear space beside a toilet.
- Space for the future provision for a lift.
- Slip resistant flooring in areas such as the kitchen and entranceway.
- Reinforced walls and hand rails in the toilet.

Despite costing analysis around universal design and accessible housing undertaken in the past showing minimum costs around these features in new builds, over two thirds of these builders perceived LifeMark homes as more expensive to build. Nevertheless, the builders experienced in delivering accessible homes using LifeMark noted that LifeMark dwellings were only a little more expensive and additional costs could be minimal if they were planned at the first stage of build. That view is consistent with overseas costing research around accessible and universal design.[2]

The builders were specifically asked whether there were universal design features that they had difficulty getting through the building consent process. Well over a quarter stated that they did have difficulties with consenting. The majority had had issues with installing level entry access. Some builders reported that they experienced conflicting requirements regarding level entry, not only between different councils but between consenting officers within a single council. Currently less than 15 percent of these builders reported providing level entry as standard.

[2] See Saville-Smith and James, 2012 for a review of that material.

4. CONCLUSIONS AND WAYS FORWARD

Whether delivering housing or consuming housing, there remains a deep lack of awareness of universal design. What is even more problematic is the apparent inability to access accessible design from the building industry even when it is desired and explicitly sought by householders. This divergence between consumer desire and what the industry is able or willing to deliver is not new. It reinforces the profound limits of a consumer sovereignty model as an effective approach to drawing better and more responsive performance from the building industry.

The rhetoric on the supply-side is persistently around the idea of consumer demand driving what it provides. A small number of householders volunteered their pleasure and satisfaction with their suppliers. More, however, raise doubts about the industry. The inertias in the building sector are exacerbated by a lack of consumer knowledge, but it is not caused by it. There are clear instances of resistance or lack of knowledge among builders and designers themselves.

Comments from these different householders provide an insight into those dynamics and demonstrate the multi-pronged approach needed on both the supply-side and demand side of the building relationship to get a more functional and enabling stock. The evidence suggests that what drives the dwellings supplied is more embedded in the existing plans and practices of the building industry. It is an industry that is quick to respond to superficial fashions around finishes, certain materials and products. Where functional design is apparent in the homes reported on here, it tends to be where fashion has simply coincided with products that are enabling. The lever door handle is a case in point. However, there are still, despite the preferences of these householders, preferences which would be enabling but are still not common in the standard range of dwellings being built: level entry and open plan with the almost total removal of hallways are two instances.

This research, then, provides a hint as to one of the critical pathways to generating more functional homes. That is, the importance of ‘plug and play’ products and systems: windows, level entry solutions and wet area showers are all examples in which product development and market take-up could make a significant difference. In that regard, some of the issues relate to elegance of design. The so-called grab rail is a case in point. In others, it is about achieving a solution which is easy for builders and building inspectors. It is notable that level entry remains an on-going barrier, literally, to accessible dwellings.

This research was intended to pursue the benefits and barriers to accessible building through a closer engagement with developers and through case studies. The first tranche of data collection, however, shows that the findings to date are similar in substance and implication to previous research and previous analysis on ways forward to engendering a more functional, more accessible and more functional housing stock. That research and those analyses have broadly found that:

- Typically, builders/developers have little concern with universal design and accessibility although (as for sustainability) there is a tendency to claim that they do and that the primary inhibitor to supply is the lack of householder or property investor demand.
- Householders struggle to get accessibility embedded in design and builds even when they are knowledgeable and explicit about their requirements.

- Householders who do achieve accessible design dwellings report considerable satisfaction across a number of functional and comfort dimensions.

Arguably the problem here is not so much a research problem. The research that exists is showing similar outcomes. Moreover, the lack of sophistication and/or interest among builders means that there is little ability to drill into micro-issues around cost driving at this point. The core problem is the problem of mobilising public and private sectoral change. Key elements of the research platform underpinning business cases for the pursuit of such change are in place including the data generated by these first components of the research. Those findings suggest that take-up of universal design needs a multi-pronged strategy of incentivisation, regulation and demonstration. That conclusion takes us back to the sort of argumentation made in the report commissioned by the Office of Disability and MBIE *Getting Accessible Housing: Practical Approaches to Encouraging Industry Take-Up and Meeting Need.*[3] That report argues that government both as a procurer, funder, taxation agent and regulator needs to take a leadership role. So too do local authorities around issues such as level entry. Households need education along with the industry. In addition, this research reinforces the argument previously made around the importance of promoting a single accreditation system. This research shows that lack of commitment to such an accreditation system encourages a sort of 'accessibility wash' in the industry and confusion among consumers.

Does this mean that no further research can be done at this point? No, there are further ways to explore practical research directed to change. While establishing the pre-conditions and a framework conducive to getting universal design embedded in the housing stock must be considered one of industry and political will, the findings from this research suggest some significant progress could be made, even if the sectoral and political will to institute a multi-pronged accessibility strategy is weak. That is, in the area of level entry. Getting level entry is seen by builders as one of the most demanding, expensive and problematic aspects of accessible design. There are a number of reasons for this, the most important of which are:

- Inconsistency across local government in the way in which level entry is treated by building officers.
- Relatively expensive solutions to generating accepted designs for level entry. Slot drains in particular have raised new issues around storm water infrastructure and drain laying.
- Solutions to level entry being largely restricted to:
    - responding to the use of concrete pads while there appears to be in some places a resurgence of piles. The latter appears to be particularly the case where issues of potential liquefaction are of concern.
    - dealing with house structure rather than taking opportunities providing by land works solutions.

It is in finding practical solutions to that problem, of exploring the acceptability of those solutions to the industry and building consenting officers that some useful traction may be found.

[3] Saville-Smith & James 2012.

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