



# HOUSING RESEARCH REPORT

## **Assessment of Adaptable Housing Design Needs and Solutions**

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# Assessment of Adaptable Affordable Housing Design Needs and Solutions

## Literature Review



September 2018

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## EXECUTIVE SUMMARY

This research explored adaptable, accessible, affordable housing that can better respond to changing household needs and demographic patterns. The scope of work included identification of gaps in the area of study and recommendations for further research or updating of previous studies. The research was conducted by searching, reviewing and documenting existing literature to collect information on the needs and challenges of building or renovating adaptable affordable housing to meet changing demographics and user needs. An annotated bibliography was created of the most informative results of the scan of existing research from Canadian, US and international resources and projects developed within the last ten years. Based on the resource research, key contacts were identified, questions were formulated, and, interviews conducted to obtain qualitative information from housing providers and experts.

The review found evidence that socio/demographic changes can be expected to have a profound effect on housing needs. There is a broad spectrum of residents in need of more affordable and appropriate housing, from the elderly to youth, and from indigenous communities to newcomers. There is a growing need in Canada for more MURBs in general. This is expected to continue into the future due to aging baby boomers, most newcomer households needing the space and affordability offered by multi-unit dwellings, and increasing urbanization that increases housing costs – particularly single, detached dwellings.

In general, there is a need for adaptable and affordable housing, to accommodate changing demographics because:

- Aging building stock was built with little or no incorporation of accessible features
- People are living longer, and wishing to age in place
- Diminished incomes, unstable economy and rising energy costs
- Changing ‘family’ size and nature
- Newcomers requiring larger units; singles requiring smaller units, generally in MURBs due to affordability

The idea of adaptability is not something that the affordable housing providers who participated in the interviews reported as a need, nor is it incorporated into the provincial housing strategies that were examined. However, once the ideas were described to them, the providers agreed it could be beneficial for adaptability features to be included in new housing, and in regeneration projects as much as possible. They noted that before adaptable features could be incorporated, the benefits would need to be considered, and

the costs analyzed, along with the bigger picture of all the priorities dealt with in the production of affordable housing.

Challenges to the provision of flexible, accessible and adaptable housing include: regulatory controls such as restrictions on secondary suites, the rigid physical nature of the construction of existing MURB stock, and a mismatch of unit sizes to needs in existing MURB's. Other barriers can include: resistance to new approaches, lack of data and information on costs and benefits, minimal regulatory requirements for incorporation of barrier-free and aging-in-place features, and construction budget limitations.

In Canada, strategies in support of adaptable, accessible and affordable housing include: regulatory changes to allow accessory suites, funding for accessibility upgrades, and inclusion of accessibility features in federal, provincial and municipal housing programs. In the market sector for MURBs, some developers are responding to consumer demand with innovative design of adaptable units. International strategies include national affordable housing frameworks with mandatory adaptable features, and innovation in design and construction of new MURB's.

The research shows that there is a need to make affordable housing adaptable. Societal and demographic changes are happening more rapidly than in the past and are having a profound effect on housing needs now and in the future. Affordable housing providers can benefit from an adaptable approach that can more cost-effectively and efficiently accommodate changes in housing needs. Features such as flexible floor plans and embedded features that facilitate future accessibility upgrades are part of the solution. However, this review also indicated that there is insufficient knowledge and experience with the costs and benefits of adaptable housing solutions – particularly in the affordable housing stock – and this represents a significant barrier to awareness and adoption. Research, development and demonstration of practical, cost-effective approaches in new and existing residential housing projects are needed to more fully understand the full range of costs and benefits of adaptable housing solutions.

## SOMMAIRE

Dans ce projet de recherche, on a étudié les logements adaptables, accessibles et abordables qui peuvent le mieux répondre l'évolution des besoins des ménages et des tendances démographiques. La portée des travaux comprenait l'identification des lacunes dans le domaine de l'étude et la formulation de recommandations de recherches supplémentaires ou de mise à jour d'études antérieures. La recherche a été réalisée en étudiant la documentation existante afin d'y recueillir des renseignements sur les besoins et les défis en matière de construction ou de rénovation de logements adaptables et abordables en vue de répondre aux changements démographiques et aux nouveaux besoins des utilisateurs. Une bibliographie annotée des résultats les plus utiles de l'étude contextuelle des recherches existantes a été créée à partir de sources canadiennes, américaines et internationales et de projets élaborés au cours des dix dernières années. La recherche documentaire a permis de dresser une liste de personnes-ressources, de formuler des questions et de mener des entrevues afin d'obtenir des renseignements qualitatifs auprès de fournisseurs de logements et d'experts.

L'examen a révélé des preuves que des changements sociodémographiques pourraient avoir une incidence importante sur les besoins en matière de logement. Un large éventail de résidents (personnes âgées, jeunes, communautés autochtones, nouveaux arrivants) ont un plus grand besoin de logements abordables et convenables. De manière générale, il y a un besoin croissant d'augmenter le nombre d'ICR au Canada. Cette tendance devrait se poursuivre en raison du vieillissement des baby-boomers, de la préférence des ménages de nouveaux arrivants ayant besoin de l'espace et de l'abordabilité que leur offrent les collectifs d'habitation, ainsi que de l'accroissement de l'urbanisation qui fait grimper les coûts des logements – particulièrement ceux des maisons individuelles.

En général, il y a un besoin à combler dans le secteur du logement adaptable et abordable en réponse aux changements démographiques, notamment pour les raisons suivantes :

- Le parc de logements vieillissant a été construit en n'y intégrant que peu ou pas d'éléments accessibles
- Les gens vivent plus longtemps et veulent vieillir chez eux
- La baisse des revenus, l'économie instable et la hausse des coûts de l'énergie
- L'évolution de la taille et de la composition des familles
- Les nouveaux arrivants ont besoin de logements plus grands; les personnes seules ont besoin de logements plus petits, généralement dans un ICR en raison de l'abordabilité.

L'adaptabilité n'est pas un concept qui figure sur la liste des besoins prioritaires tenue par les fournisseurs de logements qui ont participé aux entrevues. Ce concept ne fait pas non plus partie des stratégies de logement provinciales qui ont fait l'objet de recherches. Cependant, après avoir pris connaissance de ces constats, les fournisseurs ont reconnu qu'il serait bénéfique d'inclure les caractéristiques d'adaptabilité aux nouveaux logements et aux projets de remodelage, dans la mesure du possible. Ils ont aussi indiqué qu'avant d'intégrer les éléments adaptables, il faudrait examiner les avantages et analyser les coûts, et avoir une meilleure vue d'ensemble de toutes les priorités à traiter pour la production de logements abordables.

Voici quelques-unes des difficultés que doivent surmonter les personnes qui essaient de fournir des logements flexibles, accessibles et adaptables : les contrôles réglementaires tels que les restrictions visant les logements accessoires, la nature rigide de la construction des ICR existants et la disparité entre la dimension des logements et les besoins dans les ICR existants. Les autres obstacles peuvent comprendre : la résistance aux nouvelles approches, le manque de données et de renseignements sur les coûts et les avantages, les exigences réglementaires minimales à l'égard de l'intégration de l'aménagement sans obstacle et du concept de vieillissement chez soi et les limites des budgets de construction.

Au Canada, les stratégies à l'appui des logements adaptables, accessibles et abordables comprennent des changements réglementaires afin de permettre les logements accessoires, le financement des améliorations à l'accessibilité et l'ajout d'éléments d'accessibilité dans les programmes de logement fédéraux, provinciaux et municipaux. Dans le secteur du marché des ICR, certains promoteurs répondent à la demande des consommateurs en offrant une conception novatrice de logements adaptables. Les stratégies internationales comprennent des cadres de référence nationaux pour le logement abordable renfermant des caractéristiques adaptables obligatoires, et l'innovation en matière de conception et de construction des ICR.

La recherche démontre le besoin d'améliorer l'adaptabilité du logement abordable. Les changements sociétaux et démographiques se produisent plus rapidement que par le passé et ont un effet marqué sur les besoins de logement actuels et futurs. Les fournisseurs de logements abordables peuvent tirer profit d'une approche favorisant l'adaptabilité qui pourrait s'adapter d'une manière plus efficace et rentable à l'évolution des besoins en matière de logement. Des caractéristiques comme la flexibilité des plans d'étage et des caractéristiques intégrées qui facilitent les améliorations futures de l'accessibilité font partie de la solution. Cependant, cette recherche indique également qu'il y a une lacune sur le plan des connaissances et de l'expérience en matière d'établissement des coûts et des avantages des solutions de logements adaptables – particulièrement pour le parc de logements abordables – et que cela représente un obstacle qui nuit à la sensibilisation et à l'adoption. La recherche, le développement et la

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Needs and Solutions – Literature Review

démonstration d'approches pratiques et rentables dans les ensembles de logements neufs et existants sont nécessaires pour mieux comprendre les coûts et l'ensemble des avantages attribuables aux solutions de logement adaptables.





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*Cover image: Camas Gardens, Victoria, British Columbia*

*Architect: Chow Low Hammond Architects Inc.*

*Source: Pacific Housing website*

<https://www.pacificahousing.ca/news/camas-gardens-wins-international-property-award>

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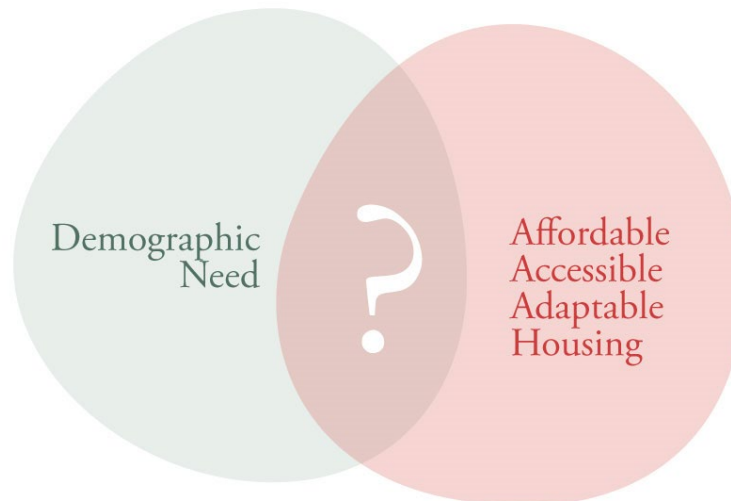
## 1.0 Study Overview

This literature review research study explores the potential demand for adaptable, accessible, affordable housing that responds to changing household needs and demographic patterns, and economical, sustainable and flexible solutions in the affordable housing sector, with particular attention to multi-unit residential buildings (MURBs).

The review of the literature also aims to identify gaps in the area of study and note any areas recommended for further research or updating of previous studies.

### 1.1 Objectives

The objective of the report is to provide a brief analysis of the issue and an overview of related existing housing solutions based on the information and resources found.



### Literature Review

The purpose of the literature review is to determine the existence and extent of a mismatch between the current affordable housing stock and existing and future housing needs across a mix of housing types, with particular attention to MURBs. The literature review aims to: investigate and describe the extent of the problem; identify a range of solutions and existing projects where adaptable, accessible and flexible principles have been implemented; and discover where affordable housing providers have planned for or are dealing with this issue.

## Industry Interviews

The purpose of the interviews is to gather information from a variety of housing providers, based on projects and proponents identified in the literature review, in order to obtain qualitative indicators relating to adaptable, affordable housing issues, needs, solutions and trends. The questionnaire seeks information on the current needs and potential challenges of building or adapting MURBs, or adjusting a housing provider's building portfolio, to meet changing demographics and user needs.

### 1.2 Background and Purpose

There is increasing interest in affordable housing models that can cost-effectively adapt to changing needs over time. Key areas of enquiry in this domain include: What is the potential for affordable housing projects to be designed and constructed (or renovated) to be more adaptable, flexible, and accessible to suit life's changing needs in an efficient, economical and resilient manner? What is the extent of the demand for such adaptable housing, and the range of "flex" technologies, practices and strategies that exist or that may be required? Are there case studies of adaptable MURB designs that can be applied in Canada to future and existing affordable housing?

Much of the affordable housing stock in Canada was constructed in the 1950s to 1980s and was built to meet the local housing needs of the day. As populations age, immigration ebbs and flows, and economic conditions evolve, some affordable housing providers are finding that the housing constructed decades ago is no longer appropriate to meet current needs. In addition, there are concerns that housing being built today may not meet tomorrow's evolving needs. Some housing providers have pointed to a mismatch between their stock and the changing demographics of the people they serve; buildings specifically constructed to house families, seniors or singles are now being used for different demographics. This mismatch can also undermine the financial viability of housing providers.

Aging populations require more adaptations for independent living and potential in-house care, which impose new costs to make buildings more accessible and suitable. Empty nester seniors often need (or want) to downsize and may require accessible housing with more aging-in-place features and space for related caregivers. In the absence of adaptable housing, the only option is to undertake significant renovations, or to move – a solution that is expensive, inconvenient and disruptive to community support networks and neighborhood stability.

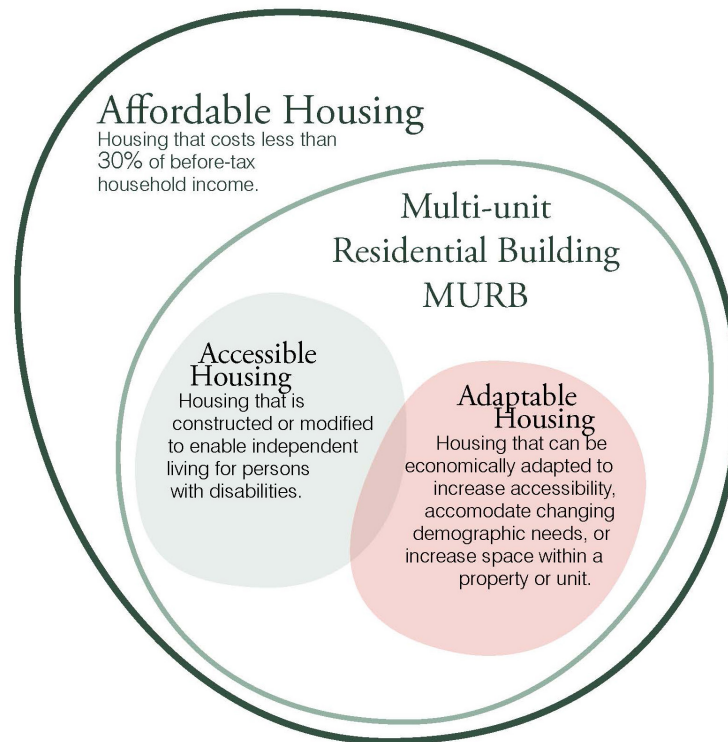
There are three general types of adaptability that have the potential to be incorporated into affordable housing:

1. Adaptable features that increase accessibility for seniors or people who become disabled, for example support for grab-bars, removable cupboards, clearances for barrier-free circulation, closets stacked for elevator installation.
2. Adaptable building designs that allow changes to unit size and mix to accommodate changing demographic needs, such as layouts where two adjacent units can be combined or separated as need be.
3. Adaptations to increase or divide space within a property or unit, for example the addition of an accessory suite or laneway house.

Although flexible, adaptable design principles have been explored within the context of single family and low-rise housing, their application within MURBs (rental or condominium) in Canada is a relatively less common consideration. MURB design tends to rely on repeated, relatively inflexible floor plans, stacked building services, and rigid fire and sound requirements for partitions between units. The introduction of flexible, adaptable technologies, practices and strategies into the design, construction and renovation of MURBs is complex.

Over the last century a strong body of international research has been conducted and many affordable MURB projects have been designed and constructed using concepts of flexibility and adaptability. The extent to which current adaptable design practices are influenced by the past varies. There are many well documented case studies that may have applicability to Canada and the role that adaptable design can play on housing affordability.

Overall, this research study explores and documents the issue and application of adaptable and accessible principles in affordable housing and aims to help promote industry awareness and adoption of adaptable, affordable options that can be applied to MURBs.



### 1.3 Definitions

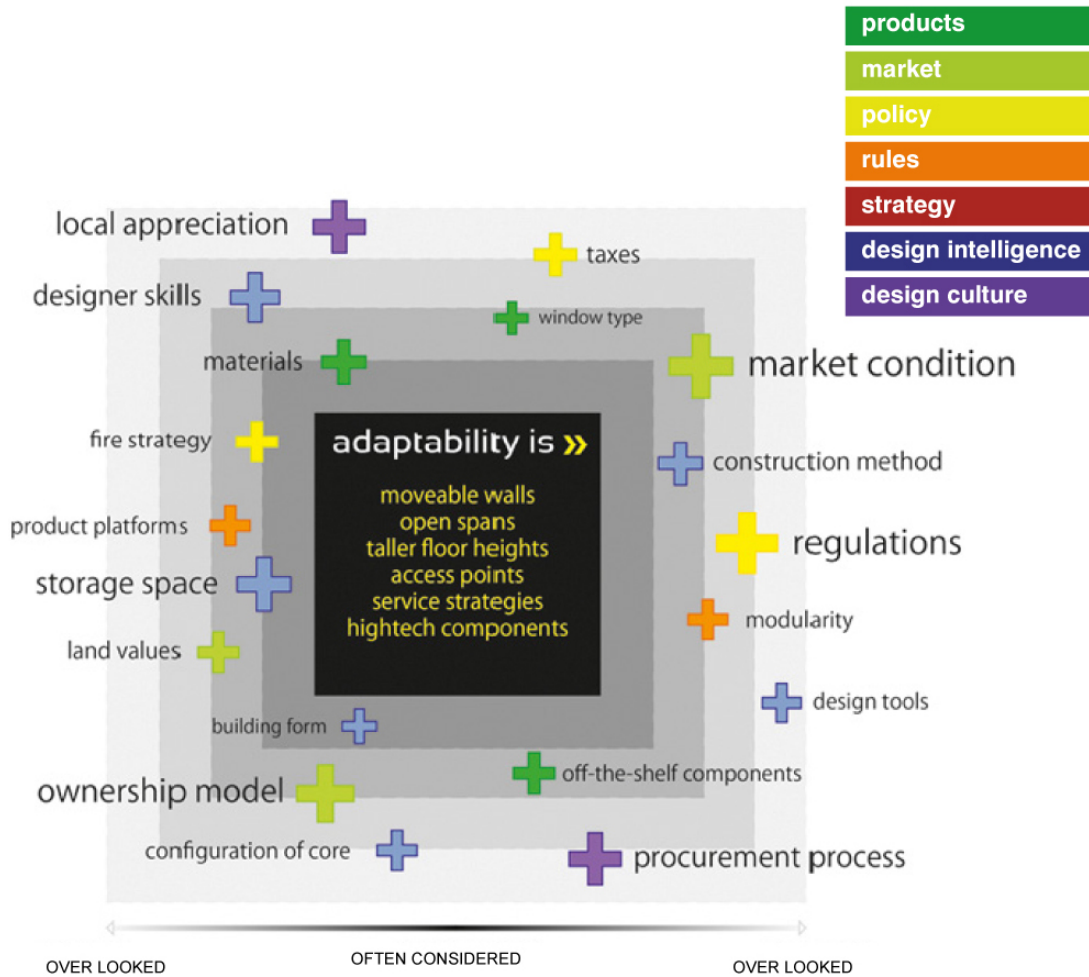
The following definitions were developed for the purpose of this report or derived from other sources as credited, and indicate a broad range of concepts and solution sets that are applicable to adaptable, accessible and affordable housing.

#### **Accessible housing**

Housing that is constructed or modified to enable independent living for persons with disabilities.

#### **Adaptable Housing**

Housing that can be economically adapted to: increase accessibility for seniors or people who become disabled (e.g. support for grab-bars, removable cupboards, clearances for circulation, closets stacked to allow for elevator installation); accommodate changing demographic needs (e.g. divide a large bedroom into 2 or join 2 adjacent units); or increase space within a property or unit (e.g. add an accessory suite such as basement apartment, granny flat, laneway house).



*Adaptability blackbox diagram*  
Source: *The Adaptable Futures Toolkit*

### Affordable housing

Housing that costs less than 30% of before-tax household income. This is a widely recognized standard used by Canada Mortgage and Housing Corporation (CMHC). According to CMHC, the term "affordable housing" can refer to any part of the housing continuum from temporary emergency shelters through transition housing, supportive housing, subsidized housing, market rental housing or market homeownership.<sup>1</sup>

<sup>1</sup> Canada Mortgage and Housing Corporation (CMHC). *About Affordable Housing in Canada*. [http://www.cmhc-schl.gc.ca/en/inpr/afhoce/afhoce\\_021.cfm](http://www.cmhc-schl.gc.ca/en/inpr/afhoce/afhoce_021.cfm)





### Core housing need

A household is said to be in core housing need if its housing falls below at least one of the adequacy, suitability, or affordability standards and it would have to spend 30% or more of its before-tax income to pay the median rent of alternative local housing that is acceptable (meets all standards).<sup>2</sup>

### Flexible housing

Housing that is adaptable to the changing needs of users. It includes the possibility of choosing different housing layouts prior to occupation as well as the ability to adjust one's housing over time. It also includes the potential to incorporate new technologies over time, to adjust to changing demographics, or to completely change the use of the building from housing to something else.<sup>3</sup>

### FlexHousing™

FlexHousing™, developed by CMHC, is an innovative approach to home design, renovation and construction that is able to affordably adapt and convert as a household's lifestyle and needs change. CMHC makes FlexHousing™ information widely available in user friendly formats to facilitate and encourage the development of housing that is adaptable.<sup>4</sup>

### Garden suite

A garden suite, sometimes called a "granny flat", is a self-contained dwelling installed in the rear or side yard of the lot of an existing, permanent, single-family house. Usually, a garden suite has a kitchen, living area, one or two bedrooms, bathroom and storage space. A garden suite can be rented, leased or purchased, and installed on a temporary or permanent basis on a lot of a single-family house.<sup>5</sup>

<sup>2</sup> Canada Mortgage and Housing Corporation (CMHC). *Canadian Housing Observer (2013). Recent Trends in Housing Affordability and Core Housing Need.* [ftp://ftp.cmhc-schl.gc.ca/chic-ccd/h/Archives/CA1\\_MH\\_C13\\_2013A\\_NO6.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/h/Archives/CA1_MH_C13_2013A_NO6.pdf)

<sup>3</sup> Schneider, Tatjana, and Jeremy Till. *Flexible Housing.* Architectural Press. (August 2007) <http://www.amazon.co.uk/Flexible-Housing-Jeremy-Till/dp/0750682027>

<sup>4</sup> Canada Mortgage and Housing Corporation (CMHC). *Accessible and Adaptable Homes (2015).* <https://www.cmhc-schl.gc.ca/en/developing-and-renovating/accessible-adaptable-housing>

<sup>5</sup> Federation of Canadian Municipalities. *Housing Affordability and Choice: A Compendium of ACT.* (2011).

### **Laneway housing**

Laneway housing refers to a smaller house or cottage that is secondary to a principal house and is typically located in the rear yard and oriented towards a lane.<sup>6</sup>

### **Lifetime Homes**

The Lifetime Homes standard is a series of sixteen design criteria intended to make homes more easily adaptable for lifetime use at minimal cost. Lifetime homes are intended to accommodate most occupants, including some (but not all) wheelchair users and visitors with disabilities, without the necessity for substantial alterations. The criteria are based on 5 principles: inclusivity, accessibility, adaptability, sustainability, and good value.<sup>7</sup>

### **Micro suite**

A micro suite is a small self-contained unit that includes a bathroom, kitchenette, and living and sleeping areas. The unit is located in a larger building such as a large single family house that would provide access to common areas such as a garden, kitchen, dining room, living room and laundry.<sup>8</sup>

### **MURB**

For the purpose of this report, MURB stands for Multi-Unit Residential Building.

### **Secondary suite**

A secondary suite is a self-contained apartment within an existing house with a separate entrance, kitchen and bathroom. These units are also known as “accessory apartments”, “in-law suites”, “granny suites” or “garage suites”, “mortgage helper suites”, “suite-within-a-suite”, and “lock-off suites”. Basement apartments are the most common type.<sup>9</sup>

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[https://www.fcm.ca/Documents/tools/ACT/Housing\\_Affordability\\_and\\_Choice\\_A\\_Compendium\\_of\\_ACT\\_Solutions\\_EN.pdf](https://www.fcm.ca/Documents/tools/ACT/Housing_Affordability_and_Choice_A_Compendium_of_ACT_Solutions_EN.pdf)

<sup>6</sup> ibid

<sup>7</sup> Lifetime Homes website.

<http://www.lifetimehomes.org.uk/pages/lifetime-homes-principles.html>

<sup>8</sup> Federation of Canadian Municipalities. *Housing Affordability and Choice: A Compendium of ACT*. (2011).

[https://www.fcm.ca/Documents/tools/ACT/Housing\\_Affordability\\_and\\_Choice\\_A\\_Compendium\\_of\\_ACT\\_Solutions\\_EN.pdf](https://www.fcm.ca/Documents/tools/ACT/Housing_Affordability_and_Choice_A_Compendium_of_ACT_Solutions_EN.pdf)

<sup>9</sup> ibid



*Plan of unit with a lock-off suite*

*Source: plan diagram based on SFU Community Trust accessory apartment*

## **Universal Housing**

Housing that recognizes that everyone who uses a house is different and comes with different abilities that change over time. Features include lever door handles that everyone can use, enhanced lighting levels to make it as easy as possible to see, stairways that feature handrails that are easy to grasp, and easy-to use appliances.<sup>10</sup>

## **Universal Design**

Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.<sup>11</sup>

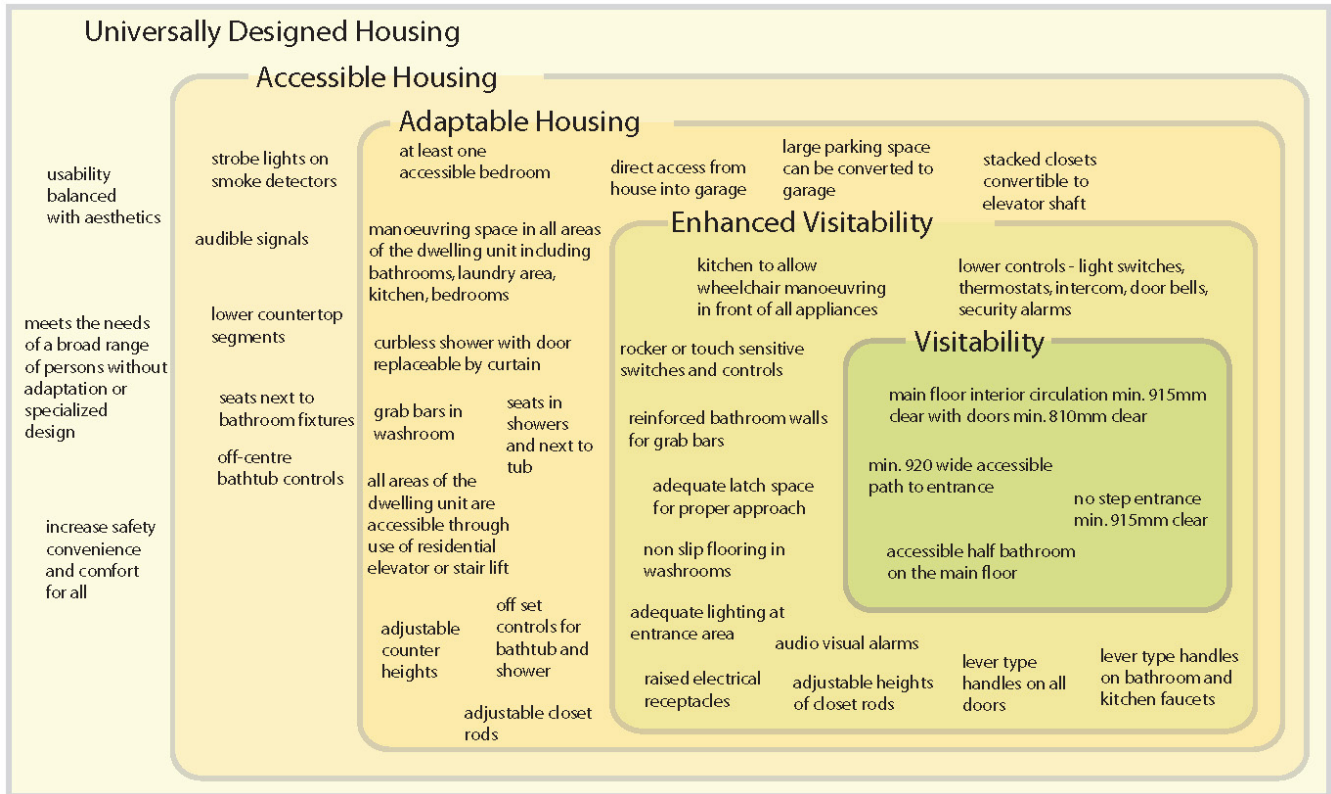
## **Visitable housing**

Visitable housing incorporates four basic accessibility features that make life easier for everyone and allow most people to visit. Basic features of a visitable house include: a one

<sup>10</sup> CMHC *Accessible Housing by Design-House Designs and Floor Plans*. [ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/AboutYourHouse-VotreMaison/66093\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/AboutYourHouse-VotreMaison/66093_w.pdf)

<sup>11</sup> Mace, Ron. 1997. The Centre for Universal Design. [https://www.ncsu.edu/ncsu/design/cud/about\\_ud/about\\_ud.htm](https://www.ncsu.edu/ncsu/design/cud/about_ud/about_ud.htm)

level, no-step entrance; wider doorways and hallways; wheelchair accessible bathroom on the main level; and an accessible path of travel from the street, sidewalk, back lane, or the dwelling unit's parking space to the dwelling units accessible entrance.<sup>12</sup>



*Illustration of the relationship of various levels of residential accessibility showing some of the key concepts included in each level*

Source: Manitoba Housing's *Visible and Adaptable Housing Guidelines for Residential Units*<sup>12</sup>

## 1.4 Methodology

Research for the study has been conducted through a literature review and industry interviews. The approach to these research elements is outlined in the following sections.

### 1.4.1 Literature Review

Research was undertaken by conducting a search of existing literature to collect information on the needs and challenges of building or renovating adaptable affordable

<sup>12</sup> Manitoba Housing, *Visible Housing: Community Building through Visible and Adaptable Housing*. <http://www.gov.mb.ca/housing/progs/pdf/visible-housing-visible-housing-community-building.pdf>

housing, with particular attention to MURBs, to meet changing demographics and user needs.

The literature review and the annotated bibliography are the result of an environmental scan of existing research on examples of adaptable, accessible, affordable housing, demographic matches/mismatches, and solutions in Canadian, US and international resources. The search was limited to studies and projects developed within the last ten years, with the exception of a few older examples that have continuing importance to this area of study. The international sources were limited to countries and sources applicable to the Canadian situation.

Innovative approaches in Canada and other countries were explored to determine which ones have the potential to make affordable housing more cost-effectively adaptable to address changing demographic and occupant needs.

#### **1.4.1.1 Literature Review Resources**

The resources for the literature review were found via search engines such as Google Scholar and the Dalhousie University library; websites such as Canada Mortgage and Housing Corporation, Federation of Canadian Municipalities, Conference Board of Canada, Canadian Housing and Renewal Association, Canadian Homebuilders' Association, Canadian Centre on Disability Studies, Centre for Universal Design, Adaptable Futures, various Canadian municipalities and provinces, Canadian Federation of Apartment Associations, Canadian Construction Association, Abilities Magazine, sources cited in bibliographies of other reports, and contacts in the industry.

#### **1.4.1.2 Criteria for Assessing Resources**

An annotated bibliography was compiled based on the following criteria:

- Is the resource current – i.e. within the last ten years?
- Does it relate to the specific topic of inquiry – i.e. affordable housing that has at least one of the two key features: adaptable and accessible
- Does it cover one or more of the following areas: housing type, demographics and need, analysis of the mismatch problem, extent of the problem; proposed strategies and solutions; and key players and projects?
- Are international resources applicable to the Canadian situation?
- Does it add new information to the field, such as information on MURBs?
- Does it contribute to our understanding of the problem under study?
- Is it useful for practice?

- Does it contribute to a range of information and solutions?

The results of the search were categorized into Canadian and international sections. Within those categories, the sources were divided into sections by housing type under the following headings in chronological order:

- General information on affordable, adaptable, accessible housing
- Single-family dwellings, including duplexes, triplexes, townhouses
- Housing for seniors
- MURBs – low-rise; mid-rise; high-rise.

The literature was also reviewed to identify if:

- There are any gaps in the area of study
- There are recommendations for updating resources
- There are areas recommended for further study

#### **1.4.1.3 Key Words**

Key words used in the search included affordable, adaptable, flexible, visitable, multi-family, multi-unit, apartment, MURB, accessibility, innovative design.

#### **1.4.2 Industry Interviews**

Based on the resource research, key contacts were listed and questions were formulated to obtain qualitative information from housing providers and experts.

##### **1.4.2.1 Interviewees**

#### **Housing Providers**

(Note that Northern communities were not sourced as most of the northern housing is ground related, i.e. not MURBs)

1. Kevin Albers, CEO, M'akola Development Services. The M'akola Group of Societies, an organization with Indigenous roots, specializes in housing and community development through partnerships with non-profit organizations, all levels of government, Aboriginal communities, and private industry.
2. Deborah Kraus, Manager, Research, and Katherine St. Denis, Manager, Corporate Planning & Reporting, BC Housing.
3. Toronto Community Housing Corporation
4. Ramzi Kwar, Manager Building Design, Housing NS.

5. Madonna Walsh, Affordable Housing Manager, Newfoundland and Labrador Housing.
6. Dwayne Rewniak, Executive Director, Housing Delivery/Land Development, Manitoba Housing.
7. Thomas Dutton, Daniels Corporation, Toronto. An architect who has worked in affordable housing and market housing for a number of years, including the Regent Park revitalization project.
8. Louis Lemoine, Polycorp, Halifax NS. An architect, private MURB developer who previously worked in not for profit housing.

### **Researchers**

9. Ryan Berlin, Urban Futures Institute
10. Greg Suttor, Wellesley Institute

### **Practitioners, architects, housing industry experts**

11. Michael Geller. A Vancouver based architect, planner, real estate consultant, property developer, newspaper columnist, professor, blogger, and previous CEO of the SFU Community Trust.
12. Sarah Watson, Deputy Director, Citizens Housing and Planning Council (CHPC) of New York City. A housing professional directing and conducting CHPC's research and education initiatives and analysis of NYC's complex housing marketplace, and author and manager of the Making Room initiative, a new approach to housing policy that seeks to match the design of a city's housing with the needs of its households.
13. Avi Friedman. Dr. Friedman is the director of the Affordable Homes Research Group at the McGill School of Architecture, where he currently teaches, and is known nationally and internationally for his housing innovations, in particular for the "Grow Home" and "Next Home" designs.

#### **1.4.2.2 Questions**

Issued to Interviewees:

This research study explores the potential demand for adaptable, accessible affordable housing that responds to changing household needs and demographic patterns. The focus is on economical, adaptable and flexible solutions in the affordable housing sector, with particular attention to multi-unit residential buildings (MURBs).

1. Have you heard of, or have any experience with, the issue of a mismatch between the physical properties of the existing affordable housing stock and the changing needs of current or future occupants?
2. Do you know of any affordable MURBs that include provision for adaptation, flexhousing, or accessible features that go beyond code?
3. Do you know if any providers of affordable MURBs have, or intend to include, provision for adaptation, flexhousing, or accessible features that go beyond code?
4. Do you know of any other initiatives such as design competitions, research studies, etc., that have, or intend to include, provision for adaptation, flexhousing, or accessible features that go beyond code?

If so, please provide names of such projects, housing providers and initiatives for potential follow-up in this project.

5. What are the challenges, for your organization, to building affordable projects that are adaptable, flexible and accessible?
6. Do you think there are challenges for builders or developers of affordable housing – is there resistance to new ideas and construction techniques? Concern for risk and costs? What would help overcome these issues?
7. For social housing providers: Do you think there are challenges for funders – is there resistance to new ideas and construction techniques? Risk concerns? What would help overcome these issues?
8. What tools or information would be useful in your work to develop affordable housing projects that are adaptable, flexible and accessible?
9. Do you have any general thoughts or comments to contribute to this topic?

## 2.0 Key Findings from the Literature Review and Interviews

The results of the literature review and the information from the industry interviews were studied and formulated into **Key Findings**, based on the following main categories:

**Need and Demand Mismatches:** the need and demand for adaptable, accessible affordable housing; the challenges associated with housing structure and demand mismatches

**Solutions and Strategies:** examples of strategies, construction techniques and renovation solutions that incorporate adaptability, flexibility and accessibility into affordable housing, particularly MURBs



**Key Resources, References and Projects:** people and organizations; ideas and application of flexible, adaptable and accessible concepts in affordable housing in Canada and internationally, particularly MURBs

## 2.1 Need and Demand Mismatches

### Need for Affordable Housing in General

Approximately 1.6 million Canadian households in core housing need in 2011, up from 1.5 million in 2001.<sup>13</sup> A national newspaper article on September 10, 2015, stated “One in five Canadian renters face an affordable housing crisis, spending more than half their income on shelter costs”.<sup>14</sup>

Further, there is a broad spectrum of residents in need of more affordable and appropriate housing, from the elderly to youth, and from indigenous communities to newcomers. Reasons for the lack of appropriate affordable housing, which accessible, adaptable housing may be able to address, as learned from the research and the interviews:

- Aging building stock was built with little or no incorporation of accessible features
- People are living longer, and wishing to age in place - a well-covered topic in Canada and internationally<sup>15</sup>
- Diminished incomes, unstable economy and rising energy costs - discussed in reports from the Federation of Canadian Municipalities and the Conference Board of Canada
- Changing ‘family’ size and nature - blended families; single parents; youth returning home; aging parents moving in; extended families
- Newcomers requiring larger units, generally in MURBs
- Indigenous communities dealing with inappropriate housing design<sup>16</sup> that does not fit with their cultural practices and life patterns

### Need for more MURBs

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<sup>13</sup> CMHC *Canadian Housing Observer* 2014 (revised April 2015). [ftp://ftp.cmhc-schl.gc.ca/chic-ccd/Archives/CA1\\_MH\\_C13\\_2014A\\_NO1.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/Archives/CA1_MH_C13_2014A_NO1.pdf)

<sup>14</sup> The Globe and Mail. *Affordable Housing Crisis Affects One in Five Renters in Canada: Study*. Sept. 10, 2015. <http://www.theglobeandmail.com/report-on-business/economy/housing/the-real-estate-beat/affordable-housing-crisis-affects-one-in-five-renters-in-canada-study/article26287843/>.

<sup>15</sup> Shiner, Donald V., Robin Stadnyk, Yvonne daSilva and Kathleen Cruttenden. *Seniors' housing: challenges, issues, and possible solutions for Atlantic Canada: final report of the Atlantic Seniors Housing Research Alliance*. Mount Saint Vincent University. (2010). <http://ashra.msvu.ca/documents/Final%20Report%20English%20%20w.hyperlinks.pdf>

<sup>16</sup> CMHC. *Northern Housing Project Profile - The Dawson E/9 Northern Sustainable House*. (2014). <ftp://ftp.cmhc-schl.gc.ca/chic-ccd/RHT-PenRT/67627.pdf>

While the changing demographics and cultural needs affect all typologies across the housing spectrum, there is a growing need in Canada for more MURBs in general, which is expected to continue into the future, as noted by one study of trends as far ahead as the year 2041.<sup>17</sup>

One study listed three reasons for the increased demand for MURBs in the future: aging baby boomers; most newcomer households preferring multiple-unit dwellings; and increasing urbanization. It is notable that multiple-unit structures have accounted for more than half of the new homes built in Canada since 2008.<sup>18</sup>

A study released in 2015 includes statistics that confirm there has been a change from growing out (suburbs) to growing up (urban mid and high-rise). In Montreal, for example, MURBs accounted for 75% of residential construction compared to 16% for ground related homes.<sup>19</sup>

### **Need for Adaptable Housing**

Information from a study makes the broad case for housing that is adaptable: “Canadians at various income levels and stages of life have different housing needs. To build a strong economy, healthy communities, and a mobile workforce, our housing market must be able to accommodate changing needs”.<sup>20</sup>

One of the affordable housing providers described their need to demolish social housing stock because it has become inappropriate for the changed demographic (studio and bachelor units were built and now two bedroom units are required). The concrete structure makes the buildings prohibitively expensive to adapt. He stated that if housing could be designed to be more flexible and adaptable for the inevitable changing demographic needs, less existing housing stock would become surplus, and fewer new buildings would be required to replace those surplus ones.

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<sup>17</sup> *Urban Futures. Trends in Housing Occupancy Demands 1971-2041 Canada Housing Series: Introduction & Overview*. 2014. <http://www.urbanfutures.com/housing-overview/>

<sup>18</sup> CMHC *Canadian Housing Observer* 2014 (revised April 2015). [ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Archives/CA1\\_MH\\_C13\\_2014A\\_NO1.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Archives/CA1_MH_C13_2014A_NO1.pdf)

<sup>19</sup> Statistics Canada, Government of Canada. *Evolution of Housing in Canada, 1957 to 2014* (2015). <http://www.statcan.gc.ca/pub/11-630-x/11-630-x2015007-eng.htm>

<sup>20</sup> Federation of Canadian Municipalities. *The Housing Market and Canada's Economic Recovery*. (2012). [http://www.fcm.ca/Documents/reports/The\\_Housing\\_Market\\_and\\_Canadas\\_Economic\\_Recovery\\_EN.pdf](http://www.fcm.ca/Documents/reports/The_Housing_Market_and_Canadas_Economic_Recovery_EN.pdf)

At the same time, another provider working in a different municipality described the mismatch of their current needs with their social housing stock, built in the 1950's with three or more bedrooms to house large families. They now need to reconfigure these into studio apartments and one and two bedroom units in order to make suitable housing for the current population. This issue was identified by other housing developers in a number of municipalities.

Specific to seniors housing, and the aging population in Canada, one report states the first of two fundamental conclusions from their work: “as we age we want to stay in our homes for as long as possible. The number of seniors reporting that this is what they want is over 90%.” They conclude with the statement, “We know that if we made homes more accessible, people would be able to live in them longer, yet it seems we insist on acting like Peter Pan, building homes designed for people who will never get old or ill.”<sup>21</sup>

One of the researchers commented that the idea of adaptability was not on their radar as something that has come up as a need, and that before it could be incorporated, the financial benefits would need to be considered along with all of the priorities of good affordable housing.

Some housing providers, who recognize the mismatch in existing unit sizes (two to three bedrooms) and the need (housing for singles), indicated that they have not considered adaptable design as a means to solve the problem, and cannot see a financial rationalization for it. They are building new for the current specific needs of their clients.

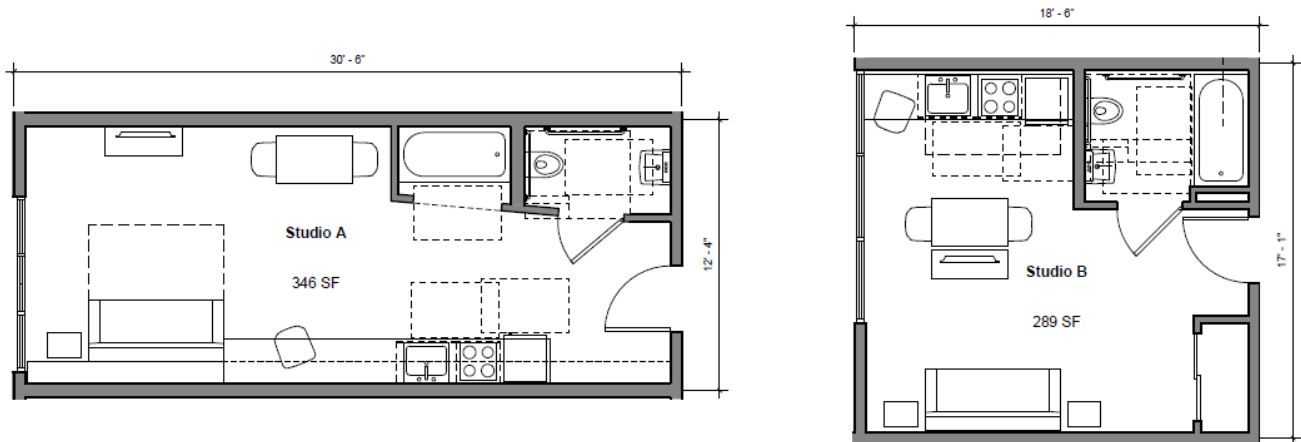
One provider stated that some municipalities are dealing with the impact of a resource boom and trying to plan for how to adapt or convert housing that will be initially provided for the temporary workers into affordable housing for long term residents.

Interviewees from the US, UK and western Canada indicated that there is a need for more housing for singles. Solutions are being sought to solve the problem at all scales: new buildings are being built with micro-units and bachelor apartments; new types of tenure are being explored, such as shared living and intergenerational units; and existing houses and apartments are being adapted with accessory suites. Solutions for adapting existing

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<sup>21</sup> Shiner, Donald V., Robin Stadnyk, Yvonne daSilva and Kathleen Cruttenden. *Seniors' housing: challenges, issues, and possible solutions for Atlantic Canada: final report of the Atlantic Seniors Housing Research Alliance*. Mount Saint Vincent University. 2010.  
<http://ashra.msvu.ca/documents/Final%20Report%20English%20%20w.hyperlinks.pdf>

housing stock are permitted in some jurisdictions and not others, and are more focused on private market single family dwellings than on MURBs.



*David Baker + Partners' proposed micro-units at 1178 Folsom Street, San Francisco*

*Source: SocketSite website*

## **Challenges faced by those trying to incorporate flexibility, accessibility and adaptability**

### **Existing stock**

#### Regulatory restrictions

Research on secondary suites in Canada shows that the zoning bylaws in some municipalities prohibit adapting properties for additions such as accessory apartments and laneway housing.<sup>22</sup>

A US housing provider working in New York City stated that secondary suites are not permitted, and the Housing Standard does not permit more than three unrelated adults living together.

#### Nature of the building stock

Existing MURBs are difficult to renovate as they are constructed with stacked services and circulation, rigid materials and fire separations dividing the units. For example, in Winnipeg

<sup>22</sup> CMHC. *Literature Review and Case Studies of Local Jurisdictions that Permit Secondary Suites*. (2015).

[ftp://ftp.cmhc-schl.gc.ca/chic-ccd/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingual/Research\\_Report\\_Secondary\\_Suites.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/Research_Reports-Rapports_de_recherche/eng_unilingual/Research_Report_Secondary_Suites.pdf) and

RedBrick Real Estate Services. *RedBrick Narrow Lot Home Initiative*. (2015). <http://redbrickinc.ca/redbrick-narrow-lot-home-initiative/>.

a housing provider must resort to demolition of some buildings that were built to accommodate a need for a high percentage of one bedroom units. Now three bedroom units are required, but since the buildings are largely concrete construction it is more economical to demolish than to adapt.

On the other hand, international research indicates that some of the features of high-rise construction can make them inherently adaptable: for example, the structural frame of a building with loadbearing columns, can allow for a variety of possible subdivisions.<sup>23</sup>

#### Mismatch of unit sizes to needs

There is a range of unit size versus resident need mismatches across Canada. Some research sources show that immigrant and indigenous communities often require units with more bedrooms, while one municipality has the opposite situation: refurbishment projects are underway to change the old 1950s social housing stock from three bedroom units to one and two bedroom units. One provider in Canada rents suites across the hall from each other to extended families. Internationally there is evidence of providers formalizing processes to encourage and support intergenerational families renting adjacent suites.<sup>24</sup>

#### **New buildings**

##### Resistance from the public and construction industry

New technologies and ideas are often seen as causing cost increases and can take time to be integrated into the industry. Both market and nonprofit providers reported that this was the case on the first few projects, but improved as builders, funders and residents became aware of the concepts and reasons.

##### Lack of knowledge of the concepts and benefits

One report detailed a mismatch between what the residents of a new seniors building need and what the builders provided. One reason given was that the builders had not built for seniors before, had no idea what they needed and were provided with no guidelines.<sup>25</sup>

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<sup>23</sup> Schneider, Tatjana, and Jeremy Till. *Flexible Housing*. Architectural Press. (2007).

<sup>24</sup> Van Vliet, Willem. *Creating Livable Cities for All Ages: Intergenerational Strategies and Initiatives*. Children, Youth and Environments Center, University of Colorado. (2009).

<sup>25</sup> CMHC. *Building Affordable Rental Housing for Seniors: Policy Insights from Nova Scotia*. (2015). (no URL available)

One of the affordable housing providers noted that within the construction industry there is a lack of knowledge of flexible, accessible and adaptable building concepts.

#### Lack of mandatory requirements for accessibility

Canadian building code regulations for barrier-free accessibility exempt “detached, semi-detached, secondary suites, duplexes, triplexes, townhouses and rowhouses”, and some jurisdictions, such as Nova Scotia, require only one in twenty units to be barrier free in multi-unit construction.

#### Funding

In most cases it costs more to build adaptable features into new projects, but one market developer stated that with good design the increase is not very large. His example is for MURBs that are not marketed as affordable, however the ideas are transferable to any MURB. A provincial housing provider, whose new projects all have visitability features, and 10% of the units accessible, stated a ballpark figure of 10-15% construction cost increase for both adaptable and energy efficient features combined.

#### Financial approach

Funders continue to evaluate projects based on capital costs instead of life cycle costs. As with energy efficiency features, the initial cost of including adaptable design features is higher than standard construction, but they can make buildings more viable in the long term. Adaptations can be made along with changing residents’ needs, without costly upgrades or people having to relocate. Interviewees indicated they thought the concept would be worth exploring.

## **2.2 Solutions and Strategies**

### **Strategies that are being implemented to incorporate flexibility, accessibility and adaptability in affordable housing**

#### **Canada**

##### Regulatory changes

In single family housing, as a means of increasing affordability, some municipalities have revised zoning bylaws to allow secondary suites, permitting single family dwelling owners to increase their density and adaptability by adding a granny flat, laneway house, or basement

apartment.<sup>26</sup> In one municipality lock-off suites are permitted in townhouses and apartment buildings for rental or use by family members.<sup>27</sup>

#### Funding and/or tax incentives

Some municipalities and provinces have programmes to pay for accessibility upgrades; some offer tax breaks for the addition of secondary suites.<sup>28</sup>

#### Municipal and Provincial Affordable Housing Strategies

Most provinces and some municipalities have affordable housing strategies, some of which include mention of accessibility; however there is usually no mention of adaptability or flexibility as solutions to the problems of affordable housing in either existing stock or new builds. Various provinces and some municipalities include accessibility beyond building code in their guidelines, which sometimes includes building infrastructure such as plywood backboards for future grab bar installation. At least one provincial jurisdiction makes visitability elements mandatory for all new housing, and for all renovations where possible, which means the housing can be more easily adapted for future needs of people aging in place, or those with disabilities.<sup>29</sup>

#### Design Strategies in market sector MURBs

Outside of the affordable housing sector, some private developers of MURB condominiums and apartments are incorporating innovative design concepts for adaptable and flexible units, in response to consumer demands. One example has “combination units” where a two bedroom apartment is adjacent to a studio apartment, with a knock-out panel in the shared wall for future need changes.

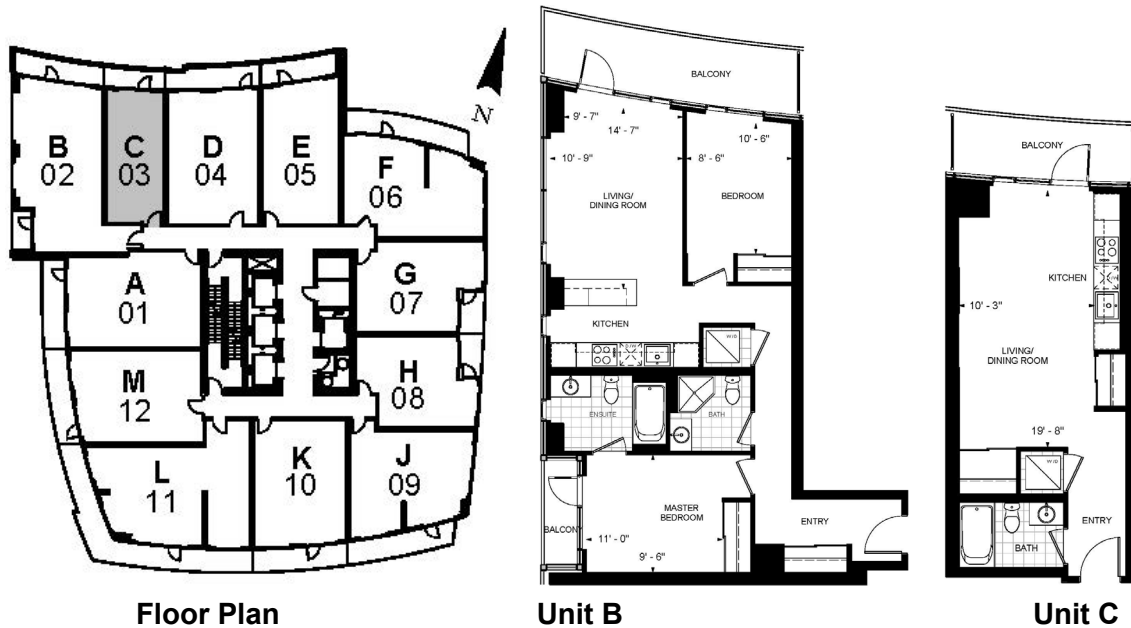
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<sup>26</sup> CMHC. *Literature Review and Case Studies of Local Jurisdictions that Permit Secondary Suites*. (2015). [ftp://ftp.cmhc-schl.gc.ca/chic-ccd/h/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingual/Research\\_Report\\_Secondary\\_Suites.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/h/Research_Reports-Rapports_de_recherche/eng_unilingual/Research_Report_Secondary_Suites.pdf)

<sup>27</sup> Michael Geller's Blog. *The UniverCity project: An experiment in suburban urbanism* (December 7, 2010).

<sup>28</sup> Conference Board of Canada. *Building From the Ground Up: Enhancing Affordable Housing in Canada*. Publication 101-122 (March 30, 2010). <http://www.conferenceboard.ca/e-library/abstract.aspx?did=3530>

<sup>29</sup> Newfoundland and Labrador Housing Corporation (NLHC). *Newfoundland & Labrador Housing Private Sector Affordable Housing 2014 Proposal Call*. (2014). <http://www.nlhc.nf.ca/documents/programs/ahpPrivateSector.pdf>



21 Widmer Street Condominiums, Toronto  
Source: Daniels Group

## International

### Regulatory changes

In single family housing, as a means of increasing affordability, some municipalities in the United States have revised zoning bylaws to allow secondary suites, permitting dwelling owners to increase their density and adaptability by adding a granny flat, laneway house, or basement apartment.<sup>30</sup>

### National Affordable Housing Strategies

Sources from Ireland and the UK detail those countries' recent policies that include flexibility, accessibility and adaptability in their guidelines.

The UK government made the Lifetime Homes standards of accessibility and adaptability mandatory in all new subsidized housing in 2011, and in all market housing in 2013. The standards were revised to reflect technological and other changes for the provision of future

<sup>30</sup> Groc, Isabelle. *Overextended? Planning* 74 (7) (2008): 6–9.  
<http://search.proquest.com.ezproxy.library.dal.ca/docview/206707630/abstract>



lifts and overhead hoisting, space for wheelchair access in bathrooms and WCs, as well as energy efficiency and assistive technologies.<sup>31</sup>

In Ireland, Home Design Guidelines have been produced as “a first step in the process of raising awareness and inspiring people to think differently about the benefits of Universally Designed homes and the potential opportunity to address some of the global challenges society faces by future-proofing our homes through embracing Universal Design thinking. The Design Guidelines are not intended to be overly prescriptive, but provide a flexible framework for designers to apply the guidelines creatively to all new home types.”<sup>32</sup>

### Design Strategies and Construction Techniques

Design and construction strategies have been developed to create more flexibility in MURBs, such as: a shell and core structure, which reduces load bearing walls and partitions; placement of stairs, service cores and entrances to allow future rearrangement at no extra cost; reduction of non-accessible and non-adaptable services; and elimination of tight fit functionalism or rooms with only one use.<sup>33</sup>

## 2.3 Key Resources, References and Projects

### Key Resources and References Canada

Refer to Appendix A: Annotated Bibliography for more information on the resources.

Canada Mortgage and Housing Corporation (CMHC)

“Canada's authority on housing for more than 65 years.”

<https://www.cmhc-schl.gc.ca/en/about-cmhc/cmhcs-story>

Federation of Canadian Municipalities

“The national voice of municipal government since 1901”

<https://fcm.ca/home/issues/affordable-housing.htm>

Canadian Housing and Renewal Association

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<sup>31</sup> Habinteg. *7 Points about the New Housing Standards 2015*. (2015). <https://www.habinteg.org.uk/latest-news>

<sup>32</sup> *Universal Design Guidelines for Homes in Ireland*. Centre for Excellence in Universal Design. (2015). <http://universaldesign.ie/Built-Environment/Housing/>.

<sup>33</sup> Schneider, Tatjana, and Jeremy Till. *Flexible Housing*. Architectural Press. (2007).

“The national voice for the full range of affordable housing and homelessness issues and solutions.”

<http://chra-achru.ca/>

Wellesley Institute

“We actively monitor public policy on housing issues at the municipal, provincial, federal level, and internationally.”

<http://www.wellesleyinstitute.com/topics/housing/>

Urban Futures Institute

“Trusted experts in demographic, economic, and housing forecasting”

<http://www.urbanfutures.com/ufi/>

Conference Board of Canada

“The foremost independent, evidence-based, not-for-profit applied research organization in Canada. Dedicated to building a better future for Canadians by making our economy and society more dynamic and competitive.”

<http://www.conferenceboard.ca/about-cboc/default.aspx>

Newfoundland and Labrador Housing

<http://www.nlhc.nf.ca/>

Manitoba Housing

<http://www.gov.mb.ca/housing/index.html>

M'akola Housing Society

<http://makoladevelopment.com/projects>

Atlantic Seniors Housing Research Alliance

<http://ashra.msvu.ca/index.htm>

## **Key Projects Canada**

Refer to Appendix A: Annotated Bibliography for more detailed project descriptions and links.

*Single family*

- Grow Home, FlexHousing™, EQUilibrium™ Housing, Canada Mortgage and Housing Corporation (CMHC): examples of CMHC's many initiatives related to innovative flexible and adaptable affordable housing ideas that include research, competitions, awards and education

<https://www.cmhc-schl.gc.ca/en/developing-and-renovating/accessible-adaptable-housing>

Bridgwater Housing: a detailed example of the concepts of visitability, incorporated into a neighbourhood development

<http://visitablehousingcanada.com/wp-content/uploads/2014/04/Final-Bridgwater-Case-Study-Report.pdf>

Bethune Flex-Plex: in a row of five new housing units, three contain rental suites that provide extra income for the homebuyers. The units, designed to be accessible, include age-in-place features.

[https://www.fcm.ca/Documents/tools/ACT/Housing\\_Affordability\\_and\\_Choice\\_A\\_Compensium\\_of\\_ACT\\_Solutions\\_EN.pdf](https://www.fcm.ca/Documents/tools/ACT/Housing_Affordability_and_Choice_A_Compensium_of_ACT_Solutions_EN.pdf)

### *MURBs*

- IRCOM 11: housing for immigrants; a good example of adaptive reuse of existing building stock to create affordable, accessible housing consciously designed with flexibility and adaptability in mind  
[https://www.gov.mb.ca/housing/pubs/ircom\\_11\\_factsheet\\_dec17-12.pdf](https://www.gov.mb.ca/housing/pubs/ircom_11_factsheet_dec17-12.pdf)
- UniverCity: lock-off suites within 50% of the apartments and townhomes at UniverCity at Simon Fraser; intended as 'mortgage helpers', to improve affordability. The suites must be a minimum of 240 square feet, and are permitted to have their own entry from the corridor, as well as their own bathroom and cooking facilities.  
<http://grist.org/article/2010-10-28-univercity-burnaby-suburban-urbanism-project/>

Benny Farm and Regent Park: examples of urban neighbourhood revitalization involving new build, regeneration and rehabilitation

<http://src.holcimfoundation.org/dnl/4b638d42-a390-492e-bfb3-23d481dab507/CommunityHousingCanada-lowres.pdf>

Cinema Tower, Daniels Corporation: private market apartments with ‘connectable’ or ‘combo’ units that can be divided or combined to meet the changing needs of residents

<https://renx.ca/daniels-programs-continue-eliminate-barriers/>

RedBrick Stadium apartments: private market housing in which the ‘flex-rooms’ provide an opportunity for adaptable spaces that meet the changing needs of residents

<http://redbrickinc.ca/our-first-project-stadium-apartments/>

### *Seniors*

- Baille Ard Seniors Housing: an example of an affordable seniors’ housing project in which all units are designed to be either fully accessible or easily adapted

<ftp://ftp.cmhc-schl.gc.ca/chic-ccdhd/Project%20Profile%20-%20Profil%20de%20l'ensemble/Baille%20Ard%20Seniors%20Housing%20FR.pdf>

Enderby Memorial Terrace: an example of affordable accessible housing created by adapting existing modular housing units

<https://www.cityofenderby.com/affordable-housing-seniors-enderby/>

Atlantic Seniors Housing Competition: the winning entry includes flexible adaptable units in a multi-unit building complex

<http://ashra.msvu.ca/AffordableSeniorsHousingIdeasDesignCompetition.htm>

### **Key Resources International**

Refer to Appendix A: Annotated Bibliography for more information and resources.

- Habinteg, UK  
A British organization that provides and promotes inclusive accessible homes and neighbourhoods.

<http://www.habinteg.org.uk>

Lifetime Homes, UK

The organization that developed the standards that now have been incorporated into the UK’s national housing strategy

<http://www.lifetimehomes.org.uk/>

Centre for Excellence in Universal Design, Ireland

The organization that developed Universal Design Guidelines, which are applied to single family, terraced housing, apartments, refurbishments and flex elements.

<http://universaldesign.ie/About-Us>

Citizens Housing and Planning Council, US

A New York based organization that revealed a substantial mismatch between the types of housing units available and the shape of that city's twenty-first century households. Organizers of Making Room: New Models for Housing New Yorkers Exhibition: a housing competition, symposium, and exhibition

<http://chpcny.org>

- Adaptable Futures, UK

An international research group focused on building adaptability as a time- rather than form-based view of architecture.

<http://adaptablefutures.com>

New London Architecture (NLA) New Ideas for Housing Insight Study.

An exhibition and study on British housing that addresses affordability, adaptability and, to a lesser extent, accessibility.

<http://www.newlondonarchitecture.org/>

Jeremy Till, Sarah Wigglesworth, Tatjana Schneider

Researchers whose focus has been flexible housing, including a research project at the University of Sheffield School of Architecture in 2004-6. They have published papers and a highly regarded book that analyzes and demonstrates, through historical precedents, many ways that adaptable design has been achieved over time.

<http://www.afewthoughts.co.uk/flexiblehousing/>

### **Key Projects International**

Data exists for successful projects by private and social housing developers, based on flexible or adaptable concepts, resulting from housing competitions, initiatives by housing departments and market conditions.

- ALMEN+, Denmark: a 240 unit social housing project in which high priority was given to ensure a variety of spatial plans could be achieved by the residents;

kitchen, living room and sleeping rooms can be configured into a number of combinations.

<http://adaptablefutures.com/our-work/case-studies/>

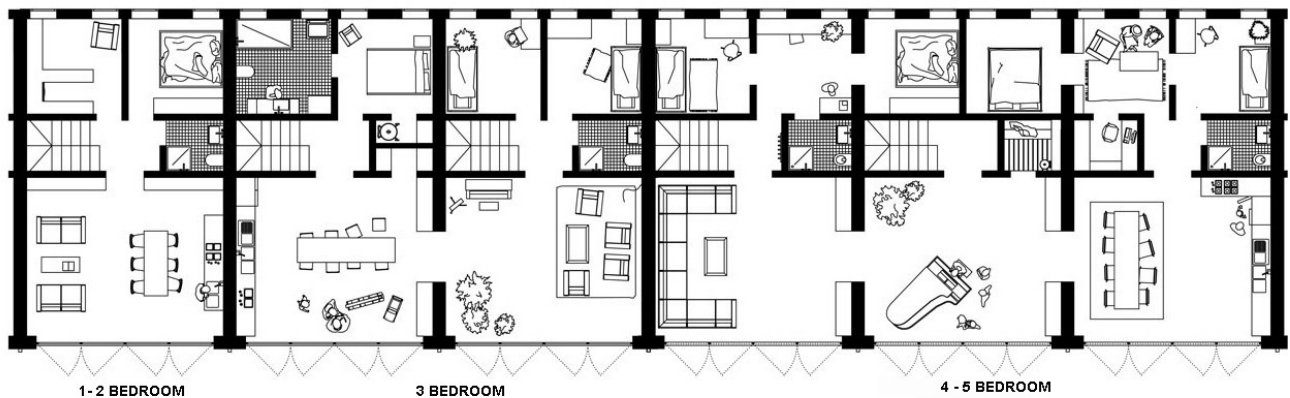
- Solid 11, Netherlands: one of the first projects designed according to the ‘Solids’ concept, this is an ultra-flexible 8,000-square metre, seven-storey building which can be used for flats, offices, shops and a hotel.  
<https://www.archdaily.com/207521/solid-11-tony-fretton-architects>
- Tetris, Slovenia: social housing in which the structure is made in a way that floor plans are flexible, since the only structural walls are those that separate the apartment shell from the rest of the building.  
<http://www.archdaily.com/3547/tetris-apartments-ofis-arhitekti/>
- Carabanchel Ensanche, Spain: 64 units of affordable housing in which kitchens and bathrooms are fixed while the remaining space is split up using moving walls.  
[http://www.arangurengallegos.com/ag/portfolio\\_page/housing-in-carabanchel](http://www.arangurengallegos.com/ag/portfolio_page/housing-in-carabanchel)
- Biombombastic, Spain: a refurbishment of an existing, very small (270 square foot) apartment unit, transformable by folding walls into many usable spaces.  
<http://www.archdaily.com/777801/biombombastic-elii>
- La Cité Manifeste, Paris: the experimental row house development aimed to provide maximal instead of minimal apartments for all. The house type designed for this development, by Lacaton & Vassal, called “carré mulhousien”, with four houses consolidated into one building, has proved itself highly extendable. It meets demands for higher capacity and increased leeway for individual appropriation.  
<http://lacatonvassal.com/index.php?idp=19>
- The PlusHome, Arabianranta, Helsinki: built by Sato Corporation, the project is based on the winning entry to a technology competition in Helsinki that aimed to find new urban solutions in accordance with the Open Building principles.  
[https://jeremytill.s3.amazonaws.com/system/redactor\\_assets/documents/47/habrake\\_n\\_review.pdf](https://jeremytill.s3.amazonaws.com/system/redactor_assets/documents/47/habrake_n_review.pdf)
- Multifunk, Netherlands: a multi-function building in which both residential and commercial users can find space in any desired proportion. The developers

recovered the extra costs of making space flexible by selling the empty building to a client who saw advantage in exploiting it.

<https://www.mimoa.eu/projects/Netherlands/Amsterdam/Multifunk>

- Flexible Housing: over 150 case studies on flexible design are included in this research study and book.

<http://www.afewthoughts.co.uk/flexiblehousing/>



*Plans for a communal apartment building illustrating how standard MURB plans can be designed for adaptability*

*Source: design by Something Fantastic Architects*

### 3.0 Analysis and Conclusions

This report presents a synthesis of the findings from the review of current literature and interviews with housing providers, researchers and experts.

The research clearly shows that there is a rationale to make affordable housing adaptable. Societal changes are inevitable and seem to be happening more rapidly than in the past. This is having a profound effect on the types of housing needs now and in the future. These societal changes cannot always be accurately predicted, but it is agreed that there will continue to be changes in demographics, economics, and residents' spatial needs. Therefore affordable housing stock can benefit from an adaptable approach to help accommodate this dynamic situation.

The report identifies the need among a variety of housing providers for affordable housing solutions that offer a range of benefits, such as flexible floor plans and infrastructure for future accessibility upgrades, resulting in lower housing costs, improved living environments, less occupant turn-over, more stable communities, and more resilient housing.

The idea of adaptability is not something that the affordable housing providers who participated in the interviews have on their priority list as a need, nor is it incorporated into the provincial and territorial housing strategies that were researched.

Some private condominium and apartment developers are incorporating innovative design concepts for adaptable and flexible units, in response to consumer demands.

The research study revealed numerous examples of accessibility in affordable housing, but not many examples of adaptable and flexible ideas, particularly in MURBs. In the area of affordable housing for seniors, several providers are developing and implementing concepts of universal design and visitability.

## 4.0 Gaps and Potential Areas for Further Study

### **Information on adaptability and affordability in MURBs**

There were few sources or projects that deal with affordable and adaptable MURBs. None of the housing providers contacted is incorporating adaptable features in new projects; in general they had not heard of the ideas beyond adaptations for accessibility.

Social housing providers and advocates spoke more about incorporating accessibility (for people with disabilities and seniors) than about adaptability for changing demographics such as larger or smaller family sizes - even though they are involved in refurbishing or demolishing old stock that no longer fits their residents' unit-size needs. This may indicate a gap in knowledge about the possibilities, costs and benefits for incorporating adaptable features (such as flexible floor plans) into the design of new buildings.

An affordable housing researcher suggested that while he could see the need for adaptability in current and future buildings, it would be beneficial to know the costs so that the ideas could be put into the priority list of all the elements necessary for good affordable housing.

### **FlexHousing™**

There is a gap in recent costing information on FlexHousing™. The 2002 CMHC publication, Cost of FlexHousing™, is out of date and does not address the costs to incorporate the concepts in MURBs. Interviewees indicated that this type of current costing information would be useful. Similarly, design strategies and guidelines for FlexHousing™ specific to MURBs would be useful.



### **Universal Design Guidelines**

There is a gap in Canada's accessibility standards. Currently there is no comprehensive national set of guidelines for barrier-free or Universal Design (UD) in all housing.

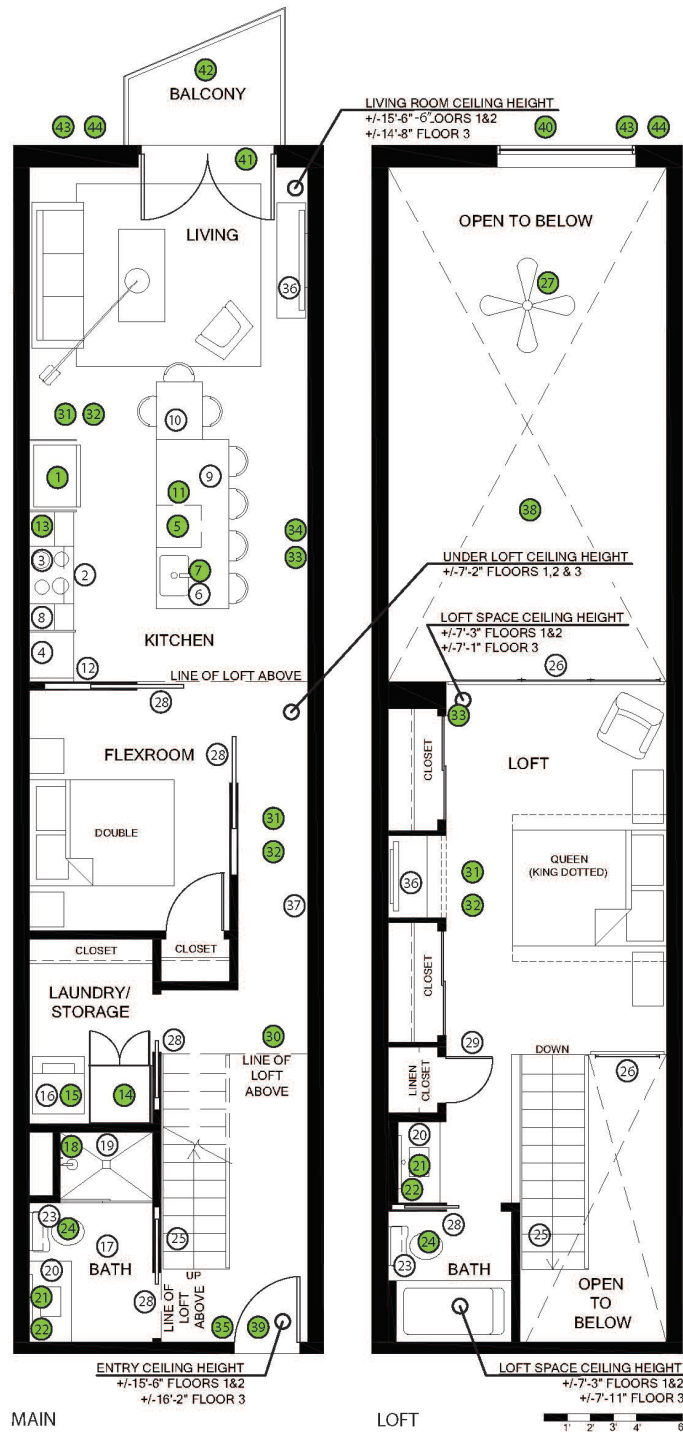
Two of the provincial housing providers (Newfoundland and Labrador Housing, and Manitoba Housing) suggested that it would be helpful to have one concise document that both explains the reasons for incorporating universal design, visitability and accessibility, and includes a set of standards. Their requests for proposals currently include universal design strategies, visitability checklists, CSA Design for the Built Environment, and building code requirements. They agreed that having all of these in one document would be helpful.

The Lifetime Homes standard from the UK and the Universal Design Guidelines for Homes in Ireland are examples of this type of document that are currently in use.

### **Information on Affordable Private or Market MURBs in Canada**

There was little information found on MURBs that fit both the affordability and adaptability criteria specifically. There are developers of interesting new projects that incorporate flexible and adaptable ideas that could be considered for the design of affordable projects.

# Assessment of Adaptable Affordable Housing Design Needs and Solutions – Literature Review



Source: Loft condos in Halifax created by Polycorp © 2013 Polycorp

### **Capital Costing and Life Cycle Costing**

There is support for the idea that incorporating adaptability in MURBs creates more economically viable housing projects: the buildings can be adapted along with residents' needs, without costly upgrades or people having to relocate. Interviewees indicated they thought the concepts would be worth exploring, however no data was found on actual costs and benefits of the features.

### **Prefabrication, Modular Housing**

There is a growing interest in the links between prefabrication, sustainability and affordable housing. The link to adaptability is less clear, except in a broad sense. Modular housing has been adapted or converted into affordable housing (e.g.; Olympic Legacy Affordable Housing), and planning for temporary resource workers housing includes future adaptation to long term affordable housing (M'akola Housing Development).

## Appendix A - Annotated Bibliography

This phase of the literature review included activity relating to affordable, adaptable and flexible housing from the last ten years, based on the following:

- **Need and Demand Mismatches:** the need and demand for adaptable, accessible affordable housing; the challenges associated with housing structure and demand mismatches
- **Solutions and Strategies:** examples of strategies, construction techniques and renovation solutions which incorporate adaptability, flexibility and accessibility into affordable housing, particularly MURBs
- **Key Resources, References and Projects:** people and organizations; ideas and application of flexible, adaptable and accessible concepts in affordable housing in Canada and internationally, particularly MURBs

The results of the search have been divided into two categories, Canadian and International. Within each of these categories, the sources are divided into General, Single Family, MURBs and Seniors, listed in chronological order.

Key words used in the search included affordable, adaptable, flexible, visitable, multi-family, multi-unit, apartment, MURB and accessibility.

The resources for the literature review were found via search engines such as Google Scholar and the Dalhousie University library; websites such as Canada Mortgage and Housing Corporation, Federation of Canadian Municipalities, Conference Board of Canada, Canadian Housing and Renewal Association, Canadian Homebuilders' Association, various Canadian municipalities and provinces, Canadian Federation of Apartment Associations, Canadian Construction Association, sources cited in bibliographies of other reports, and contacts in the industry.

### Category 1      Canada

#### *General*

Canada Mortgage and Housing Corporation (CMHC). **Accessible and Adaptable Homes (2015).**

<https://www.cmhc-schl.gc.ca/en/developing-and-renovating/accessible-adaptable-housing>

This link is the starting point to access the multitude of resources on the CMHC website on FlexHousing™, Universal Design, Aging in Place, Adaptability and Affordability. The literature review included a scan of the most pertinent of these, which are included below.

Canada Mortgage and Housing Corporation (CMHC). **Canadian Housing Observer 2014** (revised April 2015).

“CMHC's *Canadian Housing Observer*, published yearly since 2003, provides an in-depth review of housing conditions and trends in Canada, and describes the key factors that influence these developments. The report discusses housing affordability and core housing need, demographic influences on housing demand, housing finance and markets, sustainable housing and newcomers' housing.”

*The Canadian Housing Observers provide in-depth and up-to-date information on the mismatches of core housing need and existing conditions. This latest issue includes a chapter on Sustainability, listing affordability and adaptability/flexibility/accessibility within the Performance themes of the Equilibrium Housing projects.*

**Trends in Housing Occupancy Demands 1971-2041 Canada Housing Series: Introduction & Overview.** Urban Futures (2014).

<http://www.urbanfutures.com/housing-overview/>

“This report presents housing projections for Canada and its major metropolitan markets for the next three decades. The results of these projections differ significantly from the apocalyptic scenario popularized at the turn of the century.”

*This resource can be used to inform the housing industry about the numbers of people of different age groups who will be in need of housing. This quote, for example, “Shifts in the composition of the Canadian population would see those aged 65 and older, who made up just 15 percent of the national population in 2013, increase to almost one-quarter (24 percent) of Canada’s population by 2041” tells us that more housing for seniors will be required. The case can be made that there will be an increased demand for adaptable and accessible housing of all types - or at least adaptable and accessible housing could be recommended to increase financial viability.*

Conference Board of Canada, Pulla, Dr. Siomonn. **Framing Sustainable Options for Housing in Canada’s North** (2012).

<http://www.conferenceboard.ca/e-library/abstract.aspx?did=5217>

“The report ultimately suggests that effective Northern housing strategies require sensitive partnerships, programs, and policies that support and involve Northerners, and are respectful of and relevant to Northern lifestyles, traditions, and cultures.” Questions, such as the following, were asked of a variety of stakeholders:

“Housing mismatch—cultural relevance of market housing vs. social housing

I. How is the private sector addressing cultural requirements (regarding space/layout and design) of housing development?

II. Are there any initiatives or programs in place that help to guide the private sector with regard to culturally specific needs?"

*This report illustrates the need for adaptable and innovative solutions that are designed with the involvement of Northerners. In general, it is a good example of the importance of user involvement in the success of any housing solution. Specifically, it includes the example of designing larger living spaces that can be adapted to changing family living situations.*

Federation of Canadian Municipalities. **Housing Affordability and Choice: A Compendium of ACT.** (2011).

[https://www.fcm.ca/Documents/tools/ACT/Housing\\_Affordability\\_and\\_Choice\\_A\\_Compendium\\_of\\_ACT\\_Solutions\\_EN.pdf](https://www.fcm.ca/Documents/tools/ACT/Housing_Affordability_and_Choice_A_Compendium_of_ACT_Solutions_EN.pdf)

This user-friendly compendium provides project summaries of the most innovative Affordability and Choice Today (ACT) solutions and an overview of the best ideas from Canadian municipalities for tackling regulatory change to promote affordable housing. Funded by Canada Mortgage and Housing Corporation from 1990 to 2010, the ACT program was delivered by the Federation of Canadian Municipalities in collaboration with the Canadian Home Builders' Association and the Canadian Housing and Renewal Association. Many of the projects involved allow a more flexible use of existing housing stock; examples include: accessory apartments within single family houses; garden suites on single family lots; micro suites in large single family houses; the grow home; accessible and live/work housing.

*Though most of the projects are small scale, there is a lot of useful information and ideas applicable to this study that are likely replicable. The report addresses needs, strategies and key players, and describes challenges and success strategies using case studies. The Bethune Flex-Plex project is an example. In a row of five new housing units, three contain rental suites that provide extra income for the homebuyers. The units, designed to be accessible, include age-in-place features, and were built by Habitat for Humanity with donated labour and materials, which lowered the cost of the new housing.*

Wellesley Institute **Precarious Housing in Canada** (2010).

<http://www.wellesleyinstitute.com/publications/new-report-precarious-housing-in-canada-2010/>

Among the recommendations in this comprehensive report are to build 600,000 new affordable homes by 2020, to repair 200,000 low- and moderate-income homes, and to implement a new national housing strategy based on the proposed Bill C-304 A National Housing Strategy for Canada: An Act to ensure secure, adequate, accessible and

affordable housing for Canadians. The bill, appended to the report, defines “accessible” as “housing that is physically adapted to the individuals who are intended to occupy it, including those who are disadvantaged by age, physical or mental disability or medical condition, and those who are victims of a natural disaster.” The bill’s definition of “affordable” is “housing that is available at a cost that does not compromise an individual’s ability to meet other basic needs, including food, clothing and access to education.” Also from Bill C-304:

- (3) The national housing strategy shall also ensure the availability of housing that:
- (a) is secure, adequate, affordable, accessible, and not-for-profit in the case of those who cannot otherwise afford it
  - (b) reflects the needs of local communities, including Aboriginal communities
  - (c) provides access for those with different needs, including, in an appropriate proportion, access for the elderly and the disabled, and reasonable design options

*This major report provides data to support the high level of need for accessible, affordable housing, and details recommendations to meet those needs. Including the term “accessible” in the title of the proposed national housing strategy is significant for the future of all affordable housing in Canada.*

Conference Board of Canada. **Building From the Ground Up: Enhancing Affordable Housing in Canada.** Publication 101-122 (March 30, 2010): 125 pages.

<http://www.conferenceboard.ca/e-library/abstract.aspx?did=3530>

This extensive report makes the case for an expanded supply of affordable housing in Canada. It also highlights model initiatives and provides practical tools for planners, developers, and others, including flexible, adaptable and accessible elements. The premise, following the Conference Board of Canada’s mandate, is that there is an appreciable shortage of good-quality, affordable housing in Canada – a problem because it “negatively affects Canadians’ health, which reduces their productivity, limits our national competitiveness, and indirectly increases the cost of our health-care and welfare systems.” The report highlights 11 model initiatives designed to address affordability. The authors also provide practical tools for planners, private sector developers and non-profit organizations.

*Helpful to this study is an appendix listing of all government affordable housing programs, national and provincial, which aid accessibility upgrades and addition of garden suites as means to boost affordability.*

### *Single family*

Canada Mortgage and Housing Corporation (CMHC). **Literature Review and Case Studies of Local Jurisdictions that Permit Secondary Suites.** (2015).

[ftp://ftp.cmhc-schl.gc.ca/chic-ccd/RResearch\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingual/Research\\_Report\\_Secondary\\_Suites.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/RResearch_Reports-Rapports_de_recherche/eng_unilingual/Research_Report_Secondary_Suites.pdf)

This research report describes the rationale for including secondary suites as a viable option for maintaining, or increasing, affordability, flexibility and adaptability in new and existing single family housing in Canada. “Secondary suites (also known as “accessory suites”) are one possible solution to increasing rental housing supply in communities across Canada. Secondary suites are a form of market housing that results in greater choice and affordability of rental housing. There has been an increase in the number of non-conventional rental housing units, which include rental condominiums, houses for rent and secondary suites.” The findings are divided into benefits and challenges for both homeowners and communities, and are supported with case studies of municipalities’ regulatory approach to facilitating secondary suites.

*This research report describes the rationale for including secondary suites as a viable option for maintaining, or increasing, affordability, flexibility and adaptability in new and existing single family housing in Canada.*

Canada Mortgage and Housing Corporation (CMHC). **Accessory Apartment Regulations in Census Metropolitan Areas in Canada.** (2006).

<ftp://ftp.cmhc-schl.gc.ca/chic-ccd/RHSE-PenRSE/65025.pdf>

*This earlier report on secondary suites is included for historical information. It describes accessory apartments as an affordable housing option and how they can be a positive component of residential intensification and sustainability. It identifies and documents zoning regulations and bylaws in municipalities within Canada's proposed and existing Census Metropolitan Areas (CMAs), and summarizes their provisions for accessory apartments. The current situation is updated in the above reference: “Literature Review and Case Studies of Local Jurisdictions that Permit Secondary Suites.” (2015).*

Park, Youn-Young. **Canadian Centre on Disability Studies. Bridgwater Case Study VisitAble Housing: Bridgwater Neighbourhoods.** (February 2014)

<http://visitablehousingcanada.com/wp-content/uploads/2014/04/Final-Bridgwater-Case-Study-Report.pdf>

This report is based on research conducted by the Canadian Centre on Disability Studies (CCDS) as a part of the national project, Collaborative Knowledge Building and Action for VISIBLE Housing in Canadian Cities (Visibility Project). The Bridgwater project, a housing development initiative in Winnipeg, Manitoba, incorporates “VisitAble” housing principles -



affordable, sustainable and inclusive design for integrating basic accessibility features into all newly built homes and housing. The in-depth case study involved a document review, stakeholder interviews and a residents' survey. The document review focused on the development process of the project, policies and guidelines, the people involved, costing and information/promotional materials developed. Challenges identified in the report were additional costs, housing professionals' resistance, construction issues, and the public's lack of awareness of the concept and application.

*The report identifies the need for visitable housing and describes in detail a housing development project implementing visitable features. It does not address MURBs. It describes the construction challenges, specifically the no-step entrance and its effect on site grading and drainage. Another challenge identified was the time it takes for builders to adjust to new ideas and models. Some of the survey respondents found the visitable features insufficient and wanted more accessible features.*

Canada Mortgage and Housing Corporation (CMHC). **FlexHousing™ Checklist: Homes that adapt to life's changes.** (2009, 2014).

[ftp://ftp.cmhc-schl.gc.ca/chic-ccd/PamphletsOPIMS/61943\\_27-11-14.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/PamphletsOPIMS/61943_27-11-14.pdf)

A 16-page checklist based on the principles of FlexHousing™, a forward-thinking approach to building a home based on the principles of adaptability, accessibility and affordability, developed by CMHC in 1995. This document provides sample plans with critical details and measurements for planning a successful FlexHouse. Designs are made to adapt to changes in a family's lifestyle with rooms that can change in size and function. Living spaces are made accessible and functional for all family members, despite physical abilities or requirements. Affordability is achieved in FlexHousing™ by virtue of the fact that residents do not need to move or conduct costly renovations as their circumstances change.

*While this resource is specific to single family homes, there are FlexHousing™ resources for multi-unit housing as well – refer to section on MURBs below.*

Friedman, Avi, and Elizabeth Debicka. **Flexible Design for Public Housing in Iqaluit, Nunavut.** Meridian Newsletter: Fall/Winter 2011-Spring/Summer 2012 - Flexible Design  
<http://www.polarcom.gc.ca/eng/content/meridian-newsletter-fallwinter-2011-springsummer-2012-2>

This is a comprehensive article, written by the designers, examining a user-led, flexible approach to the design of new single family public housing to meet the needs of the local housing authority and occupants in an effort to address the housing crisis in Nunavut. It

covers the history of housing in the Arctic, the applicability of flexible design, a case study and unit designs, and provides a framework for the design of public housing in the Arctic. *Although this project has not been built, it is important to this literature review as an example of a strategy of achieving affordability through flexible features incorporated into the design process and product.*

Canada Mortgage and Housing Corporation (CMHC). **The Cost of FlexHousing™** (2002).  
[ftp://ftp.cmhc-schl.gc.ca/chic-ccdhd/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_bilingual/Cost%20of%20flexhousing.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccdhd/Research_Reports-Rapports_de_recherche/eng_bilingual/Cost%20of%20flexhousing.pdf)

This document is part of the 2002 Research Highlight — Socio-Economic Series. This project shows a real-life scenario of how a single family house might change over time as occupants' needs change. There is a breakdown of costs involved in building many of the FlexHouse options, as well as the cost to renovate an existing house.

*Although this document is out of date, it is included as an example of a resource that would be very useful if the costs were updated and made applicable to MURBs as well.*

Canada Mortgage and Housing Corporation (CMHC). **Northern Housing Project Profile - The Dawson E/9 Northern Sustainable House.** (2014).  
<ftp://ftp.cmhc-schl.gc.ca/chic-ccdhd/RHT-PenRT/67627.pdf>

This Northern Housing Project Profile provides an overview of the technical details and performance of the E/9 Northern Sustainable House (NSH) Duplex in Dawson City, Yukon. *Details are provided on the design process, construction techniques and FlexHousing™ features such as allowance for converting a porch into a third bedroom, and adaptations for accessibility upgrades. Costing information illustrates that while construction cost was moderate, energy systems were efficient enough to pay back the added costs for the flexibility and building envelope features within seven to nine years, making the case for affordability from a life cycle perspective. The project also illustrates the idea of linking sustainable features with adaptable design: in this case the houses are designed to be adapted in future for photovoltaic electricity production, with minimal disruption to the occupants.*

Canadian Home Builders' Association. **FlexHousing™- Design of the Times.**  
<http://www.chba.ca/newhomesmonth/consider-the-benefits-of-a-new-home/flexhousing.aspx>

The Canadian Home Builders' Association website provides a detailed overview of the ideas behind CMHC's FlexHousing™, and states that the concepts are being used by a growing number of professional, new home builders. The benefits and specific

recommendations are provided under categories such as Design and construction, Safety and convenience, Specific accessibility and mobility considerations.

*The inclusion of FlexHousing™ by the CHBA is significant to the study because it shows how private builders are incorporating adaptability and accessibility ideas into their projects, as saleable features that can increase affordability: “Pre-planning at the design stage means less renovation and fewer potentially expensive changes down the road.”*

Castaldo, Joe. **Prairie Fire**. *Canadian Business* 80 (18) (2007): 35–38.

This article is about the general situation of all types of housing and costs in Saskatoon and surrounding area. Of specific interest is the municipality’s involvement in increasing affordable housing via financial incentives for creation of secondary suites: “Saskatoon now covers 10% of the cost of affordable housing construction (up from 5%), and council is considering a program to compensate homeowners who convert their basements into apartments to take in tenants.”

*This article gives an example of a strategy by a municipality to increase affordability by encouraging the adaptation of existing housing by addition of secondary suites.*

Canada Mortgage and Housing Corporation (CMHC). **The Grow Home - Montréal, Quebec.**

[ftp://ftp.cmhc-schl.gc.ca/chic-ccdhd/Research\\_Reports-Rapports\\_de\\_recherche/Older4/Ca1%20MH%2092E81%20\(w\).pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccdhd/Research_Reports-Rapports_de_recherche/Older4/Ca1%20MH%2092E81%20(w).pdf)

World Habitat Awards Winners. (1999).

<http://www.worldhabitatawards.org/winners-and-finalists/project-details.cfm?lang=00&theProjectID=36>

The Grow Home demonstration house, documented on the CMHC Designing Flexible Housing website, was built on the McGill University campus in June 1990. Over 10,000 dwellings have been built in Montreal and throughout Canada and the United States under this program that provides affordable homes for low-income households. Flexibility is built into the project and building costs are reduced through innovative design and construction methods and by giving the buyers the option of partial internal completion. The basement or top storey of the house can be completed when resources and needs permit.

*Although it is not recent, the Grow Home has been included because it had such wide influence. Its potential for adaptation to today's market could be a topic for consideration in future studies. Related to the Grow Home were the Sprout and the Next Home. The Sprout (also the first Envirohome) built in 1997, was a CMHC-funded project for detached and townhomes in Montreal and published in a report titled SPROUT: Designing Capacities for Incremental Change, CMHC. The report's findings are summarized in SPROUT: The Versatile, Dynamic House, a 26-page illustrated booklet with floor plans and sketches.*

## MURBs

Statistics Canada, Government of Canada. **Evolution of Housing in Canada, 1957 to 2014** (2015)

<http://www.statcan.gc.ca/pub/11-630-x/11-630-x2015007-eng.htm>

This Statistics Canada webpage gives evidence of the growth of MURBs in cities, where in recent years there has been a change from growing out (suburbs) to growing up (urban mid and high-rise): “since 2012, apartments (including apartment-condominiums) have had the highest construction intentions in Canada, which has not occurred since 1973. In Toronto, they accounted for 54% of residential construction, compared with 27% for single-family homes. In Montréal, apartment units accounted for 75% of residential construction, compared with 16% for single-family homes. Meanwhile, in Vancouver, it was 67% for apartment units and 16% for single-family homes. These three CMAs accounted for just over half of the total CMA population in 2014. In all three CMAs, new single-family dwellings have been declining since the early 2000s, falling from 27,627 dwellings in 2000 to 14,840 in 2014—a 46% decrease.”

*These statistics confirm that there should be greater attention paid to MURBs than to single-family dwellings, which previously have received most of the attention in the discussion of flexible and accessible housing.*

RedBrick Real Estate Services. **RedBrick Narrow Lot Home Initiative**. (2015).

<http://redbrickinc.ca/redbrick-narrow-lot-home-initiative/>

<http://redbrickinc.ca/our-first-project-stadium-apartments/>

RedBrick Homes of Edmonton is a private-sector developer pushing the boundaries to build innovative housing, such as single family homes with garden suites, and multi-family apartment buildings with flexible features. In the multi-unit Stadium apartments “the flex-rooms provide an opportunity for adaptable spaces that meet the changing needs of the residents. For example, the flex-room can be used as a dining room, an office, a guest suite for visiting relatives, a baby room, a yoga room, etc.”

*Although they make no claim for affordability, the concepts should be investigated for possibilities of their application in the affordable MURB market. The fact that they see flex housing and secondary suites as selling features shows that the private market has interest in these concepts.*

Peters, Terri. **Seven Years in Winnipeg**. *Mark: Another Architecture*, no. 52 (October/November 2014): 136–47.

<https://www.canadianarchitect.com/features/youcube/>

This article features the innovative housing work of the Winnipeg architecture firm 5468796. Their multi-unit housing project youCube (2015) “is an 18 unit housing development that explores the potential for density and affordability on a narrow, 264’ x 63’ urban lot. With a modest budget and a background in custom home building, the developer needed a design that could be built using standard construction methods by residential contractors. In response, the project challenges conventional multi-family housing design with a modular and more affordable configuration of individual dwellings that goes beyond the brief to include extensive outdoor space and inspired architectural interiors.” One level contains flex units, which can be commercial or residential or a combination, and each of the available unit sizes has two possible interior configurations.

*This reference is included as an example of a private developer and an architecture firm collaborating on innovative housing ideas, which, in this project, include flexibility and affordability.*

Newfoundland and Labrador Housing Corporation (NLHC). **Newfoundland & Labrador Housing Private Sector Affordable Housing 2014 Proposal Call.** (2014).

<http://www.nlhc.nf.ca/documents/programs/ahpPrivateSector.pdf>

NLHC was recognized as the first jurisdiction in Canada to make Universal Design features mandatory for all new affordable and social housing constructions, including a minimum number of units to be fully accessible. This proposal call from 2014 for the Investment in Affordable Housing (IAH) to assist in the creation of modest affordable rental housing for low income households, incorporates the mandatory Universal Design criteria based on CAN/CAN/CSA-B651-12 “Accessible Design for the Built Environment” and Buildings Accessibility Act and Regulations of Newfoundland and Labrador.

*The Technical Standards in the document state clearly that the projects are intended to be affordable, adaptable and flexible to respond to a broad range of current and anticipated needs. At the same time, the goal is to meet universal design standards: to be “usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.” The guidelines are detailed and clearly laid out.*

Canada Mortgage and Housing Corporation (CMHC). **Place La Charrette**, Project profile (2014).

<ftp://ftp.cmhc-schl.gc.ca/chic-ccd/h/Project%20Profile%20-%20Profil%20de%20l'ensemble/Place-La-Charette-EN.pdf>

The CMHC project profile describes Place La Charrette, an affordable, energy efficient and universally designed 37-unit residential development in Winnipeg, comprising a four-storey apartment building and six attached bungalows. Developed and managed by Ten Ten

Sinclair Housing Inc., on behalf of Manitoba Housing, the project provides accessible housing for families, seniors and persons with disabilities, and features a state-of-the-art geothermal heating and cooling system.

*This is a good example of a project that is affordable, energy efficient and universally designed. A direct link is made between long-term affordability and high levels of energy efficiency. The kitchen and bathroom layouts were replicated in other projects. It does not appear to have adaptable features.*

Manitoba Housing. **Immigration and Refugee Community Organization of Manitoba IRCOM II, HOMEWorks Fact Sheet.** (2013).

[https://www.gov.mb.ca/housing/pubs/ircom\\_II\\_factsheet\\_dec17-12.pdf](https://www.gov.mb.ca/housing/pubs/ircom_II_factsheet_dec17-12.pdf)

Manitoba Housing renovated two apartment buildings, including one seniors building of largely studio suites, into family housing for new immigrants, including 12 one-bedroom, 24 two-bedroom and 24 three-bedroom units. The new layout allows for apartments to house a range of family sizes from two to ten member families, with the flexibility to change suites sizes/configurations, depending on needs. A minimum of one accessible apartment is provided on each floor.

*This is a good example of adaptive re-use of existing building stock to create affordable, accessible housing consciously designed with flexibility and adaptability in mind.*

Canada Mortgage and Housing Corporation (CMHC). **Case Study Research on Social Housing Redevelopment and Regeneration** (2011)

<ftp://ftp.cmhc-schl.gc.ca/chic-ccdhd/CMHCPublications/67695.pdf>

The study investigated approaches used in regeneration and redevelopment (R-R) and identified lessons learned in past projects. R-R is defined in the study as “Major changes in housing projects to renew lost vitality and offset economic decline, social and economic change, and physical and environmental dereliction.”

The eight R-R projects were undertaken by a range of agencies that included a mix of public sector and non-profit organizations, most of which were housing agencies.

*Some of the case studies are older than our research limit; however, there are newer ones that include accessibility and adaptability upgrades. This is a very detailed and valuable resource about a variety of housing types and solutions of use to those undertaking regeneration projects with adaptability and accessibility in mind. MURB projects of interest include Regent Park Revitalization in Toronto and Benny Farm in Montreal.*

Michael Geller's Blog. (December 7, 2010). **The UniverCity project: An experiment in suburban urbanism**

<http://gellersworldtravel.blogspot.ca/2010/12/univercity-project-experiment-in.html>

Michael Geller is a Vancouver based architect, planner, real estate consultant and property developer. His blog posts cover a broad range of topics related to flexibility, affordability, housing options, secondary suites, and laneway housing. In this series of posts that relate to UniverCity, and the SFU Community Trust, which he was instrumental in developing as president and CEO, he touches on concepts such as mortgage helpers, a suite within a suite and multi-unit laneway housing. He reposts an October 2010 article by Jonathan Hiskes called *The UniverCity project: An experiment in suburban urbanism*:

<http://grist.org/article/2010-10-28-univercity-burnaby-suburban-urbanism-project/>

It provides an excellent description of the project, its history, successes and challenges. In addition to being recognized for environmental sustainability, the project was recognized for its initiatives to generate affordable housing, including creating unique zoning to allow for legal secondary suites in up to 50 per cent of dwellings. These suites have their own bathroom and cooking facilities and can be legally rented out, often to SFU students, to offset mortgage expenses. This concept has already been adopted by other municipalities such as Vancouver and Kelowna. UniverCity won the 2005 Canadian Home Builders Association Sales and Marketing (SAM) award for best community development and several other environmental awards. The City of Burnaby and the SFU Community Trust were the 2011 winners of a Sustainable Community Award from the Federation of Canadian Municipalities (FCM).

<http://www.fcm.ca/Documents/case-studies/GMF/2011/2011-IND-Burnaby-EN.pdf>

*UniverCity is an example of a strategy to increase affordability for both homeowner and renters through adaptable design and flexible legislation. It does not address accessibility. Michael Geller's blog is very accessible and addresses a broad range of housing related issues, some of which are applicable to this study.*

Canada Mortgage and Housing Corporation (CMHC). **FlexHousing™ - What is FlexHousing™?**

<https://www.cmhc-schl.gc.ca/en/developing-and-renovating/accessible-adaptable-housing>

This website resource describes CMHC's FlexHousing™ concepts and how they can be applied to, and seamlessly integrated within, all forms of conventional housing - from singles and duplexes to multi-unit residential buildings. It applies to new housing construction as well as renovations, thereby helping to address the challenges associated with an aging population and an aging housing stock.

*The website provides a clear definition of FlexHousing™, linking it directly to affordability, adaptability and accessibility, and providing links to videos and an easy-to-use checklist.*

Canada Mortgage and Housing Corporation (CMHC). **Affordable, Adaptable Housing.** (2000).

<ftp://ftp.cmhc-schl.gc.ca/chic-ccdhd/CMHCPublications/62016.pdf>

From the introduction: “The purpose of this publication is to promote and demonstrate the practical and economic advantages of affordable, adaptable housing.

The report discusses various types of housing and adaptability and includes scenarios to illustrate the economic advantages of the various adaptability options. This publication is designed for developers, architects and consumers looking for housing which can be adapted to changing household requirements to enable occupants to stay in the same location for a longer time.”

*Although the publication date is prior to this study’s timeframe, it is worth including for the detailed case studies and diagrams, and the breakdown of the term adaptable into five sections: upgradeable, expandable, divisible, versatile and flexible. There may be potential for using this report’s framework for an updated study.*

### Seniors

Canada Mortgage and Housing Corporation (CMHC). **Building Affordable Rental Housing for Seniors: Policy Insights from Nova Scotia** (2015) (no URL available)

The report explores “the experiences of seniors living in newly constructed, unassisted affordable rental housing with respect to design and management. We also explore the perspectives of developers of this housing as they relate to these topics.” One of the authors’ suggestions is that “policy makers should consider providing clear guidelines to be implemented by developers of seniors’ housing, including mandating that universal design principles be incorporated in all units.”

Specific problems areas mentioned during the interviews included bathroom design, railings in units and hallways, and the lack of flexibility of units to accommodate residents during recovery periods. Several residents suggested that all units should be barrier-free, offering tenants the flexibility required to accommodate their changing needs.

*This report deals with the problems faced by residents and developers of recent affordable small-scale seniors housing in NS. The research exposed the developers’ lack of expertise in this type of housing, lack of awareness of universal design concepts, lack of regard for the specific needs of the users, insufficient consultation with users and a lack of funds for accessibility upgrades.*

Ramlo, Andrew, Yazmin Hernandez, & Ryan Berlin. **Housing Our Aging Population:**



**Projections of Private & Collective Housing Occupancy Demand for Canada's Seniors, 2014-2041.** *The Urban Futures Report* (2015).

[http://static1.squarespace.com/static/52012782e4b0707e7a30fda8/t/5612f810e4b01c6ce2f51785/1444083728893/ufi\\_seniors\\_housing\\_canada.pdf](http://static1.squarespace.com/static/52012782e4b0707e7a30fda8/t/5612f810e4b01c6ce2f51785/1444083728893/ufi_seniors_housing_canada.pdf)

This statistical report provides the following: a review of historical and projected changes in the size and composition of Canada's senior population; changes in the age-specific patterns of living arrangements showing how increasing disability-free life expectancy has changed Canadian seniors' living patterns; a long-run projection of changes in private housing occupancy demand and changes in seniors' collective housing occupancy. The report addresses the near doubling (87 percent growth) of the 65-plus segment of the population in Canada over the next three decades that will translate into increased need for private and collective housing.

*This report provides statistical projections that indicate the need for more housing to be built, and specifically housing that supports the independence of seniors who want to remain in their homes. Though not directly advocating for accessible or affordable housing, the case can be made that accessible and adaptable housing increases economic viability since it costs less for residents to stay in their own homes and communities than to move.*

Canada Mortgage and Housing Corporation (CMHC). CMHC Project Profile **Baille Ard Seniors Housing**. (2013).

<ftp://ftp.cmhc-schl.gc.ca/chic-ccdhd/Project%20Profile%20-%20Profil%20de%20l'ensemble/Baille-Ard-Seniors-Housing-EN.pdf>

Baille Ard Seniors Housing in Sydney Nova Scotia has 34 barrier free units, 6 are fully wheelchair accessible. Accessibility features include wider doorways, roll-in showers, level thresholds, lever handles and barrier-free walkways. Six of the units are fully accessible, and the others can be modified to be completely barrier-free by removing a single cabinet under the kitchen sink and range.

*This is an example of an affordable seniors' housing project in which all units are designed to be either fully accessible or easily adapted to be.*

Canada Mortgage and Housing Corporation (CMHC). CMHC Project Profile **Millwood Place** (2013)

<ftp://ftp.cmhc-schl.gc.ca/chic-ccdhd/Project%20Profile%20-%20Profil%20de%20l'ensemble/Millwood-Place-EN.pdf>

Millwood Place, a new energy-efficient affordable seniors' rental building in Middle Sackville, a suburb of Halifax, is a 59-unit, three-storey building designed to a high level of

accessibility. Five of the apartments are fully accessible, and the entire building was constructed with accessible features, including wider doors and hallways, non-slip flooring, lever handles and lower light switches, walk-in showers, night lights and heat lamps in all washrooms, under-cabinet lighting and a large storage closet in each unit.

*This is an example of an affordable seniors' housing project designed to be highly accessible throughout, although with only five fully accessible units. It is not apparent whether or not adaptability and flexibility were considered.*

Enderby Memorial Terrace was the recipient of the Best Affordable Housing Project award in the 2012 Keystone Awards. Providing 15 apartments for seniors and people with disabilities, it is the last affordable housing development to open under the Olympic Legacy Affordable Housing initiative, which took temporary modular homes used to house athletes during the 2010 Winter Games and reconfigured them to create affordable housing in communities across British Columbia. Modular housing has been used extensively for affordable housing developments as it allows construction to take place in a factory, which means less dependence on weather conditions. The modular units meet EnerGuide 80 standards and are designed to be easily accessible for seniors and people with disabilities – this includes room sizes that allow for wheelchair access and maneuvering, shelves and light switches at an accessible height and bathroom grab bars or step-in showers.

*This is an example of affordable accessible housing created by adapting existing modular housing units.*

Canada Mortgage and Housing Corporation (CMHC). **Housing for Older Canadians: The Definitive Guide to the Over-55 Market.** (2012).

[ftp://ftp.cmhc-schl.gc.ca/chic-ccd/h/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_bilingual/Ca1%20MH%2012H55.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/h/Research_Reports-Rapports_de_recherche/eng_bilingual/Ca1%20MH%2012H55.pdf)

A five-volume CMHC Guide developed to address the housing needs of Canadians aged 55 and older, an “active and mobile demographic, a group that is demanding in their expectations, looking to live independently and interested in “aging in place.” The Guide is intended for those developing seniors' housing, including for-profit developers and organizations.

*Most relevant to this literature review is Volume 4 - Designing the Project, which provides guidance on the ways in which developers and sponsors of seniors' housing can accommodate changing needs through appropriate design of dwellings and communities for people of all ages and ability to live comfortably and independently for as long as possible. It is a useful guide that discusses applying Universal Design principles to multi-unit developments.*

Shiner, Donald V., Robin Stadnyk, Yvonne daSilva and Kathleen Cruttenden. **Seniors' housing: challenges, issues, and possible solutions for Atlantic Canada: final report of the Atlantic Seniors Housing Research Alliance.** (2010). Mount Saint Vincent University

<http://ashra.msvu.ca/documents/Final%20Report%20English%20%20w.hyperlinks.pdf>

The purpose of the ASHRA project was to answer two primary questions regarding the future of housing options for the aging demographic of Atlantic Canadian seniors: what will the housing needs of aging Atlantic Canadians be over the next 20 years, and what housing options, support services and policies should be developed to meet these needs? The report includes a description of seniors' housing solutions around the world and assesses their applicability in Atlantic Canada.

*Affordability, accessibility, adaptability and flex design principles are all addressed, with recommended next steps, such as embedding the Lifetime Homes Standard in the building code. (Refer to the International section below for Lifetime Homes Standard).*

Atlantic Senior Housing Research Alliance. **Affordable Seniors Housing Ideas Design Competition.** (2009). Mount Saint Vincent University

<http://ashra.msvu.ca/AffordableSeniorsHousingIdeasDesignCompetition.htm>

This link is to the webpage for the Atlantic Senior Housing Research Alliance (ASHRA) international ideas competition held in 2009.

*The aim of the competition was to showcase new, innovative, affordable ideas for housing seniors in Canada twenty years from now. The winning entry, which can be accessed on the site, includes flexible adaptable units in a multi-unit building complex.*

Danziger, Sara, and Habib Chaudhurya. **Older Adults' Use of Adaptable Design Features in Housing Units: An Exploratory Study.** *Journal of Housing for the Elderly.* Volume 23, Issue 3, (2009): 134-148.

<http://www.tandfonline.com/doi/abs/10.1080/02763890903035498>

This article reports on the first qualitative evaluation of adaptable design features using the 1997 Adaptable Design Guidelines for housing to support aging-in-place for older tenants in North Vancouver, British Columbia. The study used a qualitative methodology to explore the elderly tenants' use and satisfaction of the features in the housing units, and environmental changes made by those tenants. Findings can inform future revisions of the guidelines and demonstrate what needs to be done in environmental design of seniors' housing to foster functional independence.

Category 2 Housing Types International

*General*

New London Architecture (NLA) **New Ideas for Housing Insight Study**. (October 2015).

This Insight Study accompanies the NLA exhibition and events program, “New Ideas for Housing,” from October to December 2015. It includes research by Claire Bennie who was commissioned to provide background information for the competition, exploring new ideas to deliver quality housing at speed and at scale in London. The exhibition displays some of the new or proposed housing developments and presents a selection of both practical and more radical ideas: from increasing self-building and co-housing, to building over infrastructure assets, infilling council estates and densifying the suburbs. Bennie’s essay is here:

[http://www.newlondonarchitecture.org/docs/nla\\_housing\\_essay-6-1-1.pdf](http://www.newlondonarchitecture.org/docs/nla_housing_essay-6-1-1.pdf)

She asks how we ensure that we build high quality and affordable housing, while maintaining flexibility for the future. In a comprehensive overview, she addresses family sizes, tenure issues, employment increase, foreign investment/ownership and UK construction capacity regarding skills, materials and techniques.

*This excellent resource addresses affordability, adaptability and, to a lesser extent, accessibility, in its analysis, expert opinions and ideas proposals. The numerous solutions include: strategies for adapting existing post-war low- and high-rise housing; a “shared house” model made of low-cost modules that inhabitants can finish according to their means, allowing micro-units of space to be owned; rooftop bedrooms providing cheap accommodation for young workers priced out of the market, constructed of a lightweight steel frame, adapted to fit onto the differing roofs, and connected by towers and walkways; affordable and flexible ecological “Waterhoods,” adapted and reconfigured according to needs, with new facilities floated into place; and “fluid” housing, a mass-produced modular system that breaks a home into parametric components, allowing adaption to suit design conditions.*

ARUP. **Shaping Ageing Cities 10 European case studies**. (2015).

[http://publications.arup.com/Publications/S/Shaping\\_Ageing\\_Cities.aspx](http://publications.arup.com/Publications/S/Shaping_Ageing_Cities.aspx)

This is a comparative overview of the performance of ten European cities according to ageing data and observations about society, mobility, and built and digital environment. This information is used to further investigate the correlation among politics, planning and ageing. The study addresses adaptability and flexibility in housing design from a range of perspectives, and states, “the design of housing should be conceived as adaptable to the

transforming needs of ageing individuals. Besides accessibility, the design of housing for older people requires adaptability to the varying needs determined, for example, by different family sizes. On the other hand, affordable housing specifically designed for older people is a sector that will certainly be explored in the future.”

*This is a far-reaching study, describing an Age Friendly City Framework that includes accessible, adaptable and affordable housing. The case studies looked at a broad range of issues including housing, and made specific observations about the inadequacy of the existing housing stock in many cities; for example, “the dimension of the spaces, such as the bathroom and the lifts, are not designed to be flexible to adapt to eventual disabilities or to a reduced physical capacity of the members of the families.”*

Habinteg. **7 Points about the New Housing Standards 2015.** (2015).

<https://www.habinteg.org.uk/latest-news>

In this briefing paper, Habinteg, a British organization that provides and promotes inclusive accessible homes and neighbourhoods, explains the policy context and implementation plan for new UK Housing Standards. It details the timetable for implementation, content of the standards, their optional nature, and the applicable viability test and assesses the costs and benefits of accessible housing.

*This document analyses the UK Housing Standards, and in particular the technical accessibility standards which replaced the Lifetime Homes Standard in October 2015. It is critical of the optional nature of parts of the standards, the methods used in cost calculations, the limited nature of the cost-benefit analysis and proposed viability testing, and makes the case for all future housing to be built to accessible standards. It addresses affordability and touches on adaptability, and has relevance for Canada where new accessibility legislation is being implemented in various jurisdictions.*

Royal Institute of the Architects of Ireland. **RIAI Publishes Housing Policy.** (2015).

[http://www.riai.ie/news/article/riai\\_publishes\\_housing\\_policy](http://www.riai.ie/news/article/riai_publishes_housing_policy)

The RIAI launched a new Housing Policy in September 2015 to help create a framework to deliver sustainable housing solutions for a growing population with changing demographics and evolving needs. The policy proposes New Housing Types: “the increasing number of homes needed requires new models to be developed and requires higher densities which can be delivered through apartment developments as well as having greater flexibility in external space standards, including higher density housing schemes. Flexibility in space standards is a key element in creating sustainable communities. This would enable the delivery of appropriate homes for a changing demographic, acknowledging that one size does not fit all.”

*This policy illustrates how Ireland is linking the issues of sustainability, affordability and flexibility to meet present and future needs – a strategy that could be considered for integration into Canada’s planned affordable housing strategy.*

**Universal Design Guidelines for Homes in Ireland | Centre for Excellence in Universal Design. (2015).**

<http://universaldesign.ie/Built-Environment/Housing/>.

“These Home Design Guidelines are a first step in the process of raising awareness and inspiring people to think differently about the benefits of Universally Designed homes and the potential opportunity to address some of the global challenges society faces by future-proofing our homes through embracing Universal Design thinking. The Design Guidelines are not intended to be overly prescriptive, but provide a flexible framework for designers to apply the guidelines creatively to all new home types through incremental steps. The Home Design Guidelines are informed by research, a literature review of national and international best practice and guidance and a consultation process with key stakeholders. Universal Design Home Design builds upon social and technological advancements in Ireland and internationally. The consultation process with stakeholders that informs these guidelines highlighted a need for better quality housing design for everyone in Ireland for the future.”

*This resource, and the process that Ireland followed, could inform a framework for Canada to investigate for the development of national guidelines. It includes single family, terraced housing, apartments, refurbishments and flex elements.*

**Farrelly, Lorraine, *Designing for the Third Age: Architecture Redefined for a Generation of “Active Agers.”* UK: Wiley. (2014).**

<http://ca.wiley.com/WileyCDA/WileyTitle/productCd-1118452720.html>

This issue of *AD Architectural Design* magazine reflects on the forthcoming challenges that are posed globally in Europe, Australia, North America and Asia, while seeking innovative responses to the problems at both practical and speculative levels. It includes international case studies and competition-winning entries by practitioners and students. It discusses how urban design, housing and other built provisions require rethinking and redeveloping for a more integrated way of living, and adapting spaces and places to the needs of the changing population profile.

*This is a very useful broad-based resource combining analysis and case studies related to affordability, accessibility and adaptability.*

**Lifetime Homes website**

<http://www.lifetimehomes.org.uk/pages/lifetime-homes-principles.html>

The Lifetime Homes (LTH) concept, initiated in 1989, was developed in the early 1990s by a group of housing experts in Britain in response to a growing awareness of the decline of private and public sector housing quality and concerns about how inaccessible and inconvenient many homes were for large sections of the population. In early 2008, The Department for Communities and Local Government (DCLG) launched “Lifetime Homes, Lifetime Neighbourhoods: A national strategy for housing in an ageing society.” The strategy made a commitment that all new homes receiving public funding would be built to the Lifetime Homes standard by 2010, and stated an ambition to see all new homes in England built to the Lifetime Homes standard by 2013. The Standards incorporate 16 Design Criteria intended to support the changing needs of individuals and families at different stages of life.

*The website describes the concept, its evolution, the legislation and its application, and provides good practice recommendations and case studies. The regulations require that all new housing meet visitability criteria, and have adaptable features to allow for incremental changes. It applies to affordable as well as other housing, goes beyond current visitability criteria, and is applicable to the Canadian context. The Lifetime Homes standard has recently been incorporated into the UK’s national housing strategy - refer to Habinteg source above.*

Pinder James, Robert Schmidt III, and Jim Saker. **Stakeholder perspectives on developing more adaptable buildings.** *Construction Management and Economics* Vol. 31, Iss. 5 (2013).

<http://www.tandfonline.com/doi/abs/10.1080/01446193.2013.798007>

The purpose of this study was to explore why more buildings are not constructed to be more adaptable, through a literature review and interviews with industry stakeholders in the UK, including architects, developers, engineers, property agents and local authority planners. The research revealed a wide range of motives for constructing for adaptability, such as a desire to reduce life cycle costs, to produce “future-proof” buildings and to ensure that buildings are easier to sell and rent. They also revealed obstacles to creating more adaptable buildings including an assumption that adaptability always costs more, a lack of life-cycle costing, uncertainty about the benefits of adaptability, and fragmentation between industry stakeholders and short-term development models.

*This is an important resource with detailed analysis, highlighting the need for a better understanding of the costs and benefits of adaptability so that industry stakeholders can make more informed decisions about their buildings.*

Habinteg Housing Association. **Lifetime Homes Technical Forum**, Department for Communities and Local Government. (July 2012).

[http://www.housinglin.org.uk/library/Resources/Housing/OtherOrganisation/Lifetime\\_Homes\\_Technical\\_forum.PDF](http://www.housinglin.org.uk/library/Resources/Housing/OtherOrganisation/Lifetime_Homes_Technical_forum.PDF)

The Lifetime Homes Technical Forum was established to bring together a group of housing experts for discussion and debate on the implementation of the Lifetime Homes standard in Britain in publicly funded housing, with the broad aims of helping to clarify the application of the standard and to indicate ways in which it might be developed or refined. The Technical Forum was one of a number of initiatives taken by DCLG to draw on the knowledge and experience of architects, developers and others in the house-building industry and to receive feedback on the implementation of Government policy on Lifetime Homes.

*This is a useful resource, applicable to Canada, that examines accessible features and adaptable design strategies in social or affordable housing that go beyond visitability.*

Radogna, Donatella. La flessibilità per un Social Housing sostenibile: il caso di Preturo (AQ) = **The flexibility for a sustainable social housing: the case of Preturo (AQ)**. *Techne: Journal of Technology for Architecture and Environment*, no. 4: 242–50. (2012)  
<http://www.fupress.net/index.php/techne/article/view/11524/11014>

*This article states that in Italy, and throughout the world, there is an affordable housing crisis requiring changes in the approach to the typology of social housing. It makes the case for designing with flexibility and adaptability to address changing needs of residents due to continuous demographic growth and changing lifestyles. New multi-unit social housing projects from Spain, Italy, Slovenia and Denmark and incorporating flexible and adaptable ideas, are potential case studies.*

Noguchi, Masa. **The Essence of Low-Energy Affordable Housing Design Strategies: Learnt from Scottish and Canadian Homebuilders' Attempt and Experience**. *Journal of Green Building* 6 (3) (2011): 59–75.

<http://dx.doi.org.ezproxy.library.dal.ca/10.3992/jgb.6.3.59>.

This journal article deals with flexibility, Lifetime Homes and accessibility in Scotland and Canada. It makes the case for implementing sustainable building practices to combat energy poverty (“fuel poverty” in the UK), which ultimately means an extension of the viability of the affordable nature of many people’s housing. It also cites some of the obstacles to achieving the full potential of sustainable homes in Scotland, and uses examples from Canada as possible solutions.

*This is a good example of the interconnectedness of sustainability with affordability and accessibility.*

Kendall, Stephen H., and Jonathan Teicher. **Residential Open Building**. Routledge, (2010).



[http://www.habraken.com/html/open\\_building.htm](http://www.habraken.com/html/open_building.htm)

The theoretical Open Building movement asks: How do we design the built environment to support both stability in respect to long-term community interests, and change in respect to individual preferences? How, in other words, do we plan and implement a regenerative built environment?

*Residential Open Building* is a book providing a state-of-the-art review of the Open Building fundamental principles as they relate to housing. One of the authors is based at the Housing Futures Institute at Ball State University.

Recent developments and current international projects on both the public and private arena are included in the book. It describes how the Open Building approach can be applied to the design, financing, construction, fit-out and long-term management process of residential buildings. Its goals include creating varied, fine-grained and sustainable environment and increasing individual choice. The introduction states “Open Building is a highly flexible and economical method of building which has far reaching advantages for urban designers, architects, contractors, developers and end users.”

*The theory of Open Building, an approach informing the development of residential architecture in many places in the world, has applicability to affordable adaptable housing in Canada.*

Schmidt III, Robert, and T. Eguchi, S. Austin, A. Gibb. **What is the meaning of adaptability in the building industry?** Loughborough University, UK (2010).

<http://adaptablefutures.com/wp-content/uploads/2011/11/Schmidt-et-al.-2010b.pdf>

This paper puts forth adaptability as a design principle which brings to the forefront the critical dimension of time. It directly links adaptability and sustainability, reviews definitions of adaptability in the literature, proposes a holistic definition, and subdivides adaptability into a set of strategies, providing a way of describing the different types of changes a building may be forced to endure throughout its life. The authors outline a link between the Open Building movement and their findings regarding adaptability, and conclude that industry must shift towards a more sustainable and time-based approach to design.

*This paper contains an in-depth and enlightening examination of the meaning of adaptability in design, its relationship to time, user empowerment, durability and sustainability. One conclusion is “If adaptability brings an understanding of time, it brings an emphasis on process and enabling the building to ‘learn’ and the users to ‘teach’ or shape the space themselves. Adaptability forces design to become an ongoing social process between designer and user over time. The designer must focus on enabling adaptation to take place; as opposed to attempting to control experiences and anticipate the future.” This paper has broad applicability but does not specifically address affordability.*

Van Vliet, Willem. **Creating Livable Cities for All Ages: Intergenerational Strategies and Initiatives**. Children, Youth and Environments Center, University of Colorado. (2009). Prepared for UN-Habitat's Global Dialogue on Harmonious Cities for All Age Groups at the 2008 World Urban Forum IV, Nanjing.

<http://www.colorado.edu/cye/sites/default/files/attached-files/CYE-WP1-2009%20website%20version.pdf>

This paper examines population aging trends and discusses patterns and issues associated with youthful populations. It reviews the emergence of a normative platform for creating child-friendly cities and argues that their characteristics significantly overlap with elder-friendly cities. Drawing from practical examples of intergenerational initiatives and programs from around the world, the paper identifies benefits and challenges of synergistic efforts to create livable cities for all ages. For example, a livable city for all ages requires a supportive physical environment, with safe walking, a mix of land uses, shared multi-purpose community facilities and adaptable housing, all of which support aging-in-place and intergenerational relationships.

*The paper analyzes trends and patterns and outlines the need for affordable, adaptable, and accessible housing as part of livable and supportive environments. It uses examples from around the world, but does not focus on housing exclusively.*

### **Making Room**

<http://chpcny.org/our-initiatives/making-room/>

Developed by Citizens Housing and Planning Council (CHPC) of New York City, and described on their website, Making Room is a new approach to housing policy that seeks to match the design of a city's housing stock with the needs of its households. CHPC developed a unique data model and methodology that revealed a substantial mismatch between the types of housing units available and the shape of that city's twenty-first century households. This analysis, and the application of the Making Room approach, led to the conclusion that New York City needs to develop three new housing types to accommodate the needs of its real households: small, efficient studios designed for single people; legal shared housing options for unrelated adults; and accessory units to make a single family home more flexible for extended families or additional renters.

*This is an example of a non-profit organization dedicated to housing research and education that examines issues directly related to our study. Its many and varied initiatives address the mismatch of existing housing stock and the current and changing needs of households. Affordability and adaptability are criteria that recur; less so, accessibility.*

### **Making Room: New Models for Housing New Yorkers Exhibition**

<http://makingroomnyc.com/exhibition/>

The exhibit, *Making Room: New Models for Housing New Yorkers*, co-curated by The Museum of the City of New York and Citizens Housing and Planning Council, was open for nine months in 2011, offering insights into the city's changing demographics. It demonstrated how the rise of single-adult households are dramatically re-shaping New York City's housing landscape and presented creative solutions to the numerous housing issues New Yorkers face now and into the future.

*The exhibit, related events, and design proposals are very well documented on the website, including a 2009 symposium at the Japan Society of New York. Six housing design and planning experts from Tokyo, Barcelona, Leipzig, Montreal and San Diego shared their expertise, experience, and insight into designing and planning compact, shared and flexible housing that better reflect real needs. Underlying many of the projects was the need for affordability.*

Habraken, N. John **Design for Flexibility**, *Building Research & Information*, 36:3, 290 - 296. (2008).

<http://dx.doi.org/10.1080/09613210801995882>

Online Publication. (May 2008).

[https://jeremytill.s3.amazonaws.com/system/redactor\\_assets/documents/47/habraken\\_review.pdf](https://jeremytill.s3.amazonaws.com/system/redactor_assets/documents/47/habraken_review.pdf)

In this in-depth review of Tatjana Schneider and Jeremy Till's book *Flexible Housing*, one of the early advocates of the Open Building approach, John Habraken, commends them for being inclusive in their definition of adaptability and flexibility, and the broad range of case studies and ideas provided, although he criticizes them for the Western slant to the selection. He poses the question, "Most importantly, however, for a book about design, one would like to know in what way flexibility might inspire the making of a new architecture. Is it simply a social service some of us feel morally bound to pursue, or does it imply a new and challenging kind of architecture? ..... Taking such questions seriously also helps to find out how further study and experiments can advance the cause of flexibility. As always, questions lead to research, in this case not only for the architect, but also for other professional parties involved in housing."

*This review provides evidence of the extent of work that has been done over the past century on the topic of adaptable and flexible design with application to affordable (social, public, mass) housing. Further study will very likely reveal gaps in what is being done now and areas for further investigation.*

World Health Organization (WHO). **Global Age-friendly Cities: A Guide**. NLM classification: WT 31 (2007).

[http://www.who.int/ageing/publications/Global\\_age\\_friendly\\_cities\\_Guide\\_English.pdf](http://www.who.int/ageing/publications/Global_age_friendly_cities_Guide_English.pdf)

This guide is based on the premise that an age-friendly city adapts its structures and services to be accessible to, and inclusive of, older people with varying needs and capacities. Each part concludes with a checklist of core age-friendly features obtained by analyzing the reports from all cities. Part 7 deals specifically with housing, and highlights the issues and concerns voiced by older people and those who serve older people.

*The guide shows the breadth of the challenging issues from diverse parts of the world, and describes a variety of strategies, from Canada and elsewhere, which could be applicable here.*

**Flexible: Architecture That Responds to Change** (2007).

<http://spacing.ca/vancouver/2013/04/09/book-review-from-the-stacks-flexible-architecture-that-responds-to-change/>

The author states: “flexible architecture consists of buildings that are designed to respond easily to change throughout their lifetime. The benefits of this form of design can be considerable: it remains in use longer; fits its purpose better; accommodates users’ experiences and intervention; takes advantage of technical innovation more readily; and is economically and ecologically more viable. It also has greater potential to remain relevant to cultural and social trends.”

*This theoretical book deals with architecture in general, and makes the case that flexibility can aid affordability; it has a section on flexible homes.*

### *Single Family*

Nichols, Jane Louise, and Erin Adams. **The Flex-Nest: The Accessory Dwelling Unit as Adaptable Housing for the Life Span.** *Interiors* Volume 4, Issue 1 (March 2013): 31-52.

<http://www.tandfonline.com/doi/pdf/10.2752/204191213X13601683874136>

The stock of affordable US housing is shrinking, and little new construction is on the horizon. These realities have led to a shortage of affordable housing, and motivated residents to choose complex housing arrangements, including shared housing, doubling up, and accessory dwelling units (ADUs). In this paper the ADU is examined for its financial, social, and personal benefits as an alternative to families living alone in single-family homes. For many, the partitioning of a home can provide solutions to housing children, parents, and also renters who might generate extra income to help with the mortgage. The additional benefits of ADUs for the rapidly growing elderly population are investigated, and seven flexible design models proposed as potential housing solutions.

*This article illustrates Canadian examples already included in the bibliography (Grow Home, Sprout) and has interesting ideas for transformation of typical suburban homes applicable to Canadian suburbs.*

Penn, Shelley. **Habitat 21**. *Architecture Australia* 100 (3) (2011): 66–70.

<http://architectureau.com/articles/habitat-21/>

An article from the journal *Architecture Australia*, detailing a housing competition: “Habitat 21 produced five seven-star houses, at an average of 150 square metres each. Each house is accessible, with wide passageways and bathrooms, and each has a level of adaptability and flexibility to suit varied household types. All are well designed, with spatial and formal development not typical of houses this efficient. They all offer generosity and delight despite their compact size and some conservative market imperatives, which are remarkable achievements at around \$1,300 per square metre. It was wonderful to witness the excitement this modest initiative generated, and it confirmed for me architects' tenacious delight in and ambition for contributing to a better world through architecture.”

*This is helpful for our research in terms of innovative ideas for single-family housing, which could be practical in Canada. In addition, the article highlights the importance of good design and is written in an inspiring manner.*

Groc, Isabelle. **Overextended?** *Planning* 74 (7) (2008): 6–9.

<http://search.proquest.com.ezproxy.library.dal.ca/docview/206707630/abstract>

The article begins with how the needs of multigenerational households in the US are not being met, and goes on to describe how one group, Affordable Housing Advocates, has been successful in achieving revisions to zoning bylaws in California to allow Accessory Dwelling Units (ADUs) as a right. “Flexibility is a key component of ADU design for multigenerational households. When considering designs for multigenerational homes, it is important to account for the fact that families change over time and spaces must be adaptable.”

### *Seniors*

HAPPI. **Housing our Ageing Population: Panel for Innovation**. (2009).

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/378171/happi\\_final\\_report\\_-\\_031209.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/378171/happi_final_report_-_031209.pdf)

This report summarizes the findings of an inquiry commissioned by the Homes and Communities Agency, on behalf of the Department for Communities and Local Government and the Department of Health in the UK, and examines how best to address the challenge of providing homes that meet the needs and aspirations of older people. A wide-ranging group of architects, designers, planners, developers, providers and consumers was appointed to help advise and shape the inquiry. It also involved case study visits to innovative housing schemes for older people in England and across Europe.

*The HAPPI report, a very useful document, is referenced elsewhere in our study as an important resource with implications for policy makers, planning and funding authorities, housing providers and designers. The HAPPI recommendations stress the importance of design, and identify ten elements that are critical to achieving age-inclusive housing, including affordability, adaptability and accessibility. The case studies are well documented and broad ranging.*

## MURBs

**Biombombastic/eli.** *ArchDaily.* (2015)

<http://www.archdaily.com/777801/biombombastic-eli>

*This project in Madrid is a refurbishment of an existing very small (270-square foot) apartment unit transformable by folding walls into many usable spaces. It is well documented with plans, beautiful and fun 3D graphics and photographs of the finished product in various configurations. The ideas could be inspiration for Canadian affordable, adaptable new apartments.*

**Mass Collaboration to Create a Small Space.** *The Globe and Mail.* (March 1, 2015)

<http://www.theglobeandmail.com/life/home-and-garden/architecture/mass-collaboration-to-create-a-small-space/article550106>

This newspaper article is one of the few North American sources applicable to adapting existing MURBs. It is about a creative competition, set by the founder of the sustainability website, Treehugger, to redesign his 420-square foot tenement apartment. “Mr. Hill, a designer himself, espouses the joy of living with less and the necessity of doing it in as small a footprint as possible.”

*Flexible solutions were required for the transformation, some of which are applicable to affordable projects. The objective of working with a very small footprint in existing multi-unit high-rises meets goals of both sustainability and affordability.*

**Case Studies | Adaptable Futures.** (2015).

<http://adaptablefutures.com/our-work/case-studies/>.

*From the Adaptable Futures webpage Case Studies, ALMEN +, a Danish affordable, adaptable 240-unit social housing project with features transferable to Canada. Photographs and floor plans are included.*

“Despite limited manoeuvres for spatial composition high priority was given to ensure a variety of spatial plans could be achieved by the residents. The 3.6 m module is wide

enough to generate a versatile space and hence kitchen, living room and sleeping rooms are able to be configured into a number of combinations.”

Wietzorrek, Ulrike. **Spatial Concepts as an Expression of Social Conditions.** *Detail (English Ed.)* 3 (2014): 241–45.

<http://issuu.com/detail-magazine/docs/bk-dee-2014-3-higherdensity>

"The concept of the single-family house ... tailor-made fit for people's subjective wishes, is now being incorporated (in condensed form) in multi-storey urban housing." The article discusses seven projects that are examples of "a trend in contemporary multi-storey housing towards the creation of complex spatial relationships that combine both domestic and urban qualities."

*The issue of single family housing concepts being incorporated into MURBs is of interest - this journal article must be obtained to determine if affordability is considered in these schemes.*

**FlexiRents | Adaptable Futures** (2012).

<http://adaptablefutures.com/2012/08/flexirents/>

Adaptable Futures is an international research group, based at Loughborough University, focused on building adaptability as a time- rather than form-based view of architecture, namely a building's capacity to accommodate evolving demands of its context, thus maximizing its value, commercially and spatially, through life. The group has developed a set of concepts, models and resources to provide a refined and expanded perspective on adaptability, augmenting the delivery of more adaptable buildings by embracing a menu of spatial, physical and operational (human, organizational) strategies.

*This is one project from the Adaptable Futures website - a student project to create flex tower blocks, based on his experience growing up in a typical single family home. There are other interesting articles on their website about affordable adaptable housing, such as "Towards Economic Sustainability Through Adaptable Buildings." Their ideas are linked to the Open Building movement, another theoretical approach to flexibility and adaptability in the built environment, which can inform design ideas for use specifically in affordable adaptable MURBs.*

Praestegaard, Ida. **Solid 11.** *Architectural Review* (July 2012): 18–19.

<http://search.proquest.com.ezproxy.library.dal.ca/daai/docview/1473729695/abstract/E01DB5922104450EPQ/30>.

This is an architectural journal article about a new building in Amsterdam designed by Tony Fretton Architects to last 200 years, based on a concept called "Solids." It was commissioned by the housing association Stadgenoot for whom durability is key to

sustainability. The concept stipulates that “buildings must last a minimum of 200 years and only use structures that weather well and are made of top-quality, imperishable materials. Buildings must be constructed to enable changes to interior and function. Solid 11, one of the first projects designed according to the ‘Solids’ concept, is an ultra-flexible 8,000-square metre, seven-storey building which can be used for flats, offices, shops and a hotel.”

It uses a new highly durable and sustainable typology devised by Stadgenoot which is presented to the market as a constructed shell, offering flexibility to the building’s tenants to decide on the size, configuration and use of space.

*This resource is included as an example of the “solids” construction concept, a technical approach to flexibility, linked with durability and hence sustainability, which could be applied to new MURBs in Canada to increase their adaptability over time, and by extension their affordability.*

Schneider, Tatjana, and Jeremy Till. **Flexible Housing**. Architectural Press. Publication Date: August 2007

<http://www.amazon.co.uk/Flexible-Housing-Jeremy-Till/dp/0750682027>

This book examines the past, present and future of this important subject through over 160 international examples. Specially commissioned plans, together with over 200 illustrations and diagrams, provide extensive detail and allow direct visual comparisons to be made. The book ends with an accessible guide to how flexible housing might be designed and constructed today to achieve adaptable and ultimately sustainable buildings. Two related articles written for *Architectural Research Quarterly* are described below.

*This is an excellent resource that analyzes and demonstrates, through historical precedents, many ways that adaptable design has been achieved over time. It combines history, theory and design, and along with the two related papers described below, contains basic and practical ideas for affordable adaptable housing, which can be applied in Canada.*

Schneider, Tatjana, and Jeremy Till. **Flexible housing: opportunities and limits**.

School of Architecture, University of Sheffield. This is a copy of a paper originally published in *Architectural Research Quarterly*, 9 (2) (2005): pp. 157-166. Cambridge University Press.

[http://westminsterresearch.wmin.ac.uk/5894/1/Schneider\\_Till\\_2005\\_as\\_published.pdf](http://westminsterresearch.wmin.ac.uk/5894/1/Schneider_Till_2005_as_published.pdf)

This paper argues that flexibility is an important consideration in the design of housing if it is to be socially, economically and environmentally viable. The degree of flexibility is determined in two ways: the in-built opportunity for adaptability, defined as “capable of



different social uses,” and the opportunity for flexibility, defined as “capable of different physical arrangements.”

The authors follow with a companion paper, **Flexible Housing: The Means to the End.**

[http://www.mom.arq.ufmg.br/mom/05\\_biblioteca\\_2/arquivos/till\\_flex2.pdf](http://www.mom.arq.ufmg.br/mom/05_biblioteca_2/arquivos/till_flex2.pdf)

They examine ways in which flexible housing may be achieved, using examples from twentieth-century housing. The argument is made for a “soft” approach to the design of flexible housing, in favour of the “incomplete building,” meaning a basic frame that leaves space for the personalized interpretation of the user, i.e. number of rooms, positioning, and functional uses. The authors are clear that flexible housing can be achieved through a careful consideration of use and technology and without significant, if any, additional cost.

*These two papers contain basic and practical ideas for affordable adaptable housing applicable in Canada. Historical precedents can be drawn from, such as the Mies van der Rohe Apartment Block, Weissenhofsiedlung. “Mies van der Rohe, acknowledging that buildings generally last longer than the functions for which they were initially designed, proposed that flexibility was one of the most important concepts of architecture. Here, the structural frame of the building, with only one or two loadbearing columns within the space of a unit, allows for a variety of possible subdivisions.”*

## Appendix B - Bibliography

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