



RESEARCH HIGHLIGHT

Study of the Cost of Including Accessibility Features in Newly Constructed Modest Houses

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INTRODUCTION

It is possible to provide features in new homes to help them be more easily and more cost-effectively adapted to the changing needs of the occupants. This may become an increasingly important consideration in the design of new housing and the renovation of existing homes, as governments and the homebuilding industry seek ways to deal with a rapidly aging population. While adding features such as wider doors, accessible bathrooms, lower electrical switches and elevating equipment can be done as needs demand, the cost can be prohibitive. Architectural, structural, mechanical and electrical systems are not typically designed to accommodate such features, and additional work and cost are required. While including such features (or the provisions needed to accommodate them in the future) in the original design and construction of new housing would intuitively offer a more cost-effective approach, little information is currently available on the incremental costs of making housing accessible or ready for aging in place.

To help fill this information gap, Canada Mortgage and Housing Corporation (CMHC) initiated a research project to estimate the incremental cost of construction of typical, modest, housing units with certain basic accessibility features that would enable residents to live and age at home. The project identifies “universal” features that would have a significant impact on the home’s accessibility performance and that would be difficult or expensive to incorporate after construction. The objective was not to design houses in which persons with disabilities could live. Rather, the idea was to estimate the incremental costs to construct accessible, adaptable homes that could be modified over time, based on the occupants’ changing needs, without any major upgrades or costs.

METHOD

Based on principles of accessibility, a list of building features was established that would be used to create accessible floor plans. These characteristics addressed building floor plan layout, access to the dwelling, garage dimensions and elevation difference between the garage and the house, mobility inside the house, design of the kitchen and bathroom, windows, controls and security system, allowances for a lift, fire safety and evacuation considerations. Sixty features were identified.

Next, five theoretical “benchmark” home types were developed:

- Two-bedroom bungalow with one full bathroom
- Two-storey, semi-detached, two-bedroom house with a half-bathroom on the entry level and one full bathroom upstairs
- Two-storey, detached, three-bedroom house with a half-bathroom on the entry level and a full bathroom upstairs
- Two-storey, three-bedroom townhouse with a half-bathroom on the entry level and two full bathrooms upstairs
- Two-bedroom apartment with one full bathroom

The home models selected were modest in size and features, with a base area ranging from 121 m² to 165 m² (1,300 sq. ft. to 1,780 sq. ft.). An apartment model with an area of 81 m² (872 sq. ft.) was also included. The benchmark models and their plans were validated with

homebuilders in five selected cities: Vancouver, British Columbia; Winnipeg, Manitoba; Toronto, Ontario; Montréal, Quebec, and Halifax, Nova Scotia.

In each of the five cities, the regulatory body responsible for applicable housing construction regulations was identified, and the municipal construction regulations regarding accessibility were determined. If an accessibility feature was required in standard construction, this feature was not added when developing modified plans.

Accessibility features were then integrated to each of the standard plans to create modified floor plans. The estimated costs of the 60 accessibility features (for example, lever door handles, plywood-reinforced bathroom walls to accommodate future grab bars, extra space for a wheelchair turning circle in the bathroom) were then calculated. The sum of the cost to build based on the standard plan plus the costs for the accessibility features was used to estimate the cost of construction of the modified plans. The costs of building the benchmark homes and of including the selected accessibility features in the modified plans were estimated using a variety of sources including the www.costtobuild.net website, the *RSMeans Contractor's Pricing Guide – Residential Repair and Remodeling Costs –2015 edition*, an in-house estimating tool and consultations with experts. Costs were estimated for Montréal and then indexed for Toronto (100.9 per cent), Vancouver (94.6 per cent), Halifax (90.1 per cent) and Winnipeg (88.3 per cent) based on the RSMeans Contractor's Pricing Guide. Finally, cost estimates for the standard and modified plans were confirmed with homebuilders in each selected city.

For the purposes of this project, the results are presented in terms of the incremental percentage increase (or decrease) over (below) the standard baseline design.

FINDINGS

Size of Modified Floor Plans

Some floor plans were harder to modify for accessibility and adaptability than others, given the design complexity, layout limitations or location of stairwells, for example. In many of the designs, the floor area had to be increased to accommodate the accessibility features (see table 1).

Cost of individual accessibility features

The vast majority (75 per cent) of features were estimated to cost less than \$500; (57 per cent) generated no or negligible costs, that is, between \$0 and \$100. Another 18 per cent of features were low cost, that is, \$100 to \$500. Some accessibility features even generated lower costs than those of traditional construction (for example, a wall sink in place of a vanity in the main floor half-bathroom).

Some features (8 per cent) generated an estimated cost between \$500 and \$1,000 (kitchen cabinets with more drawers and shelves, vertical storage for future wall oven, easily modifiable structure in the shower, and preparation for potential installation of an elevator).

Last, ten features (17 per cent) generated a high cost that was more than \$1,000. These were features that could have an impact on the layout of the building, that add to the floor space (the size of the garage for a ramp; manoeuvring

Table 1 Increases in Area Required to Accommodate Accessibility Features

	Home			Garage		
	Standard Plan	Modified Plan	% Increase	Standard Plan	Modified Plan	% Increase
Bungalow	136 m ² (1,460 sq. ft.)	136 m ² (1,460 sq. ft.)	0	24 m ² (260 sq. ft.)	25.9 m ² (280 sq. ft.)	8%
Semi-detached house	121 m ² (1,300 sq. ft.)	130 m ² (1,400 sq. ft.)	7%	24 m ² (260 sq. ft.)	25.9 m ² (280 sq. ft.)	8%
Detached house	154 m ² (1,660 sq. ft.)	162 m ² (1,740 sq. ft.)	5%	24 m ² (260 sq. ft.)	25.9 m ² (280 sq. ft.)	8%
Townhouse	165 m ² (1,780 sq. ft.)	168 m ² (1,810 sq. ft.)	2%	23.8 m ² (256 sq. ft.)	24.3 m ² (261 sq. ft.)	2%
Apartment	81 m ² (872 sq. ft.)	80 m ² (861 sq. ft.)	1,0#	Not Applicable	Not Applicable	–

area in the kitchen, the bathroom, and at the top and bottom of the staircase), that provide protection against the elements above a door and that offer a refuge option on a balcony on the second floor in case of fire.

Costs of accessibility modifications to the selected housing types

The estimated costs shown in table 2 illustrate the total marginal extra cost of providing the selected accessibility features to the selected benchmark home types at the time of design and construction. Variations in building regulations impacted which features were included in the baseline plans and which were additional. The estimated costs included the cost of dwelling construction only and did not include costs associated with the lot or infrastructure development. Actual incremental costs will, of course, vary based on local housing market conditions, the availability of expertise, the cost of labour, the availability and cost of materials, and similar factors.

Additional costs generated by including accessibility features at the time of construction ranged from \$10,864 (the townhouse in Vancouver) to \$23,054 (the detached house in Montréal). For the apartment, the cost of accessibility features ranged from \$2,801 (Halifax) to \$4,213 (Montréal).

The incremental cost of integrating accessibility features varied somewhat among the five benchmark home types. The additional cost of accessibility features was lower for

bungalows (6 per cent) and townhouses (6 to 7 per cent), and higher for detached houses (9 to 10 per cent) and semi-detached houses (11 to 12 per cent). These cost differences demonstrate that some of the selected floor plans are harder to adapt than others given the design complexity, layout limitations or location of stairwells, for example.

In Vancouver, the cost impact was lower because municipal regulations require a more accessible base construction and therefore fewer additional accessibility features were required.

CONCLUSION

The purpose of this research was to explore the incremental costs associated with the inclusion of accessibility features in housing that can support Canadians in living and aging at home. The results obtained show that adding the selected accessibility features to the baseline designs generated either negligible or low incremental costs. A small number, however, generated higher costs. The construction of the selected accessible and adaptable home added an estimated 6 to 12 per cent to the cost of standard construction, depending on the home model and on the chosen location. These additional costs, although not insignificant, are nonetheless much lower than those required to convert an existing dwelling to make it more accessible.

Table 2 Incremental Cost of Including Accessibility Features in Selected Home Types and Cities (\$ and % change)

	Montréal		Toronto		Vancouver		Halifax		Winnipeg	
Bungalow	\$13,469.00	6%	\$13,287.52	6%	\$11,630.12	6%	\$12,135.57	6%	\$11,893.13	6%
Semi-detached house	\$22,275.00	12%	\$21,981.07	12%	\$19,735.45	11%	\$20,069.78	12%	\$19,668.83	12%
Detached house	\$23,054.00	10%	\$22,545.10	10%	\$19,529.22	9%	\$20,771.65	10%	\$20,356.68	10%
Townhouse	\$14,197.00	7%	\$13,608.38	7%	\$10,863.82	6%	\$12,791.50	7%	\$12,541.83	7%
Apartment	\$4,213.00	n/a	\$3,943.17	n/a	\$3,747.64	n/a	\$2,801.21	n/a	\$3,720.08	n/a

IMPLICATIONS FOR THE HOUSING INDUSTRY

This research illustrates that while the costs of adding accessibility features in new housing are not insignificant, they could be much lower than the amounts that may be needed in the future to adapt relatively inflexible systems, equipment and floor plans to better accommodate an aging population. Homebuilders, and renovators, have a role to play in making their clients aware of the opportunities to include accessibility (or accessibility supporting) features in their new homebuilding or renovation projects in a more cost-effective manner. Affordable housing providers could also benefit from the inclusion of cost-effective accessibility features in their projects that would allow units to be more easily adapted for changing demographics in the future.

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Housing Research at CMHC

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