

What We Heard

A Summary of the Universal Design Workshop

hosted by the City of Mount Pearl on January 21, 2016



TABLE OF CONTENTS

Execu	Itive Summary	.ii
Sumn	nary of the Workshop	1
Low	v-Effort Goals	1
Har	d but Important Goals	1
Group	Discussions	2
Res	sidential	2
Commercial		
Pub	blic / Infrastructure / Recreational	4
Appendix		6
1.	Event Brochure	6
2.	Event Agenda	6
3.	List of Attendees	6
4.	Presentations	6
5.	CMHC Study on the Cost of Accessibility	6



EXECUTIVE SUMMARY

On January 21, 2016, the City of Mount Pearl hosted an all-day workshop on Universal Design as part of a strategic initiative by Council and to explore ways to make the City more inclusive. Universal Design extends beyond residential projects and affects development and infrastructure in both the public and private realm. A total of 45 attendees from various community, advocacy, and user groups attended including the construction industry, different professional associations, and members of the general public. The workshop attendees explored reasonable ideas that could be recommended for inclusion in the City's regulations, standards, and policies for buildings, subdivisions, landscaping, infrastructure, and public spaces. The attendees actively participated in discussions after each presentation making the day a huge success.



SUMMARY OF THE WORKSHOP

Below is a summary of the working groups' findings outlining low effort goals and important goals, followed by the detailed notes from the groups broken up into four sections: the groups' vision, what works well, general improvements and suggested regulatory changes.

Group	Low-Effort Goals	Hard but Important Goals
Residential	Be forward thinking and proactive	Involve "users" in the planning
	• Allow nexibility in the regulations	
	Ensure ground floor is fully	 Reduce the types of residential
	accessible	zones
		 Encourage multi-unit development
Commercial	 Identify code gaps 	All buildings should be accessible to
Commondar	 Review the exceptions 	all persons
	Clearly communicate re:	 Involve professionals
	enforcement	 Question the intention of code
Public /	 Signage on trails 	 Increase connectivity
Institutional /	Finding information re: accessibility	 Consistent access/egress
Recreational	on websites	 Promote mixed-use
	Audible signals	



GROUP DISCUSSIONS

Low-effort goals are highlighted in green and hard but important goals are highlighted in red.

Residential

The main themes of this group's discussion were inclusiveness (include all types of people in the design, target market, and user list of any development), develop smaller and more mixed communities, and increase flexibility in the interpretation of the codes.

- 1. Vision
 - Build neighbourhoods and communities, don't just build for an ageing population
 - Cater to the existing demographic by building new homes while allowing new residents to come in because existing homes would be freed up
 - Move upward taller multi-unit buildings, higher density, reserve the lower level(s) for seniors
 - Hold design charrettes to encourage public participation
 - Have fewer residential zone types
 - Be forward thinking proactive versus reactive
 - Address NIMBY challenges that impact the vision
- 2. What Works Well
 - Strong community (fosters volunteerism)
 - The multi-unit development that already exists in the City
- 3. General Improvements
 - Balance universal design with affordability and resistance to change
 - Upgrade infrastructure
 - Involve users in design of infrastructure to guide accessibility choices
 - Diversity of housing choices and options (e.g. fixtures in bathrooms)
 - Education and awareness (e.g. market universal design features to rent/sell homes)
 - Create a regional plan to improve communication between municipalities
 - Implement incentives (e.g. reduce development costs by the cost of universal design features and require the following to be universally designed in a certain number of new developments: front entrance, doors, bathroom, at least one bedroom, some kitchen features)
 - Work against NIMBY by encouraging more positive dialogue
- 4. Regulatory Changes
 - Flexibility regarding enforcement of the code
 - Allow flexibility in the interpretation of the regulations
 - Create one residential zone
 - Encourage more multi-unit development (they tend to have more accessibility and universal design elements)



Width of doors to have at least one fully accessible access point

Commercial

The main themes of this group's discussion were change the process to allow all types of people to access and use all commercial buildings and ensure the codes are doing what they mean to do.

- 1. Vision
 - Process (i.e. review to inspection, etc.) needs to be streamlined and all groups involved need to be coordinated
 - Human rights all buildings/areas must be accessible
 - Involve professionals (e.g. architects) trained in analysis and design of comprehensive design
 - Uncover conflicts in the codes
 - Incentives to encourage inclusiveness instead of only meeting minimums
 - Review designs and development from an economic benefit perspective rather than only looking at universal design costs more
 - A "culture shift" is necessary
 - Choices need to be provided (e.g. vertical or horizontal grab bars)
 - Enforce the intent of the Act and explain the purpose
 - Be creative with design (e.g. building could allow users to enter on one street and exit on another with higher elevation, thus saving the users from steep sidewalk)
- 2. What Works Well
 - NL Buildings Accessibility Act
 - There is progressive language in existing regulations (e.g. blue zones)
 - National Building Code of Canada is fairly specific in terms of accessibility in commercial situations (as opposed to residential)
- 3. General Improvements
 - Identifying the gaps in the Code (e.g. grab bars in washrooms could be horizontal or vertical)
 - Sidewalks are not wide enough
 - Make wind breaks mandatory
 - Make downtown a more accessible place
 - Use universal design as the approach to designing downtown to deal with slopes
 - Create connected spaces in new developments
 - See existing development as fluctuating towns are changing
 - Look at the Halifax library regarding the clear and welcoming entrance
 - Clear international symbols
- 4. Regulatory Changes
 - Review and determine the intent and change the regulations accordingly
 - Adopt performance-based regulations



- All codes are open to interpretation
- Ramps as opposed to stairs
- Review the Code regarding exceptions from accessibility (e.g. < 50% replacement value of building)
- Clearly communicate about who enforces the regulations

Public / Infrastructure / Recreational

The main themes of this group's discussion were to design so all types of people can access all types of spaces and ensure the spaces between buildings are just as well designed as the interiors.

- 1. Vision
 - Increase connectivity in neighbourhoods (e.g. trails), use of multi-use zoning (i.e. combinations of residential and commercial), and inclusive activities
 - Signage on trails for direction and orientation
 - Ability to find information on design and accessibility easily on websites
 - Universal design standards should be more prescriptive
 - Access/Egress getting to, into, around and out of a building should have a consistent application of standards (e.g., the public area around a building is developed "properly" but then the access to the building may not be)
 - Restrictions to difficult terrain
 - Multiple uses incorporate different densities; bigger picture design, not just inside the box (e.g. Tract design in Grand Falls), and incorporate universal design
 - Multidimensional neighbourhoods that are connected and incorporate universal design
- 2. What Works Well
 - Sidewalks
 - Trails are looped, accessible, and well-lit in many places
 - Centennial Square
 - Low-density zoning was done well but not mixed residential it is now a challenge to make a development accessible in mixed residential areas
 - Recreation facilities are inclusive and well used
 - Roads are wider than other areas and allow easier parking and snow clearing
 - Underground crossing of busy streets
- 3. General Improvements
 - Audible signals need to be updated at all intersections
 - Wheelchair access at all intersections with appropriate warning mechanism (e.g. tactile warning strip or audible)
 - All public buildings to be accessible access, egress, and internally
 - Accessible parking space is a premium so it is hard to increase the size of the spaces
 - Upgrades to intersections to include ability to add accessible signals
 - Audio signals could include location/direction information



- Need to identify offices/rooms inside the building (i.e. braille)
- Public amenities for wind breaks
- 4. Regulatory Changes
 - Whether to grandfather developments that are not in compliance with accessibility regulations when renovations are made
 - Underground parking requirements for building of a certain size with direct access to building



APPENDIX

- 1. Event Brochure
- 2. Event Agenda
- 3. List of Attendees
- 4. Presentations
- 5. <u>CMHC Study on the Cost of Accessibility</u>



The City Council of Mount Pearl identified Universal Design as an area it wished to explore as a strategic indicator. The strategic objective is "to consider and, where feasible, attempt a universal design for future infrastructure and development of the City." This workshop is to assist the City in identifying elements of Universal Design that could be incorporated into the City's



policies, regulations and standards and are reflective of the Newfoundland and Labrador context. Please join us for an allday workshop on January 21, 2016 at the <u>Mount Pearl Soccer Hut</u> starting at 9:00 am. One of the objectives in the Mount Pearl Municipal Plan is "to examine the infrastructure of universal design elements to residential projects to further accessible housing design," Today, Council is aware that universal design extends beyond residential projects and affects development and infrastructure in both the public realm and private property.

Considering the aging population, those persons who are ability challenged, and those with young families who could benefit from some assistance, Universal Design has become a prominent topic as of late and is considered an element of an inclusive community.

The City of Mount Pearl is interested in exploring the concept of Universal Design and how such elements can be reasonably incorporated into the City's policies, regulations, and standards for buildings, subdivisions, landscaping, infrastructure, and public spaces.

Keynote Speaker

The keynote speaker, Claude Gautreau, Knowledge Transfer Consultant (Atlantic) with CMHC, will be speaking about what Universal Design is and how it relates to



The workshop might interest...

- Architects
- Inspectors
- Planners
- Government Employees
- Engineers
- Construction and Housing Industry Representatives
- Home Designers
- Related Association Representatives
- Landscape Architects
- Seniors Independence Group



For more information, or to submit materials related to the topic to be added to the event webpage, contact Christopher Hardy at Phone: (709) 748-1106 E-mail: <u>chardy@mountpearl.ca</u> Fax: (709) 748-1111

Registration is required. Please fill out the registration form <u>located here</u> and send it to Christopher at the contact information above.



Universal Design in Mount Pearl - Thursday, January 21, 2016

Mount Pearl Soccer Hut

WORKSHOP AGENDA

8:30	Doors Open (coffee/tea provided)			
9:00	Welcome	Stephen Jewczyk		
9:05	Opening Remarks	Mayor Simms		
9:15	Keynote Speaker Understanding Universal Design (UD) and related philosophies, incorporating elements into municipal policy, developing UD standards for Mount Pearl, and learning from other municipalities	Claude Gautreau, Knowledge Transfer Consultant (Atlantic) with CMHC		
10:00	Mount Pearl Context	Stephen Jewczyk		
10:30	Break (coffee/tea and snacks provided)			
10:45	 Panel Discussion What could be done / considered to make Mount Pearl universally accessible? Catherine Shortall, Program Policy Development Specialist with the Disability Policy Office Dave Dewling, Architect with Municipal Affairs Shelley Di-Nur, Clinical Occupational Therapist with Eastern Health Dion Regular, Peer Support Specialist with Spinal Cord Injury NL Inc. 	Julia Schwarz		
Noon	Greetings from CHBA-NL	Warrick Butler, President		
12:05	Lunch and Luncheon Speaker The Reality of Application	Greg Hussey, President of Karwood		
1:00	Breakout: Universal Design Standards for Mount Pearl Residential Commercial Public / Institutional / Recreational	Julia Schwarz		
2:00	Break (coffee/tea/water provided)			
2:15	Report Back to Larger Group	Christopher Hardy		
3:15	Next Steps and Conclusion	Stephen Jewczyk		



Universal Design in Mount Pearl - Thursday, January 21, 2016

Mount Pearl Soccer Hut

RESOURCES FOR THE WORKSHOP

Acts

- 1. Buildings Accessibility Act (NL)
- 2. <u>Residential Tenancies Act</u> (NL)
- 3. Workplace Health, Safety and Compensation Act (NL)
- 4. Occupational Health and Safety Act (NL)
- 5. <u>Highway Traffic Act</u> (NL)
- 6. <u>Urban and Rural Planning Act</u> (NL)

Policies

- 1. <u>City of Mount Pearl Municipal Plan</u> (MP)
 - a. Section 4.2.6 and 6.2.15 (v) Access to Parks and Community Services
 - b. Section 7.6.1 (viii) Road Hierarchy Disability Provisions

Regulations

- 1. <u>Buildings Accessibility Regulations</u> (NL)
- 2. Designated Mobility Impaired Parking Regulations (NL)
- 3. <u>City of Mount Pearl Building Regulations 2011</u> (MP)
- 4. Mount Pearl Development Regulations 2010 (MP)
 - a. Section 6.25 Minor Front Yard Projections on a Residential Lot
 - b. Section 6.37 Residential Wheelchair Ramp
 - c. Section 9.4 Designated Mobility Impaired Parking Spaces

Other Relevant Standards, Reports, Guides, Studies, etc.

- 1. National Building Code of Canada, esp. Sections 3 & 9
 - a. CAN/CSA-B651-12 Accessible Design for the Built Environment
- 2. <u>Barrier-free Design Guide</u> (Safety Codes Council of AB, 2008)
- 3. <u>Accessible Housing Guide for Landlords and Property Developers</u> (Independent Living Resource Centre NL, n.d.)
- 4. <u>Universal Design Guiding Principles</u> (City of Winnipeg, 2006)
- 5. <u>Housing for Older Canadians Vol 4</u> (CMHC, 2012)
- 6. Flex Housing Checklist (CMHC, 2014)
- 7. Accessible Housing By Design Ramps (CMHC, 2006)
- 8. Accessible Housing By Design Exterior Spaces (CMHC, 2014)



LIST OF ATTENDEES

Below is a list of the organizations that were represented at the workshop. If you would like to know more about that organization please visit their website (see below) or contact Christopher Hardy at <u>chardy@mountpearl.ca</u> or 748-1106.

- Canadian Home Builders' Association NL www.chbanl.ca
- Canadian Mortgage and Housing Corporation <u>www.cmhc-schl.gc.ca</u>
- City of Mount Pearl <u>www.mountpearl.ca</u>
- City of St. John's www.stjohns.ca
- Coalition of Persons with Disabilities Newfoundland and Labrador <u>www.codnl.ca</u>
- Eastern Health <u>www.easternhealth.ca</u>
- Government of NL <u>www.gov.nl.ca</u>
- NL Department of Municipal Affairs <u>www.ma.gov.nl.ca</u>
- NL Disability Policy Office <u>www.cssd.gov.nl.ca/disabilities</u>
- NL Housing <u>www.nlhc.nf.ca</u>
- Service NL <u>www.servicenl.gov.nl.ca</u>
- Spinal Cord Injury NL <u>www.sci-nl.ca</u>
- Town of Conception Bay South <u>www.conceptionbaysouth.ca</u>
- Town of Paradise <u>www.paradise.ca</u>

city of Mount Pear

UNIVERSAL DESIGN WORKSHOP

Universal Design Workshop

January 21, 2016

Mount Pearl Soccer Hut







Universal Design

"The intent of universal design is to simplify life for everyone by making products, communications, and the built environment more usable by as many people as possible at little or no extra cost. Universal design benefits people of all ages and abilities."

Ronald L. Mace, Design Pioneer and Visionary of Universal Design

Universal Design



Universal Design



Sifting through the terminology





Minor differences (specific measurements, residential vs community focus) but all share the same goal

5

Principles of Universal Design



Equitable Use

The design is accessible and appealing to all users; if possible, one design should serve all users comfortably and safely, but if not, accessible alternatives should be available to those who cannot use the mainstream design.

Equitable use . At the neighbourhood or community level

Making all public buildings and outdoor spaces fully accessible, including sidewalks, parks, transit and community facilities



City of Tulsa

8

Equitable use . In the home

Lever door handles on all doors, easygrip fixtures, hands-free faucets



Equitable use . In the home



Accessible (no-step) covered entrance for accessibility, adaptability and visitability

Flexible in use

Users have choices in manipulating an object or navigating a space; the design can be used in a variety of ways by people as their ages, abilities and preferences change over the lifecycle of the building or space.

Flexible in use . At the neighbourhood or community level

A community gathering space that can be used, for example, for public meetings, community events, neighborhood organizations, public health, commercial space, senior residence



Tapestry Seniors Residence, University of British Columbia



Symmetrical design can be beneficial for people as housing needs and preferences change over the lifecycle of the building or space.





One room can be updated into two rooms with **minimal cost and disruption**











CMHCos Flex House Demo - Adaptable House and Rooms



Simple and intuitive

Users can **immediately see** how to use an object or navigate a space, and they receive feedback on their use as they proceed.

Simple and intuitive . At the neighbourhood or community level

Clear and straightforward street networks, with landmarks that distinguish particular areas and flow patterns



Simple and intuitive . In the home



Perceptible information

The design is **clear and legible to all users**, regardless of their level of ability, including vision, hearing and mobility.

Perceptible information . At the neighbourhood or community level

Clear street signs, markings, bells at crosswalks


Perceptible information . In the home

Clear signage for entrances and exits, elevators, washrooms; emergency warnings that include flashing lights for the deaf and audible cues for the blind





Tolerance for error

The design minimizes the potential for errors and dangers; if the user misuses an object or navigates the wrong way in a space, the effects are reversible.

Tolerance for error . At the neighbourhood or community level

Maximum connectivity; for example, no dead ends or cul-de-sac, sloped grade differences between bike, pedestrian and auto lanes, or low guards with many entrance and exit points.



Tolerance for error . In the home

Automatic shutoffs for heating elements or taps; temperaturelimiting controls for taps and showerheads



Tolerance for error . In the home



Curbless shower entrance for improved accessibility, adaptability and visitability.

Low physical effort

The design of objects and spaces does not require the user to exert great physical effort, to adopt an uncomfortable body position or to

engage in tiring and repetitive physical tasks.

Low physical effort. At the neighbourhood or community level

Street network connectivity to provide, for example, for short trips, easy rolling surfaces, gentle slopes, minor abrupt variations in surface heights (curbs, thresholds)



Low physical effort. In the home



Innovative features can improve adaptability/ visitability while reducing the level of physical effort to complete simple tasks



Size and space for approach and use

All users can reach and manipulate objects and navigate spaces comfortably

Size and space for approach and use . At the neighbourhood or community level

Public spaces and features, such as picnic tables, and sidewalks and parks that can accommodate wheelchairs and electric scooters



Size and space for approach and use . In the home



Features in the home can accommodate a variety of specific housing needs related to accessibility/adaptability/ visitability



Cost and Construction Considerations





During the Construction Process õ

Strategic Pre-Wiring and Pre-Plumbing

 $\downarrow \downarrow \downarrow \downarrow$

Conversion into a Kitchen should there be a need to divide the house into two units



Additional and strategic reinforcements during the construction phase



Additional reinforcements to facilitate further adaptability $\downarrow \downarrow \downarrow$







Additional space in strategic locations

Facilitates adaptability and aging in place



Additional Space Requirements (m³)

	Std. Plan	Mod. Plan	% Increase
Bungalow	136	136	0%
Semi- Detached	121	130	7%
Detached	154	162	5%
Townhouse	165	168	2%
			_

CANADA MORTGAGE AND HOUSING CORPORATION

Additional Space Requirements (m³)





CANADA MORTGAGE AND HOUSING CORPORATION



Cost Considerations



Cost Considerations



CANADA MORTGAGE AND HOUSING CORPORATION

Cost Considerations





CANADA MORTGAGE AND HOUSING CORPORATION

Cost Considerations



CANADA MORTGAGE AND HOUSING CORPORATION

Cost Considerations



Cost impact between standard construction and accessible/adaptable construction

	Standard Construction Cost ¹ (Estimated)	Cost Differential
Bungalow	\$192,500	6%
Semi-Detached	\$165,500	12%
Single-Detached	\$200,500	10%
Townhouse	\$180,350	7%

¹ Estimated construction costs are for a modest home in the Halifax CMA.

Cost of including accessibility features in modified plans

Rank	City	Benchmark index
1	Toronto	100.9%
2	Montreal	100%
3	Vancouver	94.6%
4	Halifax	90.1%
5	Winnipeg	88.3%

¹ Estimate costs are for a modest home in the Halifax market.

Finding Resources



Finding Resources

Accessible and Adaptable Homes

Accessible and adaptable housing enables people of all ages and abilities to stay in their community as long as possible.



Finding Resources

cmhc.ca/accessibleandadaptablehomes



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The Mount Pearl Context

- **Mount Pearl Strategic Plan 2011-2016**
- **Mount Pearl Municipal Plan 2010**
- Mount Pearl Development Regulations 2010
- Mount Pearl Building Regulations 2011
- " Provincial Buildings Accessibility Regulations



MOUNT PEARL STRATEGIC PLAN 2011-2016

Mount Pearl must respond to shifts in our population demographics.

- ["] To consider, and where feasible, adopt a universal design for future infrastructure and development in the city.
- ["] To undertake an affordable seniors housing pilot project in the city.
- To provide a range of housing options that responds to the differing needs of our citizens.
- ["] To provide opportunities for Mount Pearl citizens to stay in Mount Pearl throughout all stages of life.
- ["] To be recognized by citizens as being age friendly.



MOUNT PEARL MUNICIPAL PLAN 2010

- To introduce sustainable community planning principles and green infrastructure initiatives that will enhance livability and quality of life for the citizens of Mount Pearl.
- To enhance quality of life and aesthetics in the City and to encourage and celebrate excellence in urban design and development.
- To provide for a diverse mix of housing forms within the City to ensure a variety of choice and affordable housing. The City housing options should therefore seek to evolve with changes in market demand, and the opportunities for housing which is supportive of an age-friendly community.
- To examine the introduction of universal design elements to residential projects to further encourage accessible housing design.
- To ensure that all municipal community and recreational facilities are available and designed to age-friendly standards to facilitate easy access and mobility for all citizens, including those with disabilities.



MOUNT PEARL DEVELOPMENT REGULATIONS 2010

Designated Mobility Impaired Parking Spaces

9.1 For any development where parking spaces for person with disabilities, are required pursuant to the Building Accessibilities Regulations under the Building Accessibility Act (Newfoundland and Labrador), such spaces shall be provided on the basis of one (1) parking space per lot or four percent (4%) of the total number of required parking spaces provided on the lot, whichever is greater, and such parking space or spaces shall be designated and marked in accordance with the Designated Mobility Impaired Parking Regulations under the Highway Traffic Act (Newfoundland and Labrador) and the Building Accessibilities Act.



MOUNT PEARL BUILDING REGULATIONS BUILDINGS & ACCESSIBILITY REGULATIONS

MOUNT PEARL BUILDING REGULATIONS

" Reference to Codes

PROVINCIAL BUILDINGS ACCESSIBILITY REGULATIONS

" Referral to Service NL



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Mount Pearl Soccer Hut
Social Policy & Universal Design



Disability Policy Office Department of Seniors, Wellness and Social Development

Disability Policy Office

Apply disability lens to public policy, legislation and programs; determine impact for persons with disabilities; identity gaps, barriers, and solutions	Advise on current accessibility standards, inclusion practices and emerging technologies	Link government departments to community-based expertise and resources
Lead for Provincial Strategy (and action plans) for the Inclusion of Persons with Disabilities (facilitate, monitor, measure, report)	Act as secretariat for the Provincial Advisory Council for the Inclusion of Persons with Disabilities	Engage and collaborate with community organizations of and for persons with disabilities

A Powerful Story





Not all disabilities look like this Some disabilities look like this

New Way of Thinking

Inclusive Policies Inclusive Practices

Social Policy

What is the role of social policy in making social change?



Legislation can be a powerful vehicle for positive social change







Legislation or Charters

Canada

- Canadian Charter of Rights and Freedoms
- " Canadian Human Rights Act
- UN Convention for the rights of Person with Disabilities

Newfoundland and Labrador

- Adult Protection Act
- ["] Enduring Pwrs of Attorney
- " Building Accessibility Act
- Highway Traffic Act
- "Human Rights Act NL
- Self-Managed HomeSupport Services Act
- " Service Animal Act
- "Mentally Disabled Persons' Estates Act

Social Policy

Other ways social policy can impact social change?



Develop strategies or policies to promote inclusive culture.

Universal Design principles = fluid process which allows for all people to access and participate in their environments.

Question?

As a municipality, when should we be thinking about disability and disability issues?



Let's re-think the question 7



As a municipality, when should we be thinking about disability and disability issues?

When should we be thinking about access and accessibility?



All the Time...





















Empowerment through Design



Comments or Questions





Contact Information

Disability Policy Office

Phone: 709 729-6279; TTY: 709 729-5440;

Email: <u>disability.policy.office@gov.nl.ca</u>

Website: www.gov.nl.ca/DisabilityPolicy

Catherine Shortall

E: catherineshortall@gov.nl.ca

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Newfoundland Labrador

Welcome to The Journey of Design: "A Universal Approach" - Anna

Dave Dewling, MNLAA – Architect Department of Municipal Affairs

The Project Journey

- **Design is a process within a process**
- It sits between Promise and Delivery



The Promise

- Wision Wish, Want and Need
 - Goals
 - \circ Objectives
 - Deliverable





The Promise

″ Goal:

- An offer to produce/deliver something on budget, on time:
 ie. a vacation, party, renovation or new build
- " Objective:
 - To be inclusive, Universally Designed
- ["] Deliverable:
 - o The Solution



http://dilbert.com/strip/1994-02-20



Delivery

- The result of the design being ready for pricing and results in a final product being delivered
- " Agreement on the results of the pricing
- Delivery of the product
- Product delivery; the final outcome, vacation, party, renovation or new build



The Design

- ["] Phases of Design
 - Preliminary (Pre-Design)
 - Concept Design
 - \circ Design Development
 - Contract Documents



The Design

- - Research
 - \odot Research the issues
 - \odot Engage the stakeholders
 - \odot Set the boundaries, what can be achieved
 - \odot Understand the challenges







Newfoundland Labrador



The Design

- ["] Concept
 - The packaging of the information and forming a solution that is deliverable
- ["] Design Development
 - Refinement of the concept and the beginning of detail planning
- Contract Documents
 - The detail information prepared to form the basis for pricing and verification of the final prepared solution



Universal Design

- Vision Solution to the issue, Universally Designed
 - \circ Goals out comes for achieving final solution
- Őbjectives
 - The Measurables: indicators to measure the achieved outcome
- ["] The solution
 - Remember every solution is based on the research, time and available resources: time to do more research could discover a different solution that may be available
 - $\,\circ\,$ Be open to an alternative solution





Thank You

Dave Dewling MNLAA, Architect Email: dewlingd@gov.nl.ca Phone: (709) 729-1189

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What needs to be done and considered to make Mount Pearl universally accessible?

Shelley Di-Nur, Occupational Therapist Rehab Day Services, L·A· Miller Centre, Eastern Health shelley·dinur@easternhealth·ca

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- Peer Support Specialist/Community Rehabilitation
- He has worked with SCINL full time for 4 years and volunteered/part time for over 10 years
- He has been an ambassador with the Rick Hansen Foundation for 14 years

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'Extreme' 4.5-storey project assailed in Mount Pearl

CBC News Posted: Apr 16, 2013 12:35 PM NT | Last Updated: Apr 16, 2013 4:24 PM NT



Mount Pearl city council is considering a proposal to put a 42-unit complex on this part of Delaney Avenue. (Zach Goudie/CBC)

A woman in a Mount Pearl neighbourhood says her low-rise area will be destroyed if city council allows a proposed apartment complex to proceed, even if it is just over four storeys.



RESEARCH REPORT



Study of the Cost of Including Accessibility Features in Newly-Constructed Modest Houses Revised Final Report





CMHC — HOME TO CANADIANS

Canada Mortgage and Housing Corporation (CMHC) has been Canada's national housing agency for almost 70 years.

CMHC helps Canadians meet their housing needs. As Canada's authority on housing, we contribute to the stability of the housing market and financial system, provide support for Canadians in housing need, and offer objective housing research and information to Canadian governments, consumers and the housing industry. Prudent risk management, strong corporate governance and transparency are cornerstones of our operations.

For more information, visit our website at **www.cmhc.ca** or follow us on **Twitter, YouTube, LinkedIn** and **Facebook**.

You can also reach us by phone at 1-800-668-2642 or by fax at 1-800-245-9274.

Outside Canada call 613-748-2003 or fax to 613-748-2016.

Canada Mortgage and Housing Corporation supports the Government of Canada policy on access to information for people with disabilities. If you wish to obtain this publication in alternative formats, call 1-800-668-2642.

The information in this publication is a result of current research and knowledge. Readers should evaluate the information, materials and techniques cautiously for themselves and consult appropriate professional resources to see if the information, materials and techniques apply to them. The images and text are guides only. Project and site-specific factors (climate, cost, aesthetics) must also be considered.

Canada Mortgage and Housing Corporation (CMHC)

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

Revised Final Report

Submitted to: Janet Kreda Canada Mortgage and Housing Corporation 700 Montreal Road Ottawa ON K1A 0P7 jkreda@cmhc-schl.gc.ca

Submitted by: SOCIÉTÉ LOGIQUE

3210 Rachel Street East Montréal QC H1W 1A4

Project Manager: Isabelle Cardinal, Architect Director, Consulting Services Telephone: 514-522-8284, ext. 117 Fax: 514-522-2659 E-mail: <u>icardinal@societelogique.org</u>

File 6296-01

Table of Contents

EXECUTIVE SUMMARY			3
1.	PROJECT DESCRIPTION	page	4
2.	METHODOLOGY	page	5
3.	MUNICIPAL CONSTRUCTION REGULATIONS	page	11
4.	KEY PRINCIPLES OF ACCESSIBILITY	page	12
5.	FLOOR PLANS	page	17
6.	COSTS	page	19
7.	CONCLUSION	page	22

APPENDIX 1: Municipal construction regulations

- **APPENDIX 2: Accessibility features**
- APPENDIX 3: Standard benchmark plans and modified plans
- APPENDIX 4: Detailed table of costs
- APPENDIX 5: Stakeholders' contact information Municipalities
- APPENDIX 6: Stakeholders' contact information Contractors and homebuilders' associations

Executive Summary

This research estimates the cost of incorporating accessibility features in newly constructed modest houses. It identifies universal features that would allow a dwelling to be adapted as its inhabitants age and which would be difficult or expensive to incorporate after construction.

Benchmark plans for five common types of dwellings were developed and then modified to include about 60 accessibility features. The marginal cost of including these accessibility features *at the time of design and construction* were estimated for modest bungalows, townhouses, semi-detached houses , detached houses and apartments, in five Canadian cities.

The costing methodology used several sources: the <u>www.costtobuild.net</u> website, RSMeans *Contractor's Pricing Guide: Residential Repair & Remodeling 2015 Book*, and a proprietary design tool. Plans and costs reflected municipal construction regulations and were reviewed by local home builders or builders` associations.

About three-quarters of the 60 features added for future accessibility cost less than \$500 each. Cost estimates reflect both the accessibility features (e.g. lever door handles, plywood-reinforced bathroom walls to accommodate future grab bars) and extra square footage added for greater accessibility (e.g. allowance for a wheel chair turning circle in bathrooms). Some floor plans were found to be easier to adapt than others.

The total cost of adding all the accessibility features was found to represent between 6 and 12 per cent of the base construction cost, depending on the type of dwelling and city. These cost estimates were compiled to demonstrate the marginal extra cost of providing adaptable housing if accessibility features are considered at the time of design and construction. Actual costs will, of course, vary based on local conditions.

Although this information product reflects housing experts' current knowledge, it is provided for general information purposes only. Any reliance or action taken based on the information, materials and techniques described are the responsibility of the user. Readers are advised to consult appropriate professional resources to determine what is safe and suitable in their particular case. Canada Mortgage and Housing Corporation assumes no responsibility for any consequence arising from use of the information, materials and techniques described.

1. Project description

This research focuses on the construction of housing units with certain basic accessibility features to enable residents to live and age at home.

The purpose of the project is to estimate the cost of including these accessibility features in newly constructed modest houses. Five types of construction were selected for this study: a two-bedroom bungalow, a semi-detached two-bedroom house, a detached three-bedroom house, a three-bedroom townhouse and a two-bedroom apartment. These are the popular home options in Canada.

In particular, the study identifies features that would have a significant impact on the home's accessibility performance and that would be difficult or expensive to incorporate after construction. These are universal features likely to be useful and pleasing to most people. The objective is not to build houses in which persons with disabilities can live. The idea is to construct accessible, adaptable homes that can be modified over time without any major upgrades or costs, based on the occupants' changing needs.

The cost of these accessibility features and their net impact on total construction costs were established for the five types of dwellings in five cities in Canada.

The following steps were undertaken to fulfill the mandate:

- 1. Make a list of accessibility features whose costs are to be established.
- 2. Select five cities for analysis of construction costs.
- 3. Identify municipal construction regulations that apply in each selected city.
- 4. Establish floor plans for five standard benchmark homes and validate these plans with homebuilders for each selected city.
- 5. Modify the standard benchmark plans by including the accessibility features.
- 6. Estimate the cost of building standard benchmark homes in each of the five cities.
- 7. Estimate the costs of including the accessibility features in the modified plans and confirm these costs with homebuilders for each selected city.

2. Methodology

1. Make a list of accessibility features whose costs are to be established

CMHC developed a preliminary list of features, which was subsequently completed as part of the mandate.

Features that would have a significant impact on accessibility performance and that would be difficult or expensive to incorporate after construction were selected.

Features involving details that are easy to install or that can be provided at negligible cost after construction are therefore not included in the list of features.

Features involving adaptations specific to the needs of a particular individual are also not included in the final list because the mandate does not cover construction of adapted housing; it focuses on building accessible homes that can be adapted.

2. Select five cities for analysis of construction costs

The choice of cities for the study was based on the following criteria:

- Major Canadian city
- Representative of each region (the West, Prairies, Ontario, Quebec, Atlantic)
- High 2013/2014 rate of housing starts compared to other cities in the same region (according to CMHC)
- Builders or homebuilders' association in the region that can provide information on the local situation, validate benchmark plans and provide information on construction costs
- Availability of information on construction costs

The five following cities were selected:

- 1. Vancouver, British Columbia
- 2. Winnipeg, Manitoba
- 3. Toronto, Ontario
- 4. Montréal, Quebec
- 5. Halifax, Nova Scotia

3. Identify municipal construction regulations that apply in each selected city

The regulatory body from which to obtain information on applicable housing construction regulations was identified for each city.

Specifically, this involved checking whether accessibility features were required in standard construction to ensure these features were not included in the incremental costs of developing modified plans.

Contact information for the individuals contacted in each city is provided in Appendix 5.

4. Establish floor plans for five standard benchmark homes and validate these plans with homebuilders for each selected city

Construction plans for various types of homes were first selected from Internet sites (real estate developers, house plans) and plans provided by CMHC. The following maximum areas were considered:

- 1,800 sq. ft. (176 m^2) for a two-storey house
- 1,200 to 1,500 sq. ft. (111 to 140 m²) for a bungalow

Different builders or homebuilders' associations for each region were then contacted to ensure the selected plans were representative models for each target city. Note that, for Halifax, it was not possible to identify any stakeholders to comment on the submitted plans.

Contact information for the individuals contacted in each city is provided in Appendix 6.

The types of plans and the plans themselves were adjusted based on feedback. Five plans for standard benchmark homes were finally selected:

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

The homes include a garage and basement in order to take into account consumer preferences for this type of space.

The five home types are not necessarily representative of housing construction in all the cities. Typically, two or three types are representative for a given city.

5. Modify the standard benchmark plans by including the accessibility features

The standard plans selected for the five home types were modified to include the accessibility features identified in step 1.

One of the challenges was to ensure that the areas in the standard and modified plans were the same, while also ensuring the number of bedrooms and the quality of the spaces were the same. Some modifications did, however, require additional space for the home as well as for the garage.

Not all of the accessible features could be included in every plan. Some plans provided better potential for certain features, especially for getting from one floor to another.

6. Estimate the cost of building standard benchmark homes in each of the five cities

The <u>www.costtobuild.net</u> website was used to determine the standard construction cost of the four single-family homes (bungalow, semi-detached house, detached house and townhouse) in Montréal.

The <u>www.costtobuild.net</u> website can be used to calculate the construction costs of a single-family home, based on criteria such as building area, number of floors, building style, materials, number of bedrooms, number of bathrooms, presence or absence of a basement, presence or absence of a garage, etc.

For purposes of the study, the following materials were selected to calculate costs: wood flooring on upper floors, ceramic flooring in the kitchen and bathrooms, thermoplastic kitchen and bathroom cabinets, and laminate countertops.

Costs for the four other cities were assessed using the RSMeans *Contractor's Pricing Guide: Residential Repair & Remodeling 2015 Book.* This estimation tool includes data on construction costs and indexes for a number of cities in the United States and Canada.

The RSMeans *Contractor's Pricing Guide: Residential Repair & Remodeling 2015 Book* provides the following indexes for the five cities selected for this study:

Rank City		Benchmark index		
1	Toronto	100.9%		
2	Montréal	100%		
3	Vancouver	94.6%		
4	Halifax	90.1%		
5	Winnipeg	88.3%		

The costs of construction for standard benchmark homes in Toronto, Vancouver, Halifax and Winnipeg were extrapolated from the costs identified for Montréal, based on the established indexes.

The costs obtained in this way were submitted to builders or regional homebuilders' associations to confirm their accuracy. Only the Toronto stakeholders commented on the costs submitted.

Various meetings were held with designers, the developer and the builder to establish the construction cost of the benchmark apartment, but information has yet

to be obtained on the cost of constructing the building in which the apartment is located. No base cost is therefore indicated.

7. Estimate the cost of including accessibility features in the modified plans and confirm these cost estimates with homebuilders for each of the selected cities

Costs were first established for Montréal, since we already had all the necessary resources for estimating costs.

There are various types of costs for accessibility features:

- Construction system: foundation wall, exterior wall or roof
- Additional area: balcony, bathroom, garage
- Module: vertical module for future built-in oven
- Hardware: lever faucet, lever hardware
- Material: plywood nailing base
- Labour: time required to install the nailing base
- And some features do not involve extra costs (some flooring, colour choices, etc.)

Several estimation strategies were used:

- The <u>www.costtobuild.net</u> site was again used to determine the costs of some additional areas (floor plan, garage, balcony and canopy).
- An in-house estimating tool was then used for various jobs related to accessibility (pull-out shelves, built-in oven module, etc.).
- Specialized manufacturers were consulted to identify the costs related to specific equipment (doors, hardware, plumbing fixtures and appliances, kitchen fixtures, etc.).
- The hourly rates of the various construction trades were also used to assess the cost of certain jobs.
- A senior structural technician with experience in home adaptation projects was consulted to determine the methods and costs of building an easily modifiable structure that could accommodate a vertical platform lift or curbless shower.
- Finally, three general contractors with experience in building accessible or adapted homes were consulted to confirm the costs of certain features (additional excavation, canopy, etc.).

Again, the cost of accessibility features for the four other cities was assessed using the RSMeans *Contractor's Pricing Guide: Residential Repair & Remodeling 2015 Book.* This estimation tool includes data on construction costs and indexes for a number of cities in the United States and Canada.

The RSMeans *Contractor's Pricing Guide: Residential Repair & Remodeling 2015 Book* provides the following indexes for the five cities selected for this study:

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1	Toronto	100.9%			
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4	Halifax	90.1%			
5	Winnipeg	88.3%			

The cost of accessibility features for Toronto, Vancouver, Halifax and Winnipeg were extrapolated from the costs identified for Montréal, based on the established indexes.

All the estimated costs were submitted to builders or homebuilders' associations to confirm their accuracy. Only the Toronto stakeholders commented on the costs submitted.

It should be noted that the costs in this report are estimates only, compiled to demonstrate the marginal extra cost of providing adaptable housing *if accessibility features are considered at the time of design and construction*. Actual construction 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 other factors.

3. Municipal construction regulations

The regulatory body for each city was consulted to identify the accessibility features required under municipal regulations.

Generally speaking, the provinces covered in this study use a building code based on the 2010 National Building Code (NBC), with the exception of Quebec, whose Construction Code is based on the 2005 NBC. All the provinces in which the selected cities are located have made amendments to NBC requirements, some regarding accessibility.

However, since under the NBC single-family homes are excluded from the scope of application of the Barrier-Free Design section, no accessibility measure is required for the targeted homes.

It is then up to municipalities to establish regulations that are more stringent than those of the province. This is notably the case in Vancouver, Toronto and Halifax, which have adopted more stringent accessibility regulations.

More detailed information regarding regulations specific to each city is presented in Appendix 1.

4. Key Principles of Accessibility

The accessibility features that were identified, included in the modified plans, and whose cost was then assessed are grouped in different categories, the key principles of which are explained here. Those features are detailed in Appendix 2.

Again, the objective of these accessibility features is not to build houses in which persons with disabilities can live. The idea is to construct accessible, adaptable homes that can be modified over time without any major upgrades or costs, based on the occupants' changing needs.

Building layout

A home's accessibility performance is primarily related to the number and usability of accessible entrances.

The entrance to an accessible home is level or slightly above ground, whereas the entrance to a standard home is about 510 mm (20 in.) above ground. To make the entrance level with the ground, the joists for the entrance level are embedded in the top of the foundation wall to reduce the height from the ground.

The walkway leading to the entrance slopes gently (1:20 maximum), without any steps or ramps. This walkway also leads to the garage without any steps or ramps.

Access to the home

A landing or balcony with enough wheelchair manoeuvring space (turning circle of 1,500 mm (5 ft.) minimum in diameter) is provided at the entrances.

The front door, the door connecting the garage to the dwelling and the door leading to the back patio are 915 mm (36 in.) wide, which provides 860 mm (34 in.) of clearance. The doors are equipped with lever handles. The threshold is flat if the door is protected from the weather. If not, the threshold is standard but embedded to make it as level as possible with adjacent surfaces.

The door has a sufficiently low glass panel or a glass sidelight that allows occupants to see who is at the door. A peephole in the door is now standard in apartments. A second peephole at an accessible height must be provided. To make it easier to approach and operate the door in a wheelchair, 600 mm (24 in.) of free space is provided on the side of the handle when the door needs to be pulled open and 300 mm (12 in.) of space is provided when the door needs to be pushed open.

Garage dimensions and difference in elevation between the garage and the house

An accessible garage provides enough room to park a car and manoeuvre around it in a wheelchair (turning circle of 1,500 mm (5 ft.) in diameter).

The height between the garage and the house should be as low as possible to make it easy to move back and forth between them. Ideally, the path between the two should be level. A maximum 100 mm (4 in.) difference in height allows for the installation of a short access ramp, if necessary.

A 4,270 mm (14 ft.) wide by 6,100 mm (20 ft.) long single-car garage meets these needs.

The garage has a 2,750 mm (9 ft.) ceiling, providing ample space for various types of adapted vehicles.

Note that a single-car garage cannot accommodate a side-loading wheelchair van. A double garage is required for this type of vehicle.

<u>Mobility</u>

Corridors must be at least 920 mm (36 in.) wide. Wheelchair manoeuvring space (turning circle of 1,500 mm (5 ft.) in diameter) is provided at key locations, such as in front of the washer/dryer, on both sides of the doors, in front of storage space, in each room, etc.

Doors are 865 mm (34 in.) wide, which provides 815 mm (32 in.) of clearance. Doors are equipped with lever handles, and flooring is installed so as to eliminate door sills.

To make it easier to approach and operate doors in a wheelchair, 600 mm (24 in.) of free space is provided on the side of the handle when the door needs to be pulled open and 300 mm (12 in.) of space is provided when the door needs to be pushed open.

When wheelchair manoeuvring space is compromised by a swinging door, a recessed sliding door can be installed instead.

The bedroom is large enough to provide a 1,500 mm (5 ft.) turning circle beside the bed. At least one bedroom has a door with the required clearance on the side of the door handle.

Smooth, slip-resistant flooring is installed. Carpet is not recommended.

Controls and security system

Switches, thermostats and controls are located a little lower than usual.

All hardware is designed for one-hand operation: lever handles, easy-to-manoeuvre locks, D-shaped cabinet and drawer handles, etc.

<u>Kitchen</u>

A U-shaped counter provides a continuous work surface and makes it easy to handle dishes without having to carry them from one counter to another. A 1,500 mm (5 ft.) space in front of all sections of the counter makes it easy to move around in a wheelchair.

Counter height is standard to accommodate normal kitchen appliances, such as a dishwasher and stove. The upper cabinets are also at standard height. If necessary, the bottom cabinets can easily be modified or replaced with lower cabinets, and the upper cabinets can be lowered.

Pull-out shelves, corner lazy Susan cabinets and full-height storage allow occupants to work and access objects from a sitting position. A roll-in pantry also allows occupants to reach many objects from a sitting position. When space is limited, deep drawers in the lower cabinets can be installed instead of a roll-in pantry.

The kitchen can easily be modified by installing a built-in oven and replacing the stovetop with a movable hotplate below. Vertical storage at least 760 mm (30 in.) wide is provided for future installation of a built-in oven.

The kitchen sink cabinet is designed with a separate toe kick panel and a removable bottom section to make it easy to free the space underneath the sink for wheelchair access, if necessary. The sink is equipped with a lever faucet.

Ceramic flooring is installed throughout the kitchen, including under the counters. This provides uniform flooring underneath the sink if the space has to be converted for wheelchair access.

<u>Half-bath</u>

In two-storey houses, a half-bath is provided on the main floor with space for wheelchair access (1500 mm (5 ft.) turning radius).

The toilet is adjacent to a wall and nailing bases are provided for future installation of grab bars on the side and rear walls. The space next to the toilet is free, but can be compromised when space is limited.

A wall-mounted sink with lever handles and no pedestal is preferable.

Bathroom

The bathroom is large enough to provide wheelchair access (1500 mm (5 ft.) turning radius).

The entire area in front of the bathtub is clear. When a shower is provided, it is large enough to be converted into a roll-in shower, if necessary. The structure underneath the shower is designed for easy conversion.

The toilet is adjacent to a wall and nailing bases are provided for future installation of grab bars on the side and rear walls. The space next to the toilet is free, but can be compromised when space is limited.

The bathtub, shower and sink have lever faucets.

<u>Lift</u>

Single-family homes are designed for future installation of a chair stair lift, platform stair lift or vertical platform lift in a well for access to all floors, including the basement.

Chair or platform stair lift

Where possible, a straight staircase without landings or turns is planned for future installation of a chair or platform stair lift

Since the staircase is also an evacuation route, it must meet certain width requirements to allow occupants to go downstairs to reach the exit on the entry level. A lift can be installed in a staircase 1000 mm (39 in.) wide, which meets evacuation width requirements.

A space for wheelchair access (1500 mm (5 ft.) turning radius) is provided at the top and bottom of the stairs. However, future installation of a platform stair lift requires

more space on the lower landing, which is not always provided at the time of construction. If necessary, a closet can easily be demolished to provide the additional space required.

Vertical platform lift

Space is provided by stacking closets or storage space on top of one another.

These areas have a knock-out floor panel to simplify future installation of a platform lift.

Where future installation of a vertical lift platform is planned (semi-detached and detached houses), the staircase was nevertheless expanded to offer the option of installing a chair stair lift if one is required.

Fire safety and evacuation

When the fire alarm is triggered, most people know it's time to evacuate the building. The alarm must warn all occupants regardless of their sensory abilities. Systems must be in place to allow all occupants to exit the building independently.

To achieve this, audible <u>and visual</u> smoke alarms are installed and all dwelling entrances are accessible (main entrance, rear entrance and access to the garage).

The floor where the bedrooms are located includes a balcony where occupants can find shelter and wait for help to arrive, away from smoke. The basement also has an exit to the outside.

Windows

Windows are installed at a height that allows occupants to see outside from a sitting position. They can easily be opened and locked with one hand from a sitting position.

5. Floor Plans

Five plans for standard benchmark homes were selected:

- Bungalow with an area of 136 m², excluding basement, with a 24 m² garage, two bedrooms and one full bathroom;
- Two-storey semi-detached house with an area of 121 m², excluding basement, with a 24 m² garage, two bedrooms, one half-bath on the main floor and one full bathroom on the second floor;
- Two-storey detached house with an area of 162 m², excluding basement, with a 24 m² garage, three bedrooms, one half-bath on the main floor and one full bathroom on the second floor;
- Two-storey townhouse with an area of 165 m², excluding basement, with a 23.8 m² garage, three bedrooms, one half-bath on the main floor and two full bathrooms on the second floor;
- Two-bedroom apartment with an area of 81 m² and one full bathroom.

Generally speaking, integrating accessibility features resulted in minor modifications to the plans, most affecting the interior layout only.

Some more substantial modifications, however, involved adding surface area or changing the interior organization more significantly, namely:

- expanding the garage by about 2 m² for benchmark homes with a garage, with the exception of the townhouse, to which 0.5 m² of additional garage space was added;
- adding 9 m² of floor space for the semi-detached house, 8 m² for the detached house, 3 m² for the townhouse and 1 m² for the apartment;
- changing the configuration of the staircase to make it straight and/or wider so that a lift could be installed, while meeting evacuation width requirements;
- adding a second bathroom upstairs in the detached house as a result of reconfiguring the staircase; and
- adding a balcony upstairs in the two-storey houses as a refuge option in case of fire and expanding the balcony in the apartment by about 0.5 m².

The standard and modified plans are presented in Appendix 3. The accessibility features are indicated in the modified plans by numbers, which are explained in the detailed features table in Appendix 2.

Size of Modified Floor Plans

Some floor plans were easier to modify for accessibility and adaptability than others, due to design complexity, layout limitations or location of stairwells, for example. In the benchmark bungalow and the apartment accessibility features could be integrated into the standard floor plans with no increase in the living area. In the townhouse a relatively small increase of three square metres (2%) was needed. In the detached and semi-detached models, increases of eight square metres (5%) and nine square metres (7%), respectively, were required. The size of the garage was increased in all models by amounts ranging from 0.5 to 0.8 square metres.

	Home (m ²)			Garage (m ²)		
	Standard	Modified	%	Standard	Modified	%
	Plan	Plan	Increase	Plan	Plan	Increase
Bungalow	136	136	0	24	25.9	8%
Semi-						
detached	121	130	7%	24	25.9	8%
house						
Detached	154	162	5%	24	25.9	8%
house	104	102	070	2 -1	20.0	0,0
Townhouse	165	168	2%	23.8	24.3	2%
Apartment	81	81	0	Not Applicable	Not Applicable	-

Table 1. Increases in Area Required to Accommodate Accessibility Features

6. Costs

Cost of Individual Accessibility Features

The estimated costs of approximately 60 accessibility features (e.g. lever door handles, plywood-reinforced bathroom walls to accommodate future grab bars, extra space for a wheel chair turning circle in key areas) are shown in Appendix 4.

The vast majority of features cost less than \$500: (57%) generate nil or negligible costs, that is, between 0 and \$100. Another 18% of features are low cost, that is, \$100 to \$500. Some accessibility features even generate costs lower than those of traditional construction (e.g. wall sink in place of a vanity in the main floor half-bathroom)



Figure 1: Cost differential of accessibility features on construction costs

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

Lastly, ten features (17%) generate a high cost that is more than \$1,000. These are features that have an impact on the layout of the building (single-storey, stairless); that add to the floor space (size of garage and manoeuvring area in the kitchen, in the bathroom, and at the top and bottom of the staircase); and that provide protection against the elements above a door and offer a refuge option on a balcony on the second floor in case of fire.

The detailed cost table is presented in Appendix 4. The cost of each accessibility feature is shown for each type of dwelling and for each city.
Since building regulations vary from one city to another, some accessibility features are included in the cost of construction of standard benchmark homes, if required by municipal regulations. Moreover, accessibility features already required by municipal regulations are not factored into the cost of construction of modified homes because they are already included in the standard benchmark homes. This situation accounts for many of the cost differences between Vancouver and the other cities.

The costs shown correspond to the cost of construction of the building only and do not include costs associated with the lot or infrastructure development. And finally, the costs shown are estimates only, compiled to demonstrate the marginal extra costs of providing adaptable housing if accessibility features are considered at the time of design and construction. Actual construction 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 other factors.

Total Cost of Accessibility Modifications

The cost of construction of standard benchmark homes ranges from \$162,245.00 (semi-detached house in Winnipeg) to \$224,358.00 (detached house in Toronto). Data could not be obtained for the cost of construction of the benchmark apartment.

	Montréal	Toronto	Vancouver	Halifax	Winnipeg
Bungalow	\$213,695	\$215,618	\$202,155	\$192,539	\$188,693
Semi-detached house	\$183,743	\$185,397	\$173,821	\$165,552	\$162,245
Detached house	\$222,357	\$224,358	\$210,350	\$200,344	\$196,341
Townhouse	\$200,156	\$201,957	\$189,348	\$180,341	\$176,738
Apartment	N/A	N/A	N/A	N/A	N/A

 Table 2: Cost of construction of standard benchmark homes

Additional costs generated by accessibility features range from \$10,864.00 (townhouse in Vancouver) to \$23,054.00 (detached house in Montréal). For the apartment, the cost of accessibility features ranges from \$2,801.00 (Halifax) to \$4,213.00 (Montréal).

The estimated cost of construction of homes modified for accessibility and adaptability therefore ranges from \$181,914.00 (semi-detached house in Winnipeg) to \$246,903.00 (detached house in Toronto). In the absence of construction costs for the benchmark apartment, the total cost of the modified apartment could not be established.

	Montréal	Toronto	Vancouver	Halifax	Winnipeg
Bungalow	\$227,164	\$228,906	\$213,786	\$204,675	\$200,586
Semi-detached house	\$206,018	\$207,378	\$193,556	\$185,622	\$181,914
Detached house	\$245,411	\$246,903	\$229,879	\$221,115	\$216,698
Townhouse	\$214,353	\$215,566	\$200,211	\$193,132	\$189,280
Apartment	N/A	N/A	N/A	N/A	N/A

Table 3: Cost of construction of homes modified for accessibility and adaptability

Additional costs associated with accessibility features represent, depending on the type of dwelling and city, between 6 and 12 per cent of the base construction cost. In the absence of construction costs for the benchmark apartment, the percentage change associated with the integration of accessibility features for this type of dwelling could not be calculated.

Table 4: Cost impact between standard construction and accessible and adaptal	ble
construction (\$ and % change)	

	Montréa	al	Toronto		Vancouv	/er	Halifax	(Winnipe	g
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

The incremental cost of integrating accessibility features varies somewhat among the five benchmark home types. The additional cost of accessibility features is lower for bungalows (6%) and townhouses (6% to 7%), and higher for detached houses (9% to 10%) and semi-detached houses (11% to 12%). These cost differences demonstrate that some floor plans are easier to adapt than others due to design complexity, layout limitations or location of stairwells, for example.

7. Conclusion

The purpose of this research was to show how traditionally built dwellings can be modified to allow residents to live and age at home.

Five different home models were selected to demonstrate how the plans of dwellings built in urban areas can be modified to be more accessible and adaptable.

The home models selected were modest, with a base area ranging from 121 m^2 to 165 m^2 . Since construction of condominium apartments is on the rise in urban areas, this type of dwelling was also considered. The apartment model selected had an area of 81 m^2 .

The assessment of the cost of construction of standard benchmark homes and the cost estimate for each accessibility feature were carried out and validated using various models for as much accuracy as possible. Nonetheless, the costs presented are for information purposes only and will vary based on the regions and construction contexts.

The results obtained show that accessibility features generate either negligible or low costs. A few, however, generate higher costs.

All in all, the construction of an accessible and adaptable home carries an added cost of between 6 and 12 per cent of the cost of standard construction, depending on the home model and on the city in which the home is built.

These additional costs, although not insignificant, are nonetheless much lower than the amounts that need to be invested to convert an existing dwelling in order to make it accessible. This is a value-added benefit for all citizens and taxpayers.

With the aging of the population and increasing life expectancy, the construction of sustainable homes that change with occupants' needs could also have social benefits. The majority of seniors express a preference for "aging in place". Adaptable housing could delay or eliminate the relocation of older residents. A longer period of independent living would retain residents` established support services, maintain their existing social links and allow continued participation in the community.

APPENDIX 1

Municipal construction regulations

Vancouver

- The Code in force in British Columbia is the 2012 British Columbia Building Code (BCBC) based on the 2010 National Building Code of Canada (NBC), with amendments specific to British Columbia.
- Vancouver Building Bylaw 10908 came into force on January 1, 2015, amending the 2012 BCBC. It includes provisions regarding accessibility <u>http://vancouver.ca/your-government/vancouver-building-bylaw.aspx.</u>
- The bylaw contains a number of accessibility requirements for single-family homes and dwellings in a multi-family building (a condominium-type apartment unit) that pertain mainly to the:
 - . width and threshold of the entrance door to the home or unit;
 - . glass sidelight, two peepholes or an intercom security system by the entrance door;
 - . opening hardware for the entrance door to the home or unit;
 - . width of corridors and interior doors;
 - . door opening hardware and thresholds of interior doors;
 - . width of the interior stairs*;
 - . kitchen sink faucets and pipes;
 - . location of bath and shower controls;
 - . faucets for bathroom sinks;
 - . floor structure in at least one bathroom that must be configured for the future installation of a low barrier shower with a second drain roughed in;
 - . clear floor space in front of the washbasin, toilet, bathtub or shower;
 - . wall assemblies that must include reinforcement adjacent to the toilet, bathtub and shower;
 - . requirement of having a bathroom on the entrance level of multi-level dwellings of a certain size;
 - . height of electrical and telecommunications controls;
 - . maximum height of at least one window sill in the living room; and
 - . wiring for the future installation of visual warning fire alarms inside homes.
 - * Note: The City of Vancouver approves the installation of an elevator in an interior stairway 915 mm wide, even if this reduces the width of the evacuation route.

Winnipeg

- The 2010 NBC is in force in Manitoba, with amendments specific to Manitoba.
- The City of Winnipeg has no accessibility regulations other than those applicable provincially.
- There are no accessibility requirements for single-family homes.
- For apartments: a visual warning fire alarm must be installed in addition to the audible alarm in all buildings.

Toronto

- The Code in force in Ontario is the 2012 Ontario Building Code (OBC) based on the 2010 NBC, with amendments specific to Ontario.
- On January 1, 2015, the *Building Code Act* was amended to incorporate changes and includes provisions for accessibility
- www.e-laws.gov.on.ca/html/regs/english/elaws_regs_120332_e.htm.
- Certain accessibility requirements are stipulated under provincial regulations for single-family homes, including in particular the following:
 - . Wall assemblies must include reinforcement adjacent to the toilet, bathtub and shower.
 - . Smoke alarms must include a visual alarm.
- Some accessibility requirements are stipulated under provincial regulations for the interior of dwellings in a multi-family building (a condominium-type apartment unit), including in particular the following:
 - . The fire alarm system must include a visual alarm inside the dwelling.
 - . Requirement for a barrier-free path of travel from the suite entrance door to at least one bedroom, at least one bathroom, a kitchen and living room for at least 15 per cent of the suites in the building.
 - . The walls next to the toilet, bathtub and shower must be reinforced (one bathroom in 15 per cent of suites in the building).
 - . Bathrooms must be designed to permit a wheelchair to turn in an open space (one bathroom in 15 per cent of suites in the building).
 - . Location and height of switches, thermostats, electrical outlets, etc.

Montréal

- The Code in force in Quebec is the Quebec Construction Code (CCQ) based on the 2005 NBC, with amendments specific to Quebec.
- In Montréal, By-law concerning the construction and conversion of buildings 11-018 came into force on December 3, 2011, amending the CCQ.
- There are no accessibility requirements for the construction of single-family homes.
- For units in a multi-family building (a condominium-type apartment unit), a visual alarm connected to the fire alarm system must be installed in each dwelling and in each bedroom of a dwelling larger than 600 m² or more than three storeys in height.

Halifax

- The Code in force in Nova Scotia is the Nova Scotia Building Code based on the 2010 NBC, with amendments specific to Nova Scotia.
- In Halifax, Bylaw M-100 Respecting Standards for Residential Occupancies Bylaw amends the Code.
- There are no accessibility requirements for single-family homes.
- Some accessibility requirements are stipulated under provincial regulations for the interior of units in a multi-family building (a condominium-type apartment unit), including in particular the following:
 - . The requirement of a barrier-free path of travel inside 1 unit in 20 for any building with three or more units.
 - . Balcony access and dimensions (1 unit in 20 for any building with three or more units).
 - . Height of switches, thermostats, electrical outlets, etc. (1 unit in 20 for any building with three or more units).
 - . Size of the bedroom and closet (1 unit in 20 for any building with three or more units).
 - . Size and fixtures of a bathroom (1 unit in 20 for any building with three or more units).
 - . Size of a kitchen, and clearance and space for counters, cabinets and appliances (1 unit in 20 for any building with three or more units).

APPENDIX 2

Accessibility features

Layout

Single-storey layout, without steps or staircases, that may include slabs on grade or a slight gradient (1:20 or less).

Access to the home

On the door handle side, clearance of 600 mm (24 in.) on the side where the door is pulled and 300 mm (12 in.) on the side where it is pushed.

Door at least 915 mm (36 in.) wide with clearance of at least 865 mm (34 in.).

If the door is not exposed to the elements:

The threshold of the exterior entrance door is flat and bevelled at a maximum height of 12.5 mm ($\frac{1}{2}$ in.).

If the door is exposed to the elements:

The threshold of the entrance door is standard but embedded so as to reduce the height to the adjacent surfaces.

The doors are equipped with lever handles.

The door is equipped with a device allowing the occupant to see who is there.

There is protection against rain and snow above the main entrance.

There is an appropriate turning circle inside and outside the entrance of 1,500 mm (60 in.).

Garage

Garage dimensions of at least 4,270x6,100 mm (14x20 ft.) so that a car can be parked and the person can manoeuvre around.

A difference in height of less than 100 mm (4 in.) between the garage level and the floor level of the house. A short ramp with a top landing measuring 1,500x1,500 mm (5x5 ft.) can easily be added.

A height of 2,700 mm (9 ft.) to accommodate various types of vehicles.

Mobility

A manoeuvring area of 1,500 mm (60 in.) in diameter for wheelchairs in primary locations throughout the home.

Avoid hallways but, if necessary, plan for a width of 920 mm (about 3 ft.) there.

Swinging or sliding doors 865 mm (34 in.) wide with clearance of 815 mm (32 in.) when open.

On the door handle side, clearance of 600 mm (24 in.) on the side where the door is pulled and 300 mm (12 in.) on the side where it is pushed.

Lever handles.

No door sill.

Flat, smooth, non-slip, anti-glare flooring.

Controls and security systems

Switches and controls installed between 450 and 1,200 mm (between 18 and 48 in.) above the ground. Controls located more than 450 mm from the inside corner of a wall.

Easy single-handed operation of switches and controls.

Faucets and other lever controls that require little strength and no gripping or turning.

Kitchen

The kitchen is designed to facilitate movement and access to the workspace and appliances and has a clearance of 1500 mm (60 in.) in front of each counter.

Continuous counter space between the stove and the sink.

Counters at regular height, allowing for integration of regular equipment: stove and sink. Plan sliding shelf to facilitate work in a seated position.

Kitchen cabinets with a lot of drawers and sliding shelves. Users pull articles toward themselves and do not have to stretch.

All cabinet handles are D-handles, enabling easy use without having to grasp them.

Kitchen cabinets and work surfaces are of contrasting colours, which enables users to see and use doors, handles and counters more easily.

The upper cabinets are installed at a maximum of 450 mm (18 in.) above the counter.

Plan a module that can be modified easily in order to clear an accessible space under the sink 760 mm wide by 685 mm high (30x27 in.) over the entire depth of the counter.

Plan for a floor covering in the entire kitchen, even under the sink countertop section.

Plan vertical storage space with an interior free width of 760 mm (30 in.) and a depth of 600 mm (24 in.) to accommodate a wall oven. Plan a sliding shelf under the oven.

Bathroom

For a two-storey home: Half-bath accessible on the main floor with a manoeuvring area of 1,500 mm (60 in.); ideally, a full bathroom.

For a two-storey home: Half-bath accessible on the main floor with the potential for being converted into a full bathroom; ideally, a full bathroom.

Main bathroom with a manoeuvring area of 1,500 mm (60 in.).

Entire area in front of the bathtub is clear.

Sink at a height of 810 to 860 mm (32 to 34 in.). Plan a module that can be modified easily in order to clear an accessible space under the sink 760 mm wide by 685 mm high (30x27 in.) over the entire depth of the counter.

Plan for a floor covering in the entire bathroom, even under the sink countertop section.

Walls behind and on either side of the toilet are reinforced with plywood so that grab bars can be installed anywhere on those walls.

Bathtub walls are reinforced with plywood so that the user can install grab bars anywhere.

The toilet is adjacent to a wall and its centreline should be between 460 mm (18 in.) and 480 mm (19 in.) from that wall.

The main bathroom is designed so that a curbless shower measuring at least 915 mm (36 in.) by 1,200 mm (48 in.) may be installed in future.

The structure can be easily modified under the shower.

The bathroom is adjacent to a bedroom for easy connection between the two. This also allows for the installation of a rail ceiling lift.

Possibility of installing a lift in future (for two-storey homes) Some options are applicable depending on the dwelling

Straight staircase with only one flight, allowing for the installation of a chair or platform stair lift.

Space (at the bottom and top of the stairs) for the future installation of a chair or platform stair lift.

Space wide enough for the future installation of a chair or platform stair lift.*

Preparation for the future installation of an elevator by superimposing closets and using a structure that can be easily modified.

*The installation of a lift on the staircase reduces the width required by regulations for evacuation. A special request for the installation of such a device must be submitted to the municipality.

Windows

Bottom of window sill max. 760 mm (30 in.) above grade.

Windows equipped with easy-to-use opening and locking systems.

Access to the balcony or deck (a wider sliding door was planned for single-family homes and a swinging door for the apartment).

French doors 1,800 mm (72 in.) wide with clearance of 810 mm (32 in.).

Swinging door, without storm door, at least 915 mm (36 in.) wide with clearance of at least 865 mm (34 in.).

The threshold of the door is standard but embedded so as to reduce the height to the adjacent surfaces.

Weather protection above the door.

Two-storey homes

Plan to lay out a bedroom on the ground floor.

Fire safety

If smoke detectors are installed in the homes, they must have an audible and visual alarm signal.

Plan for a balcony that is accessible from the bedroom floor for taking refuge in case of fire.

Plan for an outdoor space that is accessible from the basement for taking refuge in case of fire.

Standard benchmark plans and modified plans

Two-bedroom bungalow Standard plan: 136 m², excluding basement Basement



Basement



SOUS-SOL E.H. FUTUR EMPLACEMENT POUR PLATE-FORME ELÉVATRICE INCLINÉE

UP FUTURE LOCATION OF INCLINED LIFT PLATFORM

Two-bedroom bungalow Standard plan: 136 m², excluding basement (Standard garage: 24 m²)

Main floor





Two-bedroom bungalow Modified plan: 136 m², excluding basement (Modified garage: 25.9 m²)

Two-bedroom semi-detached house Standard plan: 121 m², excluding basement

Basement



Two-bedroom semi-detached house Modified plan: 130 m², excluding basement

Basement



FUTURE LOCATION OF VERTICAL LIFT PLATFORM

AD SU

ADDITIONAL SURFACE AREA



DINING ROOM

LIVING ROOM

POWDER / LAUNDRY ROOM

DWN UP

GARAGE

SALLE À MANGER

SALLE D`EAU / BUANDRIE

SALON

GARAGE

E.B.

E.H.

Two-bedroom semi-detached house Standard plan: 121 m², excluding basement (Standard garage: 24 m²)

14





Two-bedroom semi-detached house Standard plan: 121 m², excluding basement

2nd floor



CHAMBRE #2	BEDROOM #2
S.D.B.	BTH
Irr. 1980 X 4420	Irr. 1980X4420
E.B.	DWN
CHAMBRE PRINCIPALE	MASTER BEDROOM

Two-bedroom semi-detached house Modified plan: 130 m², excluding basement

2nd floor



CHAMBRE #2	BEDROOM #2
Irr. 3550 x 3065	Irr. 3550x3065
S.D.B.	BTH
E.B.	DWN
CHAMBRE PRINCIPALE	MASTER BEDROOM
BALCON	BALCONY

FUTURE LOCATION OF VERTICAL LIFT PLATFORM

ADDIT SURFA

ADDITIONAL SURFACE AREA

Three-bedroom detached house Standard plan: 154 m², excluding basement



Three-bedroom detached house Modified plan: 162 m², excluding basement



Main floor



Main floor



L S

Three-bedroom detached house Standard plan: 154 m², excluding basement

2nd floor



CHAMBRE #2	
CHAMBRE #3	
E.B.	
S.D.B.	
Irr. 2690 x 3000	
CHAMBRE PRINCIPALE	

BEDROOM #2 BEDROOM #3 DWN BTH Irr. 2690x3000 MASTER BEDROOM

Three-bedroom detached house Modified plan: 162 m², excluding basement

2nd floor



AI

ADDITIONAL SURFACE AREA

Three-bedroom townhouse Standard plan: 165 m², excluding basement

Basement



Three-bedroom townhouse Modified plan: 168 m², excluding basement

Basement



Main floor



Main floor



Three-bedroom townhouse Standard plan: 165 m², excluding basement

2nd floor



S.E).B.	
Irr	201	C

Irr. 2010 x 4825	
Irr. 2540 x 2590	
CHAMBRE	
PRINCIPALE	
Irr. 3860 x 4825	
S	
L	
BUANDERIE	
E.B.	
CHAMBRE #2	
Irr. 2745 x 3355	
CHAMBRE #3	

BTH Irr. 2010x4825 Irr. 2540x2590 MASTER BEDROOM

Irr. 3860x4825 D W LAUNDRY ROOM DWN BEDROOM #2 Irr. 2745x3355 BEDROOM #3 Irr. 3125x3810

Three-bedroom townhouse Modified plan: 168 m², excluding basement

2nd floor



FUTURE LOCATION OF INCLINED LIFT PLATFORM



ADDITIONAL SURFACE AREA



L.V. CUISINE SALLE À MANGER / SALON BALCON MEC L/S CHAMBRE #2 Irr. 3353 x 2390 S.D.B. Irr. 2945 x 1905 CHAMBRE PRINCIPALE Irr. 3505 x 2945 DW KITCHEN DINING/LIVING ROOM

BALCONY MECH W/D BEDROOM #2 Irr. 3353x2390 BTH Irr. 2945x1905 MASTER BEDROOM Irr. 3505x2945



G.M.
L.V.
CUISINE
SALLE À MANGER /
SALON
BALCON
MEC
L
S
CHAMBRE #2
S.D.B.
CHAMBRE PRINCIPALE

DW KITCHEN DINING/LIVING ROOM

BALCONY MECH W D BEDROOM #2 BTH MASTER BEDROOM

ADDITIONAL SURFACE

Cost impact

Feature required in the bylaw, No additional cost

\$0

Nil or negligible costs (\$0 to \$99) or non applicable Low costs (\$100 to \$499) Moderate costs (\$500 to \$999) High costs (\$1,000 or more)

Legend

Cost not available Not applicable

N.D. N.A.

	Accessibility Features			Bungalow		
		Montréal	Toronto	Vancouver	Halifax	Winnipeg
Layout	Single-storey layout, without steps or staircases, that may include slabs on grade or a slight gradient (1:20 or less).	\$1,200	\$1,211	\$1,135	\$1,081	\$1,060
	On the door handle side, clearance of 600 mm (24 in.) on the side where the door is pulled and 300 mm (12 in.) on the side where it is pushed.	0\$	0\$	0\$	0\$	0\$
	Door at least 915 mm (36 in.) wide with clearance of at least 865 mm (34 in.).	\$170	\$172	\$161	\$153	\$150
Access to the home	If the door is not exposed to the elements: The threshold of the exterior entrance door is flat and bevelled at a maximum height of 12.5 mm ($\frac{1}{2}$ in.). If the door is exposed to the elements: The threshold of the entrance door is standard but embedded so as to reduce the height to the adjacent surfaces.	Included	Included	\$ \$	Included	Included
	The doors are equipped with lever handles.	\$0	\$0	\$0	\$0	\$0
	The door is equipped with a device allowing the occupant to see who is there.	\$0	\$0	\$0	\$0	\$0
	There is protection against rain and snow above the main entrance.	\$0	\$0	\$0	\$0	\$0
	There is an appropriate turning circle inside and outside the entrance of 1,500 mm (60 in.).	Include	d in the cos	t of the addit	tional surfac	e area
	Garage dimensions of at least 4,270x6,100 mm (14x20 ft.) so that a car can be parked and the person can manoeuvre around.	Include	d in the cos	t of the addit	tional surfac	e area
Garage	A difference in height of less than 100 mm (4 in.) between the garage level and the floor level of the house. A short ramp with a top landing measuring 1,500x1,500 mm (5x5 ft.) can easily be added.	0\$	\$0	0\$	\$0	\$0
	A height of 2,700 mm (9 ft.) to accommodate various types of vehicles.	\$0	\$0	\$0	\$0	\$0
Mobility	A manoeuvring area of 1,500 mm (60 in.) in diameter for wheelchairs in primary locations throughout the home.	Include	d in the cos	t of the addit	tional surfac	e area

						Bungalow
	Avoid hallways but, if necessary, plan for width of 920 mm (about 3 ft.)	0\$	0\$	0\$	\$0	\$0
	Swinging or sliding doors 865 mm (34 in.) wide with clearance of 815 mm (32 in.) when open.	\$295	\$298	\$0	\$266	\$260
Mobility	On the door handle side, clearance of 600 mm (24 in.) on the side where the door is pulled and 300 mm (12 in.) on the side where it is pushed.	N.A.	N.A.	N.A.	A Z	N.A.
	Lever handles.	\$60	\$61	\$0	\$54	\$53
	No door sill.	\$0	\$0	\$0	\$0	\$0
	Flat, smooth, non-slip, anti-glare flooring.	\$0	\$0	\$0	\$0	\$0
Controls	Switches and controls installed between 450 and 1,200 mm (between 18 and 48 in.) above the ground. Controls located more than 450 mm from the inside corner of a wall.	\$0	0\$	0\$	\$0	0\$
and security	Easy single-handed operation of switches and controls.	\$0	\$0	\$0	\$0	\$0
cillate	Faucets and other lever controls that require little strength and no gripping or turning.	\$0	\$0	\$0	\$0	\$0
	The kitchen is designed to facilitate movement and access to the workspace and appliances and has a clearance of 1500 mm (60 in.) in front of each counter.	Included	d in the cos	t of the additi	onal surface	e area
	Continuous counter space between the stove and the sink.	\$0	\$0	\$0	\$0	\$0
	Counters at regular height, allowing for integration of regular equipment: stove and sink. Plan sliding shelf to facilitate work in a seated position.	\$200	\$202	\$189	\$180	\$177
	Kitchen cabinets with a lot of drawers and sliding shelves. Users pull articles toward themselves and do not have to stretch.	\$975	\$984	\$922	\$878	\$861
	All cabinet handles are D-handles, enabling easy use without having to grasp them.	\$0	\$0	\$0	\$0	\$0
Kitchen	Kitchen cabinets and work surfaces are of contrasting colours, which enables users to see and use doors, handles and counters more easily.	\$0	0\$	0\$	0\$	\$0
	Upper cabinets installed at a maximum height of 400 to 450 mm (about 16 to 18 in.) above the counter.	0\$	0\$	0\$	0\$	\$0
	Plan a module that can be modified easily in order to clear an accessible space under the sink 760 mm wide by 685 mm high (30x27 in.) over the entire depth of the counter.	\$400	\$404	\$378	\$360	\$353
	Plan for a floor covering in the entire kitchen, even under the sink countertop section.	\$540	\$545	\$511	\$487	\$477
						Bungalow
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	Plan vertical storage space with an interior free width of 760 mm (30 in.) and a depth of 600 mm (24 in.) to accommodate a wall oven. Plan a sliding shelf under the oven.	\$720	\$726	\$681	\$649	\$636
	Main bathroom with a manoeuvring area of 1,500 mm (60 in.).	Included	d in the cos	t of the addit	ional surface	e area
	Entire area in front of the bathtub is clear.	\$0	\$0	\$0	\$0	\$0
	Sink at a height of 810 to 860 mm (32 to 34 in.). Plan a module that can be modified easily in order to clear an accessible space under the sink 760 mm wide by 685 mm high (30x27 in.) over the entire depth of the counter.	\$400	\$404	\$378	\$360	\$353
Bathroom	Plan for a floor covering in the entire bathroom, even under the sink countertop section.	96\$	26\$	\$91	\$86	\$85
	Walls behind and on either side of the toilet are reinforced with plywood so that grab bars can be installed anywhere on those walls.	\$110	\$0	\$0	66\$	\$97
	Bathtub walls are reinforced with plywood so that the user can install grab bars anywhere.	\$110	\$0	\$0	\$99	\$97
	The toilet is adjacent to a wall and its centreline should be between 460 mm (18 in.) and 480 mm (19 in.) from that wall.	0\$	\$0	\$0	\$0	\$0
	The main bathroom is designed so that a curbless shower measuring at least 915 mm (36 in.) by 1,200 mm (48 in.) may be installed in future.	\$500	\$505	\$473	\$451	\$442
	The structure can be easily modified under the shower.	\$500	\$205	\$0	\$451	\$442
	The bathroom is adjacent to a bedroom for easy connection between the two. This also allows for the installation of a rail ceiling lift.	N.A.	N.A.	N.A.	N.A.	N.A.
Possibility of installing	Space (at the bottom and top of the stairs) for the future installation of a chair or platform stair lift.	Included	d in the cos	t of the addit	ional surface	e area
a lift in future	Straight staircase with only one flight, allowing for the installation of a chair or platform stair lift.	\$0	\$0	\$0	\$0	\$0
options applicable	Space wide enough for the future installation of a chair or platform stair lift.	\$100	\$101	\$0	\$90	\$88
depending on the dwelling)	Preparation for the future installation of an elevator by superimposing closets and using a structure that can be easily modified.	\$500	\$505	\$473	\$451	\$442

						Bungalow
Windows	Bottom of window sill max. 760 mm (30 in.) above grade.	\$0	\$0	\$0	\$0	\$0
	Windows equipped with easy-to-use opening and locking systems.	\$0	\$0	\$0	\$0	\$0
	French doors 1,800 mm (72 in.) wide with clearance of 810 mm (32 in.).	0\$	0\$	0\$	0\$	\$0
Access to the balcony	Swinging door, without storm door, at least 915 mm (36 in.) wide with clearance of at least 865 mm (34 in.).	N.A.	N.A.	N.A.	N.A.	N.A.
or deck	The threshold of the door is standard but embedded so as to reduce the height to the adjacent surfaces.	\$0	\$0	\$0	\$0	\$0
	Weather protection above the door.	\$1,400	\$1,413	\$1,324	\$1,261	\$1,236
	If smoke detectors are installed in the homes, they must have an audible and visual alarm signal.	\$80	\$0	\$76	\$72	\$71
Fire safety	Plan for a balcony that is accessible from the bedroom floor for taking refuge in case of fire.	N.A.	N.A.	N.A.	N.A.	N.A.
	Plan for an outdoor space that is accessible from the basement for taking refuge in case of fire.			Not included		
Additional surface area	Cost of the increase in the living area, the garage area, the bathroom area, the kitchen area, etc. (www.costtobuild.net)	\$5,113	\$5,159	\$4,837	\$4,607	\$4,515
	Total cost of accessibility features	\$13,469	\$13,288	\$11,630	\$12,136	\$11,893
	Cost of standard bungalow (www.costtobuild.net)	\$213,695	\$215,618	\$202,155	\$192,539	\$188,693
	Cost of modified bungalow	\$227,164	\$228,906	\$213,786	\$204,675	\$200,586
O	ost impact (% change between modified and standard bungalow)	%9	%9	6%	6%	6%

Semi-Detached

Cos	t impact	Legend		
	Nil or negligible costs (\$0 to \$99) or non applicable	\$0	Feature required in the bylaw, no	
	Low costs (\$100 to \$499)		additional cost	
	Moderate costs (\$500 to \$999)	N.D.	Cost not available	
	High costs (\$1,000 or more)	N.A.	Not applicable	

	Accossibility Ecoturos		Sem	i-Detached H	lome	
		Montréal	Toronto	Vancouver	Halifax	Winnipeg
Layout	Single-storey layout, without steps or staircases, that may include slabs on grade or a slight gradient (1:20 or less).	\$1,350	\$1,362	\$1,277	\$1,216	\$1,192
	On the door handle side, clearance of 600 mm (24 in.) on the side where the door is pulled and 300 mm (12 in.) on the side where it is pushed.	0\$	0\$	0\$	0\$	0\$
	Door at least 915 mm (36 in.) wide with clearance of at least 865 mm (34 in.).	\$170	\$172	\$161	\$153	\$150
Access to the home	If the door is not exposed to the elements: The threshold of the exterior entrance door is flat and bevelled at a maximum height of 12.5 mm ($1/2$ in.). If the door is exposed to the elements: The threshold of the entrance door is standard but embedded so as to reduce the height to the adjacent surfaces.	Included	\$0		Included	Included
	The doors are equipped with lever handles.	\$0	\$0	\$0	0\$	\$0
	The door is equipped with a device allowing the occupant to see who is there.	0\$	\$0	\$0	0\$	0\$
	There is protection against rain and snow above the main entrance.	\$0	\$0	\$0	\$0	\$0
	There is an appropriate turning circle inside and outside the entrance of 1,500 mm (60 in.).	Inclu	ded in the co	ost of the additi	ional surface	area
	Garage dimensions of at least 4,270x6,100 mm (14x20 ft.) so that a car can be parked and the person can manoeuvre around.	Inclu	ded in the co	ost of the additi	onal surface	area
Garage	A difference in height of less than 100 mm (4 in.) between the garage level and the floor level of the house. A short ramp with a too landing measuring 1 500x1 500 mm (5x5 ft.) can easily he					
	added.	\$0	\$0	\$0	\$0	\$0
	A height of 2,700 mm (9 ft.) to accommodate various types of vehicles.	\$0	\$0	\$0	\$0	\$0

					Semi	-Detached
	A manoeuvring area of 1,500 mm (60 in.) in diameter for	-				
		Inclu	ded in the co	ost of the additi	onal surface	area
	Avoid hallways but, if necessary, plan for a width of 920 mm (about 3 ft.) there.	\$0	\$0	\$0	\$0	\$0
	Swinging or sliding doors 865 mm (34 in.) wide with clearance of 815 mm (32 in.) when open.	\$310	\$313	\$0	\$279	\$274
Mobility	On the door handle side, clearance of 600 mm (24 in.) on the side where the door is pulled and 300 mm (12 in.) on the side					
	where it is pushed.	N.A.	N.A.	N.A.	N.A.	N.A.
	Lever handles.	\$100	\$101	\$0	\$90	\$88
	No door sill.	\$0	\$0	\$0	\$0	\$0
	Flat, smooth, non-slip, anti-glare flooring.	\$0	\$0	\$0	\$0	\$0
Controls	Switches and controls installed between 450 and 1,200 mm (between 18 and 48 in.) above the ground. Controls located more than 450 mm from the inside corner of a wall.	\$0	\$0	0\$	\$0	0\$
security	Easy single-handed operation of switches and controls.	\$0	\$0	\$0	\$0	\$0
systems	Faucets and other lever controls that require little strength and no gripping or turning.	\$0	\$0	\$0	\$0	\$0
	The kitchen is designed to facilitate movement and access to the workspace and appliances and has a clearance of 1500 mm (60 in.) in front of each counter.	Inclu	ded in the co	ost of the additi	onal surface	area
	Continuous counter space between the stove and the sink.	\$0	\$0	0\$	\$0	0\$
	Counters at regular height, allowing for integration of regular equipment: stove and sink. Plan sliding shelf to facilitate work in a seated position.	\$200	\$202	\$189	\$180	\$177
Kitchen	Kitchen cabinets with a lot of drawers and sliding shelves. Users pull articles toward themselves and do not have to stretch.	\$975	\$984	\$922	\$878	\$861
	All cabinet handles are D-handles, enabling easy use without having to grasp them.	\$0	\$0	\$0	\$0	\$0
	Kitchen cabinets and work surfaces are of contrasting colours, which enables users to see and use doors, handles and counters					

\$353

\$360

\$378

\$404

\$400

\$0

\$0

\$0

\$0

\$0

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Upper cabinets installed at a maximum height of 400 to 450 mm (about 16 to 18 in.) above the counter.

more easily.

Plan a module that can be modified easily in order to clear an accessible space under the sink 760 mm wide by 685 mm high (30x27 in.) over the entire depth of the counter.

Kitchen

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\$360	\$636	0\$	\$0	area	\$0	\$353	\$0	\$0	\$194	\$97	\$0	\$442	\$442	N.A.
\$368	\$649	0\$	\$0	onal surface	\$0	096.8	\$0	\$0	\$198	66\$	0\$	\$451	\$451	N.A.
\$386	\$681	0\$	\$0	ost of the additi	\$0	8378 8.378	\$0	\$0	\$0	0\$	0\$	\$473	\$0	N.A.
\$412	\$726	0\$	\$0	uded in the co	\$0	\$404	0\$	0\$	\$0	0\$	0\$	\$505	\$505	N.A.
\$408	\$720	0\$	0\$	Inclu	0\$	\$400	0\$	0\$	\$220	\$110	0\$	\$500	\$500	N.A.
Plan for a floor covering in the entire kitchen, even under the sink countertop section.	Plan vertical storage space with an interior free width of 760 mm (30 in.) and a depth of 600 mm (24 in.) to accommodate a wall oven. Plan a sliding shelf under the oven.	For a two-storey home: Half-bath accessible on the main floor with a manoeuvring area of 1,500 mm (60 in.); ideally, a full bathroom.	For a two-storey home: Half-bath on the main floor has potential for being converted into a full bathroom; ideally, a full bathroom.	Main bathroom with a manoeuvring area of 1,500 mm (60 in.).	Entire area in front of the bathtub is clear.	Sink at a height of 810 to 860 mm (32 to 34 in.). Plan a module that can be modified easily in order to clear an accessible space under the sink 760 mm wide by 685 mm high (30x27 in.) over the entire death of the counter	Plan for a floor covering in the entire bathroom, even under the sink countertop section.	Two-storey house: In the half-bathroom on the main floor, plan a wall sink with hidden wall support instead of pedestal/vanity sink.	Walls behind and on either side of the toilet are reinforced with plywood so grab bars can be installed anywhere on those walls.	Bathtub walls are reinforced with plywood so that the user can install grab bars anywhere.	The toilet is adjacent to a wall and its centreline should be between 460 mm (18 in.) and 480 mm (19 in.) from that wall.	The main bathroom is designed so that a curbless shower measuring at least 915 mm (36 in.) by 1,200 mm (48 in.) may be installed in future	The structure can be easily modified under the shower.	The bathroom is adjacent to a bedroom for easy connection between the two. This also allows for the installation of a rail ceiling lift.
							Bathroom				<u> </u>			<u> </u>

					Semi-	Detached
Possibility of	Space (at the bottom and top of the stairs) for the future installation of a chair or platform stair lift.	\$0	\$0	0\$	\$0	\$0
installing a lift in future	Straight staircase with only one flight, allowing for the installation of a chair or platform stair lift.	N.A.	N.A.	N.A.	N.A.	N.A.
(Some options applicable	Space wide enough for the future installation of a chair or platform stair lift.	\$200	\$202	0\$	\$180	\$177
depending on the dwelling)	Preparation for the future installation of an elevator by superimposing closets and using a structure that can be easily modified.	\$1,000	\$1,009	\$946	\$901	\$883
Windowo	Bottom of window sill max. 760 mm (30 in.) above grade.	\$0	\$0	\$0	\$0	\$0
SWODIIIW	Windows equipped with easy-to-use opening and locking systems.	\$0	\$0	\$0	\$0	\$0
	French doors 1,800 mm (72 in.) wide with clearance of 810 mm (32 in.).	\$0	\$0	0\$	0\$	\$0
Access to the balcony or	Swinging door, without storm door, at least 915 mm (36 in.) wide with clearance of at least 865 mm (34 in.).	N.A.	N.A.	N.A.	N.A.	N.A.
deck	The threshold of the door is standard but embedded so as to reduce the height to the adjacent surfaces.	\$0	\$0	\$0	\$0	\$0
	Weather protection above the door.			No protection		
Two-storey homes	Plan to lay out a bedroom on the ground floor.	N.A.	N.A.	N.A.	N.A.	N.A.
	If smoke detectors are installed in the homes, they must have an audible and visual alarm signal.	\$160	0\$	\$151	\$144	\$141
Fire safety	Plan for a balcony that is accessible from the bedroom floor for taking refuge in case of fire.	\$3,000	\$3,027	\$2,864	\$2,703	\$2,649
	Plan for an outdoor space that is accessible from the basement for taking refuge in case of fire.			Not included		
Additional surface area	Cost of the increase in the living area, the garage area, the bathroom area, the kitchen area, etc. (www.costtobuild.net)	\$11,552	\$11,656	\$10,928	\$10,408	\$10,200
	Total cost of accessibility features	\$22,275	\$21,981	\$19,735	\$20,070	\$19,669
	-					
	Cost of standard semi-detached house (www.costtobuild.net)	\$183,743	\$185,397	\$173,821	\$165,552	\$162,245
	Cost of modified semi-detached house	\$206,018	\$207,378	\$193,556	\$185,622	\$181,914

12% 11% 12% 12% Cost impact (% change between modified and standard semi-detached house)

39

12%

Detached

\$0 Legend

Cost impact

Nil or neglig	ible costs (\$0 to \$99) or non applicable	\$0	Feature required	in the bylaw,	no additiona	l cost		
Low costs (\$	\$100 to \$499)							
Moderate co	osts (\$500 to \$999)	N.D.	Cost not available	0				
High costs (\$1,000 or more)	N.A.	Not applicable					
	Accessibility Features					Detached		
				Montréal	Toronto	Vancouver	Halifax	Winnipeg
Layout	Single-storey layout, without steps or s slabs on grade or a slight gradient (1:2	taircases, tha 0 or less).	t may include	\$1,350	\$1,362	\$1,277	\$1,216	\$1,192
	On the door handle side, clearance of where the door is pulled and 300 mm (300 mm (24 ir 12 in.) on the	 on the side pushed side. 	\$0	\$0	\$0	\$0	\$0
	Door at least 915 mm (36 in.) wide with (34 in.).	ו clearance of	at least 865 mm	\$170	\$172	\$161	\$153	\$150
	If the door is not exposed to the eleme exterior entrance door is flat and bevel mm (V_2 in.).	nts: The thres led at a maxir	thold of the num height of 12.5					
Access to the home	If the door is exposed to the elements: door is standard but embedded so as t adjacent surfaces.	The threshold o reduce the I	d of the entrance neight to the	Included	Included	\$0	Included	Included
-	The doors are equipped with lever han	dles.		\$0	\$0	\$0	\$0	\$0
<u> </u>	The door is equipped with a device allo is there.	wing the occ	upant to see who	\$0	\$0	\$0	\$0	\$0
	There is protection against rain and sn	ow above the	main entrance.	Include	ed in the co	st of the addit	ional surface	e area
	There is an appropriate turning circle ir of 1,500 mm (60 in.).	iside and outs	side the entrance	Include	ed in the co	st of the addit	ional surfac	e area
	Garage dimensions of at least 4,270x6 car can be parked and the person can	,100 mm (14) manoeuvre al	(20 ft.) so that a round.	Include	ed in the co	st of the addit	ional surface	e area
Garage	A difference in height of less than 100 level and the floor level of the house. A measuring 1,500x1,500 mm (5x5 ft.) c	mm (4 in.) bet short ramp w an easily be a	tween the garage vith a top landing dded.	\$0	\$0	\$0	\$0	\$0
	A height of 2,700 mm (9 ft.) to accomm	iodate various	s types of vehicles.	\$0	\$0	\$0	\$0	\$0
	A manoeuvring area of 1,500 mm (60 i in primary locations throughout the hor	n.) in diamete ne.	r for wheelchairs	Include	ed in the co	st of the addit	ional surface	e area
Mobility	Avoid hallways but, if necessary, plan t	or width of 92	0 mm (about 3ft)	\$0	\$0	\$0	\$0	\$0
	Swinging or sliding doors 865 mm (34 mm (32 in.) when open.	in.) wide with	clearance of 815	\$560	\$565	\$0	\$505	\$494

					Dei	tached
	On the door handle side, clearance of 600 mm (24 in.) on the side where the door is pulled and 300 mm (12 in.) on the pushed side.	N.A.	N.A.	N.A.	N.A.	N.A.
Mobility	Lever handles.	\$100	\$101	\$0	\$90	\$88
	No door sill.	\$0	\$0	\$0	\$0	\$0
	Flat, smooth, non-slip, anti-glare flooring.	\$0	\$0	\$0	\$0	\$0
Controls and	Switches and controls installed between 450 and 1,200 mm (between 18 and 48 in.) above the ground. Controls located more than 450 mm from the inside corner of a wall.	0\$	0\$	0\$	0\$	0\$
security eveteme	Easy single-handed operation of switches and controls.	\$0	\$0	\$0	\$0	\$0
	Faucets and other lever controls that require little strength and no gripping or turning.	\$0	\$0	\$0	\$0	\$0
	The kitchen is designed to facilitate movement and access to the workspace and appliances and has a clearance of 1500 mm (60 in.) in front of each counter.	Includ	ed in the co	st of the additi	onal surface	e area
	Continuous counter space between the stove and the sink.	\$0	\$0	\$0	\$0	\$0
	Counters at regular height, allowing for integration of regular equipment: stove and sink. Plan sliding shelf to facilitate work in a seated position.	\$200	\$202	\$189	\$180	\$177
	Kitchen cabinets with a lot of drawers and sliding shelves. Users pull articles toward themselves and do not have to stretch.	\$975	\$984	\$922	\$878	\$861
Kitchen	All cabinet handles are D-handles, enabling easy use without having to grasp them.	\$0	\$0	\$0	\$0	\$0
	Kitchen cabinets and work surfaces are of contrasting colours, which enables users to see and use doors, handles and counters more easily.	0\$	\$0	0\$	0\$	0\$
	Upper cabinets installed at a maximum height of 400 to 450 mm (about 16 to 18 in.) above the counter.	\$0	\$0	\$0	\$0	\$0
	Plan a module that can be modified easily in order to clear an accessible space under the sink 760 mm wide by 685 mm high (30x27 in.) over the entire depth of the counter.	\$400	\$404	\$378	\$360	\$353
	Plan for a floor covering in the entire kitchen, even under the sink countertop section.	\$0	\$0	\$0	\$0	\$0
	Plan vertical storage space with an interior free width of 760 mm (30 in.) and a depth of 600 mm (24 in.) to accommodate a wall oven. Plan a sliding shelf under the oven.	\$720	\$726	\$681	\$649	\$636

Detached

	For a two-storey home: Half-bath accessible on the main floor with manoeuvring area of 1,500 mm (60 in.); ideally, a full bathroom.	\$84	<u> </u> 28\$	62\$	\$76	\$74
	For a two-storey home: half-bath on the main floor has potential for being converted into a full bathroom; ideally a full bathroom.	\$0	0\$	\$0	\$0	\$0
	Main bathroom with a manoeuvring area of 1,500 mm (60 in.).	Includ	led in the cc	st of the additi	onal surface	area
	Entire area in front of the bathtub is clear.	0\$	\$ 0	\$ 0	0 \$	0 \$
	Sink at a height of 810 to 860 mm (32 to 34 in.). Plan a module that can be modified easily in order to clear an accessible space under sink 760 mm wide by 685 mm high (30x27 in.) over the entire dept the counter.	ne of 800\$	\$ 208	757 \$	721 \$	706 \$
	Plan for a floor covering in the entire bathroom, even under the sink countertop section.	Includ	led in the co	ist of the additi	onal surface	area
Bathroom	Two-storey house: In the half-bathroom on the main floor, plan a wasink with hidden wall support instead of a pedestal or vanity sink.	-\$500	-\$505	-\$473	-\$451	-\$442
	Walls behind and on either side of the toilet are reinforced with plywood so that grab bars can be installed anywhere on those walls	\$330	\$0	0\$	\$297	\$291
	Bathtub walls are reinforced with plywood so that the user can instagrab bars anywhere.	\$220	\$0	\$0	\$198	\$194
	The toilet is adjacent to a wall and its centreline should be between 460 mm (18 in.) and 480 mm (19 in.) from that wall.	\$0	0\$	\$0	\$0	\$0
	The main bathroom is designed so a curbless shower measuring at least 915 mm (36 in.) by 1,200 mm (48 in.) may be installed in futur	s. \$0	\$0	\$0	\$0	\$0
	The structure can be easily modified under the shower.	\$1,000	\$1,009	\$0	\$901	\$883
	The bathroom is adjacent to a bedroom for easy connection betwee the two. This also allows for the installation of a rail ceiling lift.	ה.A.	N.A.	N.A.	N.A.	N.A.
Boocibility of	Space (at the bottom and top of the stairs) for the future installation a chair or platform stair lift.	of Includ	led in the cc	ist of the additi	onal surface	area
installing a lift	Straight staircase with only one flight, allowing for the installation of chair or platform stair lift.	a \$0	0\$	0\$	\$0	0\$
In tuture (Some options applicable depending on	Space wide enough for the future installation of a chair or platform stair lift. The installation of a lift on the staircase reduces the width required by regulations for evacuation. A special request for the installation of such a device must be submitted to the municipality.	\$200	\$202	\$0	\$180	\$177
the dwelling)	Preparation for the future installation of an elevator by superimposi closets and using a structure that can be easily modified.	\$1,000	\$1,009	\$946	\$901	\$883

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	Bottom of window sill max. 760 mm (30 in.) above gra-	ade.	\$0	\$0	\$0	\$0	\$0
	Windows equipped with easy-to-use opening and lock	king systems.	\$0	\$0	\$0	\$0	\$0
	French doors 1,800 mm (72 in.) wide with clearance o	of 810 mm (32 in)	\$0	\$0	\$0	\$0	\$0
Access to the	Swinging door, without storm door, at least 915 mm (3 clearance of at least 865 mm (34 in.).	36 in.) wide with	N.A.	N.A.	N.A.	N.A.	N.A.
deck	The threshold of the door is standard but embedded s the height to the adjacent surfaces.	so as to reduce	\$0	\$0	0\$	\$0	\$0
	Weather protection above the door.		\$0	\$0	\$0	\$0	\$0
Two-storey homes	Plan to lay out a bedroom on the ground floor.		N.A.	N.A.	N.A.	N.A.	N.A.
	If smoke detectors are installed in the homes, they mu audible and visual alarm signal.	lust have an	\$160	\$0	\$151	\$144	\$141
Fire safety	Plan for a balcony that is accessible from the bedroom refuge in case of fire.	m floor for taking	\$3,000	\$3,027	\$2,838	\$2,703	\$2,649
	Plan for an outdoor space that is accessible from the t taking refuge in case of fire.	basement for			Not included		
Additional surface area	Cost of the increase in the living area, the garage area area the kitchen area, etc. (www.costtobuild.net)	a, the bathroom	\$12,285	\$12,396	\$11,622	\$11,069	\$10,848
	Total cost of access	sibility features	\$23,054	\$22,545	\$19,529	\$20,772	\$20,357
	Cost of standard detached house (www.c	sosttobuild.net)	\$222,357	\$224,358	\$210,350	\$200,344	\$196,341

10%	10%	%6	10%	10%	cost impact (% change between modified and standard detached house)
\$216,698	\$221,115	\$229,879	\$246,903	\$245,411	Cost of modified detached house
\$196,341	\$200,344	\$210,350	\$224,358	\$222,357	Cost of standard detached house (www.costtobuild.net)

Row House

Cos	st impact	Legend	
	Nil or negligible costs (\$0 to \$99) or non applicable	\$0	Footure securities in the bullow on additional coat
	Low costs (\$100 to \$499)		realure required in the bylaw, no additional cost
	Moderate costs (\$500 to \$999)	N.D.	Cost not available
	High costs (\$1,000 or more)	N.A.	Not applicable

	A concelbility, Ecoturioe			Row House		
		Montráol	Toronto	Vancouver		Winning
		MONTREAL		vancouver	пашах	winnipeg
Layout	Single-storey layout, without steps or staircases, that may include slabs on grade or a slight gradient (1:20 or less).	\$1,100	\$1,110	\$1,041	\$991	\$971
	On the door handle side, clearance of 600 mm (24 in.) on the side where the door is pulled and 300 mm (12 in.) on the side where it is pushed.	\$0	\$0	0\$	\$0	\$0
	Door at least 915 mm (36 in.) wide with clearance of at least 865 mm (34 in.).	\$170	\$172	\$161	\$153	\$150
Access to	If the door is not exposed to the elements: The threshold of the exterior entrance door is flat and bevelled at a maximum height of 12.5 mm ($\frac{1}{2}$ in.). If the door is exposed to the elements: The threshold of the entrance door is exposed to the elements.					
	beint arrive door is standard but entreduced so as to reduce inc height to the adjacent surfaces.	Included	Included	\$0	Included	Included
	The doors are equipped with lever handles.	\$0	\$0	\$0	\$0	\$0
	The door is equipped with a device allowing the occupant to see who is there.	\$0	\$0	\$0	\$0	\$0
	There is protection against rain and snow above main entrance.	\$0	\$0	\$0	\$0	\$0
	There is an appropriate turning circle inside and outside the entrance of 1,500 mm (60 in.).	Inclu	ded in the c	ost of the additi	onal surface	area
	Garage dimensions of at least 4,270x6,100 mm (14x20 ft.) so that a car can be parked and the person can manoeuvre around.	Inclu	ded in the c	ost of the additi	onal surface	area
Garage	A difference in height of less than 100mm (4 in) between the garage level and floor level of the house. A short ramp with a top landing measuring 1,500x1,500 mm (5x5 ft) can easily be added.	\$0	\$0	\$0	\$0	\$0
	A height of 2,700 mm (9 ft.) to accommodate various types of vehicles.	\$0	\$0	\$0	\$0	\$0
Mobility	A manoeuvring area of 1,500 mm (60 in.) in diameter for wheelchairs in primary locations throughout the home.	Inclu	ded in the c	ost of the additi	onal surface	area
6	Avoid hallways but, if necessary, plan for a width of 920 mm (about 3 ft.) there.	0\$	\$0	0\$	\$0	0\$

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	Swinging or sliding doors 865 mm (34 in.) wide with clearance of 815 mm (32 in.) when open.	\$825	\$832	\$0	\$743	\$728
Mobility	On the door handle side, clearance of 600 mm (24 in.) on the side where the door is pulled and 300 mm (12 in.) on push side.	N.A.	N.A.	N.A.	N.A.	N.A.
	Lever handles.	\$140	\$141	\$0	\$126	\$124
	No door sill.	\$0	\$0	\$0	\$0	\$0
	Flat, smooth, non-slip, anti-glare flooring.	\$0	\$0	\$0	\$0	\$0
Controls and	Switches and controls installed between 450 and 1,200 mm (between 18 and 48 in.) above the ground. Controls located more than 450 mm from the inside corner of a wall.	\$0	\$0	0\$	\$0	0\$
security	Easy single-handed operation of switches and controls.	\$0	\$0	\$0	\$0	\$0
systems	Faucets and other lever controls that require little strength and no gripping or turning.	\$0	\$0	\$0	\$0	\$0
	The kitchen is designed to facilitate movement and access to the workspace and appliances and has a clearance of 1500 mm (60 in.) in front of each counter.	006\$	\$908	\$851	\$811	\$795
	Continuous counter space between the stove and the sink.	Included	Included	Included	Included	Included
	Counters at regular height, allowing for integration of regular equipment: stove and sink. Plan sliding shelf to facilitate work in a seated position.	\$200	\$202	\$189	\$180	\$177
	Kitchen cabinets with a lot of drawers and sliding shelves. Users pull articles toward themselves and do not have to stretch.	\$975	\$984	\$922	\$878	\$861
Kitchen	All cabinet handles are D-handles, enabling easy use without having to grasp them.	0\$	0\$	0\$	0\$	0\$
	Kitchen cabinets and work surfaces are of contrasting colours, which enables users to see and use doors, handles and counters more easily.	\$0	\$0	\$0	\$0	\$0
	Upper cabinets installed at a maximum height of 400 to 450 mm (about 16 to 18 in.) above the counter.	\$0	\$0	\$0	\$0	\$0
	Plan a module that can be modified easily in order to clear an accessible space under the sink 760 mm wide by 685 mm high (30x27 in.) over the entire depth of the counter.	\$400	\$404	\$378	\$360	\$353
	Plan for a floor covering in the entire kitchen, even under the sink countertop section.	\$336	\$339	\$318	\$303	\$297
	Plan vertical storage space with an interior free width of 760 mm (30 in.) and a depth of 600 mm (24 in.) to accommodate a wall oven. Plan a sliding shelf under the oven.	\$720	\$726	\$681	\$649	\$636

Row House

	For a two-storey home: Half-bath accessible on the main floor with a manoeuvring area of 1,500 mm (60 in.); ideally, a full bathroom.	\$168	\$170	\$161	\$151	\$154
	For a two-storey home: Half-bath accessible on the main floor has potential for being converted into a full bathroom.	LL.	lan does no	t permit includi	ng this featur	Ð
	Main bathroom with a manoeuvring area of 1,500 mm (60 in.).	Inclu	ded in the co	ost of the addit	onal surface	area
	Entire area in front of the bathtub is clear.	\$0	\$0	\$0	\$0	\$0
	Sink at a height of 810 to 860 mm (32 to 34 in.). Plan a module that can be modified easily in order to clear an accessible space under the sink 760 mm wide by 685 mm high (30x27 in.) over the					
	entire depth of the counter.	\$400	\$404	\$378	\$360	\$353
	Plan for a floor covering in the entire bathroom, even under the sink countertop section.	\$552	\$557	\$522	\$497	\$487
Bathroom	Two-storey house: In the half-bathroom on the main floor, plan a wall sink with hidden wall support instead of pedestal/vanity sink.	\$0	\$0	\$0	\$0	\$0
	Walls behind and on either side of the toilet are reinforced with plywood so grab bars can be installed anywhere on those walls.	\$330	\$0	\$0	\$297	\$291
	Bathtub walls are reinforced with plywood so that the user can install grab bars anywhere.	\$220	\$0	\$0	\$198	\$194
	The toilet is adjacent to a wall and its centreline should be between 460 mm (18 in.) and 480 mm (19 in.) from that wall.	\$0	\$0	\$0	\$0	\$0
	The main bathroom is designed so that a curbless shower measuring at least 915 mm (36 in.) by 1,200 mm (48 in.) may be installed in future.	\$0	\$0	\$0	\$0	\$0
	The structure can be easily modified under the shower.	\$1,000	\$1,009	\$0	\$901	\$883
	The bathroom is adjacent to a bedroom for easy connection between the two. This also allows for the installation of a rail ceiling lift.	N.A.	N.A.	N.A.	N.A.	N.A.
Possibility	Space (at the bottom and top of the stairs) for the future installation of a chair or platform stair lift.	Inclu	ded in the co	ost of the addit	onal surface	area
ot installing a lift in	Straight staircase with only one flight, allowing for the installation of a chair or platform stair lift.	0\$	0\$	0\$	0\$	0\$
future (Some options applicable depending	Space wide enough for the future installation of a chair or platform stair lift. The installation of a lift on the staircase reduces the width required by regulations for evacuation. A special request for the installation of such a device must be submitted to the municipality.	\$200	\$202	\$0	\$180	\$177
on the dwelling)	Preparation for the future installation of an elevator by superimposing closets and using a structure that can be easily modified.	N.A.	N.A.	N.A.	N.A.	N.A.

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	Bottom of window sill max. 760 mm (30 in.) above grade.	\$0	\$0	\$0	\$0	\$0
Windows	Windows equipped with easy-to-use opening and locking systems.	\$0	\$0	\$0	\$0	\$0
	French doors 1,800 mm (72 in.) wide with clearance of 810 mm (32 in.).	\$0	0\$	\$0	\$0	\$0
Access to the balconv	Swinging door, without storm door, at least 915 mm (36 in.) wide with clearance of at least 865 mm (34 in.).	N.A.	N.A.	N.A.	N.A.	N.A.
or deck	The threshold of the door is standard but embedded so as to reduce the height to the adjacent surfaces.	\$0	\$0	\$0	\$0	\$0
	Weather protection above the door.	\$0	\$0	\$0	\$0	\$0
Two-storey homes	Plan to lay out a bedroom on the ground floor.	N.A.	N.A.	N.A.	N.A.	N.A.
	If smoke detectors are installed in the homes, they must have an audible and visual alarm signal.	\$160	\$0	\$151	\$144	\$141
Fire safety	Plan for a balcony that is accessible from the bedroom floor for taking refuge in case of fire.	\$3,000	\$3,027	\$2,838	\$2,703	\$2,649
	Plan for an outdoor space that is accessible from the basement for taking refuge in case of fire.			Not included		
Additional surface area	Cost of the increase in the living area, the garage area, the bathroom area, the kitchen area, etc. (www.costtobuild.net)	\$2,401	\$2,423	\$2,271	\$2,163	\$2,120
	Total cost of accessibility features	\$14,197	\$13,608	\$10,864	\$12,791	\$12,542

7%	7%	6%	7%	7%	Cost impact (% change between modified and standard row house)
\$189,280	\$193,132	\$200,211	\$215,566	\$214,353	Cost of modified row house
\$176,738	\$180,341	\$189,348	\$201,957	\$200,156	Cost of standard row house (www.costtobuild.net)

Apartment

Cost	mpact	Legend	
	Nil or negligible costs (\$0 to \$99) or non applicable	\$0	Easture required in the bulow on additional and
	Low costs (\$100 to \$499)		reature required in the bylaw, no additional cost
	Moderate costs (\$500 to \$999)	N.D.	Cost not available
	High costs (\$1,000 or more)	N.A.	Not applicable

				Apartment		
	Accessibility Features	Montréal	Toronto	Vancouver	Halifax	Winnipeg
Layout	Single-storey layout, without steps or staircases, that may include slabs on grade or a slight gradient (1:20 or less).	N.A.	N.A.	N.A.	N.A.	N.A.
	On the door handle side, clearance of 600 mm (24 in.) on the side where the door is pulled and 300 mm (12 in.) on the push side.	0\$	0\$	0\$	0\$	0\$
	Door at least 915 mm (36 in.) wide with clearance of at least 865 mm (34 in.).	\$85	\$0	\$80	\$0	\$75
Access to the home	If the door is not exposed to the elements: The threshold of the exterior entrance door is flat and bevelled at a maximum height of 12.5 mm (γ_2 in.). If the door is exposed to the elements: The threshold of the entrance door is standard but embedded so as to reduce the height to the adjacent surfaces.	N.A.	N.A.	Z.A.	N.A.	Z.A.
	The doors are equipped with lever handles.	\$0	\$0	\$0	\$0	\$0
	The door is equipped with a device allowing the occupant to see who is there.	\$50	\$50	\$0	\$45	\$44
	There is protection against rain and snow above the main entrance.	N.A.	N.A.	N.A.	N.A.	N.A.
	There is an appropriate turning circle inside and outside the entrance of 1,500 mm (60 in.).	Includ	led in the co	st of the addit	ional surfac	e area
	Garage dimensions of at least 4,270x6,100 mm (14x20 ft.) so that a car can be parked and the person can manoeuvre around.	N.A.	N.A.	N.A.	N.A.	N.A.
Garage	A difference in height of less than 100 mm (4 in.) between the garage level and the floor level of the house. A short ramp with a top landing measuring 1,500x1,500 mm (5x5 ft.) can easily be added.	N.A.	N.A.	N.A.	N.A.	N.A.
	A height of 2,700 mm (9 ft.) to accommodate various types of vehicles.	N.A.	N.A.	N.A.	N.A.	N.A.
Mobility	A manoeuvring area of 1,500 mm (60 in.) in diameter for wheelchairs in primary locations throughout the home.	Includ	led in the co	st of the addit	ional surfac	e area
	Avoid hallways but, if necessary, plan for width of 920 mm (about 3 ft.)	\$0	\$0	\$0	\$0	\$0

						,
	Swinging or sliding doors 865 mm (34 in.) wide with clearance of 815 mm (32 in.) when open.	\$60	\$61	\$0	\$54	\$53
	On the door handle side, clearance of 600 mm (24 in.) on the side where the door is pulled and 300 mm (12 in.) on the push side.	N.A.	N.A.	N.A.	N.A.	N.A.
	Lever handles.	\$80	\$81	\$0	\$72	\$71
	No door sill.	\$0	\$0	\$0	\$0	\$0
	Flat, smooth, non-slip, anti-glare flooring.	\$0	\$0	\$0	\$0	\$0
Controls and	Switches and controls installed between 450 and 1,200 mm (between 18 and 48 in.) above the ground. Controls located more than 450 mm from the inside corner of a wall.	0\$	0\$	\$0	\$0	0\$
security	Easy single-handed operation of switches and controls.	\$0	\$0	\$0	\$0	\$0
ayətemə	Faucets and other lever controls that require little strength and no gripping or turning.	\$0	\$0	\$0	\$0	\$0
	The kitchen is designed to facilitate movement and access to the workspace and appliances and has a clearance of 1500 mm (60 in.) in front of each counter.	Include	d in the co	st of the addit	ional surface	e area
	Continuous counter space between the stove and the sink.	\$0	\$0	\$0	\$0	\$0
	Counters at regular height, allowing for integration of regular equipment: stove and sink. Plan sliding shelf to facilitate work in a seated position.	\$0	\$0	\$0	\$0	\$0
	Kitchen cabinets with a lot of drawers and sliding shelves. Users pull articles toward themselves and do not have to stretch.	\$975	\$984	\$922	\$878	\$861
	All cabinet handles are D-handles, enabling easy use without having to grasp them.	\$0	\$0	\$0	\$0	\$0
Kitchen	Kitchen cabinets and work surfaces are of contrasting colours, which enables users to see and use doors, handles and counters easily.	\$0	\$0	\$0	\$0	\$0
	Upper cabinets installed at a maximum height of 400 to 450 mm (about 16 to 18 in.) above the counter.	\$0	\$0	\$0	\$0	\$0
	Plan a module that can be modified easily in order to clear an accessible space under the sink 760 mm wide by 685 mm high (30x27 in.) over the entire depth of the counter.	\$400	\$404	\$378	\$360	\$353
	Plan for a floor covering in the entire kitchen, even under the sink countertop section.	\$324	\$327	\$307	\$292	\$286
	Plan vertical storage space with an interior free width of 760 mm (30 in.) and a depth of 600 mm (24 in.) to accommodate a wall oven. Plan a sliding shelf under the oven.	\$720	\$726	\$681	\$649	\$636
	Main bathroom with a manoeuvring area of 1,500 mm (60 in.).	Include	d in the co	st of the addit	ional surface	e area

					Apartn	nent
	Entire area in front of the bathtub is clear.	Include	ed in the co	st of the addit	ional surfac	e area
	Sink at a height of 810 to 860 mm (32 to 34 in.). Plan a module that can be modified easily in order to clear an accessible space under the sink 760 mm wide by 685 mm high (30x27 in.) over the entire depth of the counter.	\$400	\$404	\$378	\$360	\$353
	Plan for a floor covering in the entire bathroom, even under the sink countertop section.	\$324	\$327	\$307	\$0	\$286
	Walls behind and on either side of the toilet are reinforced with plywood so that grab bars can be installed anywhere on those walls.	\$110	0\$	0\$	0\$	26\$
	Bathtub walls are reinforced with plywood so that the user can install grab bars anywhere.	\$110	0\$	0\$	0\$	26\$
	The toilet is adjacent to a wall and its centreline should be between 460 mm (18 in.) and 480 mm (19 in.) from that wall.	\$0	\$0	\$0	\$0	\$0
	The main bathroom is designed so that a curbless shower measuring at least 915 mm (36 in.) by 1,200 mm (48 in.) may be installed in future.	\$0	\$0	\$0	\$0	\$0
	The structure can be easily modified under the shower.	N.A.	N.A.	N.A.	\$0	N.A.
	The bathroom is adjacent to a bedroom for easy connection between the two. This also allows for the installation of a rail ceiling lift.	N.A.	N.A.	N.A.	N.A.	N.A.
Possibility of	Space (at the bottom and top of the stairs) for the future installation of a chair or platform stair lift.	N.A.	N.A.	N.A.	N.A.	N.A.
installing a lift in future	Straight staircase with only one flight, allowing for the installation of a chair or platform stair lift.	N.A.	N.A.	N.A.	N.A.	N.A.
(Some options applicable depending on	Space wide enough for the future installation of a chair or platform stair lift. The installation of a lift on the staircase reduces the width required by regulations for evacuation. A special request for the installation of such a device must be submitted to the municipality.	Z.A.	N.A.	N.A.	Z.A.	N.A.
(Guillean ann	Preparation for the future installation of an elevator by superimposing closets and using a structure that can be easily modified.	N.A.	N.A.	N.A.	N.A.	N.A.
Windowe	Bottom of window sill max. 760 mm (30 in.) above grade.	\$0	\$0	\$0	\$0	\$0
	Windows equipped with easy-to-use opening and locking systems.	\$0	\$0	\$0	\$0	\$0

						Apartm	ent
	French doors 1,80	0 mm (72in) wide with clearance of 810 mm (32in)	N.A.	N.A.	N.A.	N.A.	N.A.
Access to the	Swinging door, wil clearance of at lea	hout storm door, at least 915 mm (36 in.) wide with st 865 mm (34 in.).	\$0	\$0	\$0	\$0	\$0
deck	The threshold of the	le door is standard but embedded so as to reduce djacent surfaces.	\$0	\$0	\$0	\$0	\$0
	Weather protection	above the door.	N.A.	N.A.	N.A.	N.A.	N.A.
	If smoke detectors audible and visual	are installed in the homes, they must have an alarm signal.	\$0	\$0	\$150	06\$	\$0
Fire safety	Plan for a balcony refuge in case of fi	that is accessible from the bedroom floor for taking re.	\$575	\$580	\$544	\$0	\$508
	Plan for an outdoc taking refuge in ca	r space that is accessible from the basement for se of fire.	N.A.	N.A.	N.A.	N.A.	N.A.
Additional surface area	Cost of the increa: area, the kitchen a	se in the living area, the garage area, the bathroom rea, etc. (www.costtobuild.net)	N.D.	N.D.	N.D.	N.D.	N.D.
		Total cost of accessibility features	\$4,213	\$3,943	\$3,748	\$2,801	\$3,720

Cost of standard house (www.costtobuild.net)	N.D.	N.D.	N.D.	N.D.	N.D.
Cost of modified house	N.D.	N.D.	N.D.	N.D.	N.D.
Cost impact (% change between modified house and standard house)	N.D.	N.D.	N.D.	N.D.	N.D.

APPENDIX 5 Stakeholders' contact information – Municipalities

Vancouver

Jason Watt, P.Eng., C.P. Building Policy Engineer City of Vancouver Building Policy Branch Tel.: 604-871-6074 jason.watt@vancouver.ca http://www.vancouver.ca/cbo

Boris Turishev, M.Eng., P.Eng., MBA Building Policy Engineer City of Vancouver Licenses & Inspections, Office of the Chief Building Official Tel.: 604-873-7401 <u>boris.turishev@vancouver.ca</u> http://www.vancouver.ca/cbo

Winnipeg

Grant Labossiere, B.A, M.arch, MAA House Plan Examiner City of Winnipeg 4th floor, 65 Garry St. Winnipeg MB R3C 4X7 Tel.: 204-986-4970 Fax: 204-942-2008 grantlabossiere@winnipeg.ca

Montréal

By-law concerning the construction and conversion of buildings 11-018: <u>http://ville.montreal.qc.ca/sel/sypre-consultation/afficherpdf?idDoc=23322&typeDoc=1</u> (in English) <u>www.ville.montreal.qc.ca/pls/portal/docs/PAGE/ARROND_ANJ_FR/MEDIA/DOCUMENTS/11_018.PDF</u> (in French)

Toronto

Nadim Khan, P.Eng., CFPS Building Code Adviser Ministry of Municipal Affairs and Housing 777 Bay St., 2nd Floor Toronto ON M5G 2E5 Tel.: 416-585-6453 Fax: 416-585-7455 nadim.khan@ontario.ca

Michael Swann Building Consultant Toronto Building Toronto and East York District Tel.: 416-392-7575 mswann@toronto.ca

Halifax

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APPENDIX 6

Stakeholders' contact information – Contractors and homebuilders' associations

Vancouver

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Winnipeg

Derek Thorsteinson President & General Manager Parkhill Homes 203-3303 Portage Avenue Winnipeg MB R3K 0W7 Tel.: 204-982-2930 <u>derekt@parkhillhomes.ca</u>

Toronto

Pauline Lip Senior Technical Advisor Ontario Home Builders' Association Tel.: 416-443-1545, ext. 226 plip@ohba.ca

Andrew Oding, CEA, LEED AP Senior Building Science Associate Building Knowledge Canada Inc. 240 Holiday Inn Drive, Suite O Cambridge ON N3C 3X4 Tel.: 1-800-267-6830 andy@buildingknowledge.ca

Montréal

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*After March 1, 2015: André Gagné, Building and Environment Consultant Tel.: 514-715-3060

Nicola Trinci, General Contractor Construction Trilikon Construction Inc. 9200 Perras Boulevard, #2 Montréal QC H1E 6P1 Tel.: 514-494-3661

Michel Page, General Contractor Bâti-Rénove (2002) Inc. 540 Principale Street Saint-Etienne-de-Lauzon QC G6J 0C2 Tel.: 418-836-3221

Martin Gagnon, General Contractor 10674 Sainte-Anne Boulevard Sainte-Anne-de-Beaupré QC G0A 3C0 Tel.: 418-827-1029

Halifax

No stakeholder identified

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