Boom or Bust:
Adapting 1960s, 1970s, and 1980s Housing Affordably and Sustainably

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of the requirements of the degree of Master of Architecture

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ABSTRACT

Canadian homes built between the 1960s and 1980s met the space and lifestyle needs of that generation. However, in the decades since then, social attitudes and demographics have changed. These houses can be affordably adapted to be more sustainable as well as increase their suitability for current and future homeowners. Examining the changes that occupants have already made to their houses over the decades can assist designers and policy makers in designing and introducing policies for easily adaptable dwellings.

To gain information about possible needs and modification strategies, the author identified and selected a suburban neighbourhood built in the 1970s and 1980s. 225 questionnaires were distributed in that one neighbourhood of 2,100 homes. 82% of the questionnaires were returned and the responses were analysed. Seven follow-up interviews were also conducted.

The questionnaire responses indicate that homeowners modify their houses for their current, but not future needs. Energy efficiency, sustainable energy generation, and resource conservation systems were shown to be of low importance to homeowners, with the one exception of replacing windows and doors. Respondents were strongly opposed to making modifications that could result in diversified, affordable housing and in densification of their neighbourhood, for fear that it would have a negative impact on the suburban lifestyle they had chosen.

The author demonstrates that while the houses and the neighbourhood could be adapted to provide more affordable housing options, and straightforward modifications could be made to the existing houses in the research neighbourhood to increase efficiency and sustainability, these changes will not happen without changes to people's perception of suburban living in the twenty-first century. Additionally, people's resistance to overt change, as found in this study, may challenge current designers and policy makers in modifying current houses and neighbourhoods, as well as in designing easily adaptable dwellings to address people's changing needs as a function of time.

RÉSUMÉ

Les foyers canadiens construits entre les années 1960 et 1980 répondent aux besoins d'espace et de style de vie de cette génération. Cependant, dans les décennies suivantes, les attitudes sociales et les démographiques ont changé. Ces maisons peuvent être adaptés dans une manière abordable pour être plus durable ainsi que d'augmenter leur aptitude pour les propriétaires actuels et futurs. L'examen des changements que les occupants ont déjà pris à leurs maisons au cours des décennies peut aider les concepteurs et les décideurs politiques dans la conception et l'adoption de politiques pour des logements facilement adaptables.

Pour obtenir des informations sur les éventuels besoins et des stratégies de modification, l'auteur a identifié et sélectionné un quartier de banlieue construit dans les années 1970 et 1980. 225 questionnaires ont été distribués dans un quartier que de 2 100 foyers. 82% des questionnaires ont été retournés et les réponses ont été analysées. Sept entrevues de suivi ont également été menées.

Les réponses au questionnaire indiquent que les propriétaires modifient leurs maisons pour leurs besoins actuels, mais pas les besoins futurs. L'efficacité énergétique, la production d'énergie durable, et les systèmes de conservation des ressources ont été présentés comme étant de faible importance pour les propriétaires, à la seule exception du remplacement de portes et fenêtres. Les répondants étaient fortement opposés à apporter des modifications qui pourraient aboutir à un logement abordable et diversifié et la densification de leur quartier, de crainte que cela aurait un impact négatif sur la vie de banlieue qu'ils avaient choisi.

L'auteur démontre que, bien que les maisons et le quartier pourraient être adaptés pour offrir des options de logement plus abordables, et des modifications simples pourraient être prises dans les maisons existantes dans le quartier de la recherche pour accroître l'efficacité et la durabilité, ces changements ne se feront pas sans modifier la perception de la vie banlieue dans le XXIe siècle. En outre, la résistance des peuples au changement non déguisé, que l'on trouve dans cette étude, peut contester les concepteurs et les décideurs politiques à modifier les maisons et les quartiers actuels, ainsi que dans la conception des demeures facilement adaptables pour répondre aux besoins changeants de la population en fonction du temps.

ACKNOWLEDGEMENTS

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I wish to acknowledge the assistance provided by my professors over the course of my year at McGill. The lectures, readings, and assignments from several classes were of great benefit to my project.

I would like to offer my thanks to the homeowners in Convent Glen North who took the time out of their schedules to answer my questionnaire. Special thanks also goes to the homeowners who took the time to answer follow-up questions by e-mail.

Finally, I could not have completed this research and report without the encouragement and support of my parents and fiancé.

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CHAPTER 1 – INTRODUCTION

1.1 INTRODUCTION / STUDY RATIONALE

I grew up in a (fairly) quintessential 1970s split-level house in a typical 1970s Canadian suburban neighbourhood (**Figure 1.1**). The only unusual thing about my house is that the single-car garage is not attached to the house. Growing up in this neighbourhood, I watched my parents and neighbours repeatedly rearrange furniture in a bid to make their houses more comfortable and to use the space more effectively.

The houses built in the latter half of the twentieth century were designed for a nuclear family: a mother, a father, and several children. The modern family is not so easily described: there are many debates about what constitutes a family and who is identified as a "parent," as well as issues around gender, sexuality, marriage, and equality, which makes it much more difficult to design spaces for a group that is not easily defined. Additional changes to the family units (sizes) are highlighted in the infographic in **Figure 1.2**.

Houses are different today than those built forty years ago. When homeowners want to sell a 1970s house today, they will probably replace the kitchen, maybe the bathroom, perhaps the floors, and give the walls a fresh coat of paint. However, a facelift doesn't solve the underlying problems of how to use and adapt spaces design forty years ago for today's modern activities.

Additionally, building technologies have improved significantly in the last forty to fifty years. In 2004, the Canada Mortgage and Housing Corporation (CMHC) put out a series entitled "Renovating for Energy Savings" in which they detail the energy savings that homeowners can benefit from by making certain updates needed for energy efficiency and sustainability, such as upgrading the furnace or replacing single-glazed windows (CMHC 2004). The CMHC "Renovating for Energy Savings" report (2004) is an excellent guide for recommendations for renovations. Energy efficiency standards have changed; homes are now built with better air tightness, higher insulation standards (structure as well as glazing), sustainably sourced (or more sustainably sourced) building materials, and energy efficient appliances (CMHC 2012). Awareness of environmental sustainability issues has also changed; practical and theoretical research is being conducted regarding sustainability issues such as the concept of the carbon footprint (including energy sources, and cars vs. public/active transportation), and there is greater

Figure 1.1 – Author's parents' 1970s house source: photos by author 2013

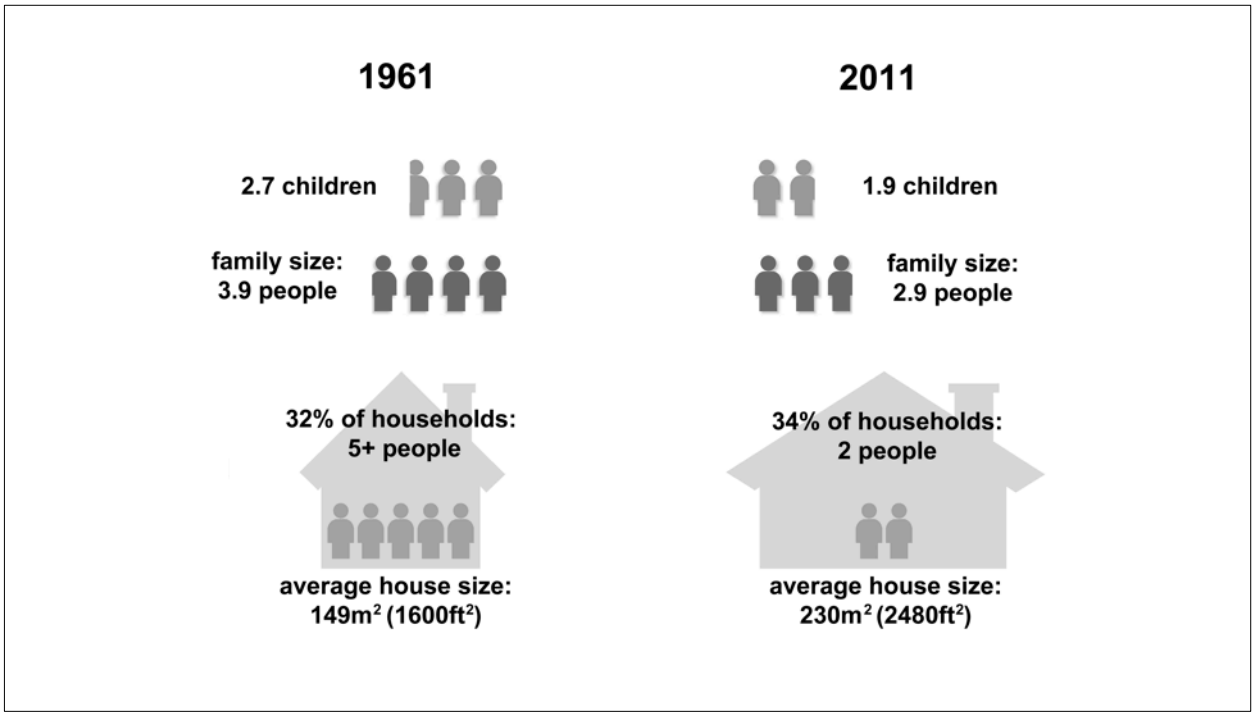


Figure 1.2 – Changes to the household, 1961-2011 source: Statistics Canada 2012(b) (infographic by author)

public awareness of sustainability issues (Kelley 2008).

The housing stock in Canada has not changed much over the last forty to fifty years. Between 1960 and 1979, about forty-five percent of the houses built were single detached homes (an average of 95,107 per year), and about four percent were semi-detached units (Statistics Canada 1980). More recently, the CMHC predicted that about forty-one percent of the houses built in the 2010s would be single detached homes (about 80,300 per year), but it is unclear how many will be semi-detached as CMHC groups semi-detached houses with row-houses and apartment buildings (CMHC 2013).

Since there has been little change in the proportion of detached homes being built, why not demolish these forty to fifty year old homes and reuse the property for new ones? Rather than letting these houses become totally obsolete and fall into complete disrepair, it is preferable to bring people into these existing neighbourhoods with existing infrastructure (roads, water, electricity, and sewage) and established schools, parks, and other amenities. Moreover, there is substantial energy required to demolish older houses and build new ones: the significant embodied energy (i.e. the energy used to create and transport the building materials and the energy used to build the house) in the existing houses, the energy required for demolition and clearing, and the embodied energy of new materials and construction (Venkatarama-Reddy and Jagadish 2003, Milutiene 2010). From a sustainability standpoint, it is favourable to re-use the man made capital wherever possible. Preserving and adapting these older neighbourhoods also protects greenfield sites (usually farmland) and diminishes suburban sprawl.

1.2 THEORETICAL FRAMEWORK

Household spaces, gender roles, values, and activities have evolved over the years. In addition, room uses have changed over the last half-century. Some notable changes are seen in the dining room, the kitchen, and the living room. As is adeptly stated in Akiko Busch's "Geography of Home," the formal dining room is obsolete; it is a stubborn holdover from more formal times (1999:54). Strangely, the obsolete formal dining room is still included in brand-new houses, which may be due to the cultural significance of the dining room. In the 1960s and 1970s there would still have been formal dinner parties, whereas people today are somewhat more likely to order takeout for a less formal dinner or to meet friends at a restaurant. Many people use the dining room for formal meals only a few times a year – for example Easter, Thanksgiving,

Christmas, and the rare party. Whether used rarely or used everyday for meals (which may be the case if the kitchen is small), the dining room often becomes more like a home office, a craft room, or a space for writing Christmas cards, doing taxes, and/or doing homework. These alternative activities, as opposed to actual dining, may occur simply in-between meals, or may begin to encroach on the dining space in a more permanent way. The dining room may also contain other furnishings, such as bookshelves (library) or a piano (music room) (**Figure 1.3**). Perhaps the dining room should be redesigned as a multi-functional space in a deliberate, less ad-hoc way.

Figure 1.3 – Left: "Dining" room source: photo by author 2008**; Right: 1960s kitchen** source: Kueber 2011

In the 1960s the kitchen was the housewife's domain (**Figure 1.3**); her telephone was mounted on the wall such that she could complete all her domestic tasks while chatting to her friends; the kitchen was situated such that the housewife could keep an eye on the children, either in the family room or in the backyard (Cieraad 2010, Johnson 2006). The 1960s kitchen was mainly for food preparation, though breakfast would usually be eaten here, and dinner too, if the kitchen was large enough for a proper table. In the 1970s there was a slight change in the use of the kitchen: it was the golden era of processed (i.e. pre-prepared) foods. The first countertop domestic microwave was introduced in 1967 and by the 1970s, it was believed that microwave ovens would become the "primary cooking appliance in the home" (Robertson 2006, Lorence and Pesheck 2009:108); as a result, kitchens shrank. Today, the kitchen has re-expanded and is once again used to prepare wholesome foods (with many appliances, all which require considerable space) as an awareness of healthy eating sweeps through our society (Busch 1999). Additionally,

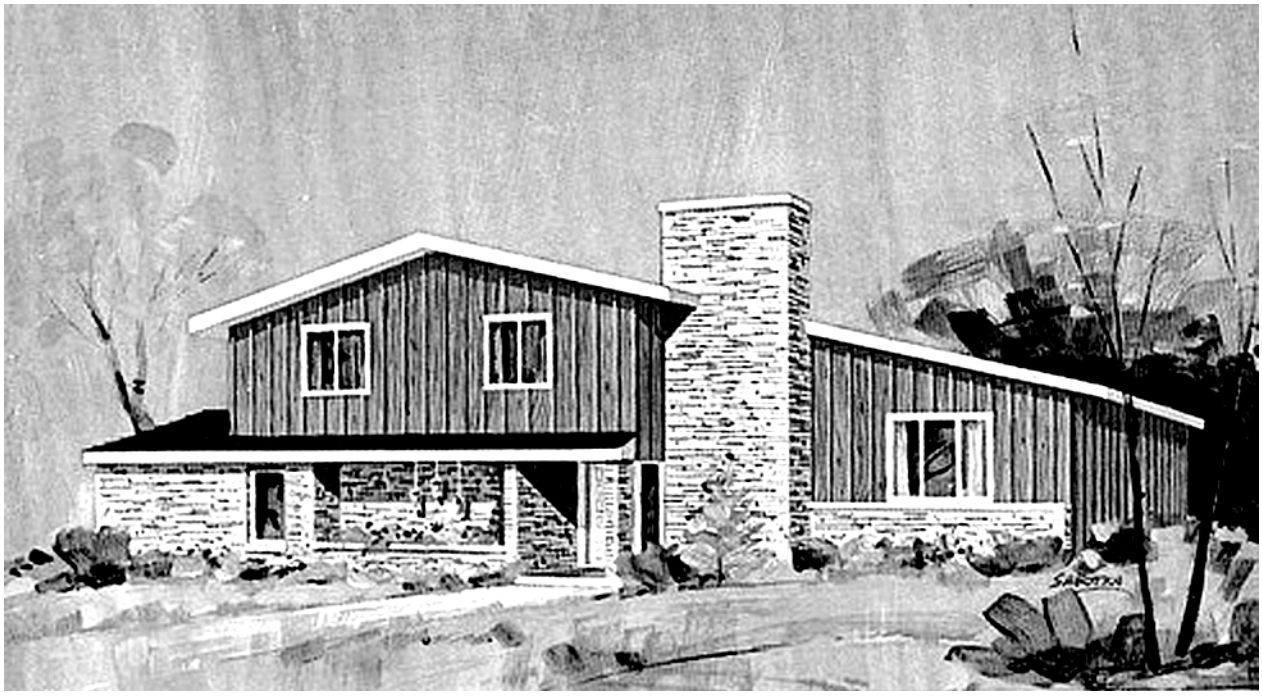
the kitchen is also entirely open to both the living and dining rooms, becoming a social space along with these other two rooms, whose function has always been social. This trend for larger, more social kitchens, such as those found in 2010s houses may be achieved in older houses through the alteration of their interiors.

Many houses from the 1960s, 1970s, and 1980s were built with both a formal living room and an informal family room (**Figure 1.4**). Houses built today combine these two rooms together in the "great room" (**Figure 1.5**). In the 1960s house, the living room was focused on the fireplace while the modern living room is completely focused on the television and media centre. This shift in focal points causes problems in older houses; for example, some people mount the television above the fireplace, while others struggle with the hierarchy between fireplace and television.

New technologies being introduced into homes, such as wireless Internet and laptop computers, and new room uses, such as home offices and exercise rooms, also present problems for room and furniture layouts in 1960s, 1970s, and 1980s homes. While the new uses of the rooms seem incompatible with the way the room was designed, solutions may be found in the rearrangement of interior spaces and their interrelationships.

Part of the solution to the under-used/inefficiently used spaces in 1960s through 1980s houses may be to introduce an open plan for maximum flexibility in the use of space. With an open plan, temporary and/or removable partitions allow users to arrange the interior space, as they like, to suit their current needs, and they can easily be changed as homeowners' needs change.

This research examines and evaluates existing house renovations in the neighbourhood as shown in **Figure 1.6**; for instance, some homeowners have made changes to their houses to expand their living space. One example is the conversion of the garage into an additional room. However, this is not easily done in a house like my parents' because the garage is not attached to the house. With additional expense, the garage could be connected to the house, though this would mean losing the dining room window. Another example is having an extension added either above the garage or to the back of the house. However, this may not be possible for many people because of the prohibitive cost of an addition, which can range from $30,000 to more than $100,000 (Holmes 2006).



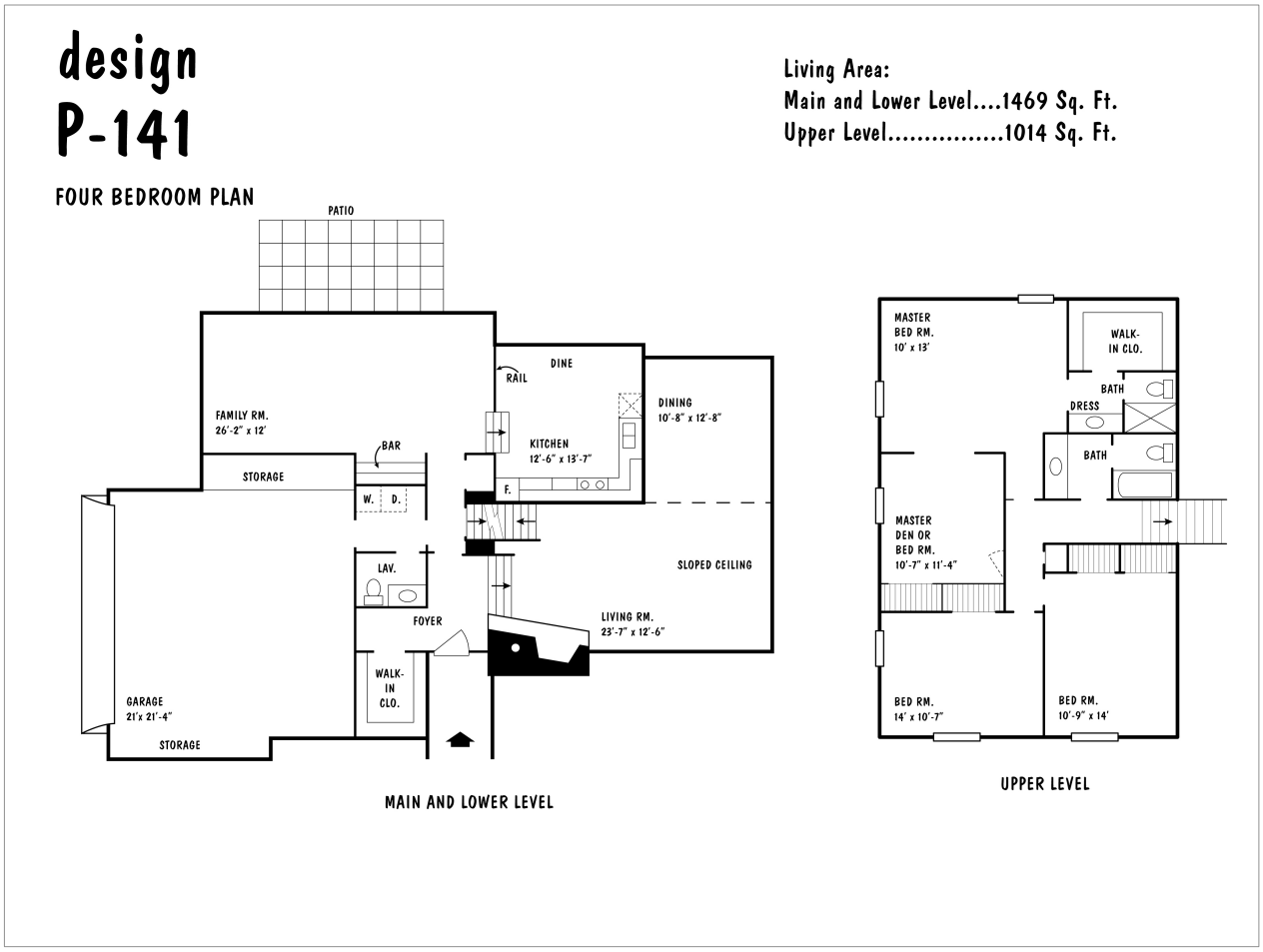


Figure 1.4 – Large split-level house, 1960s source: Ethan 2010 (floor plan redrawn by author)

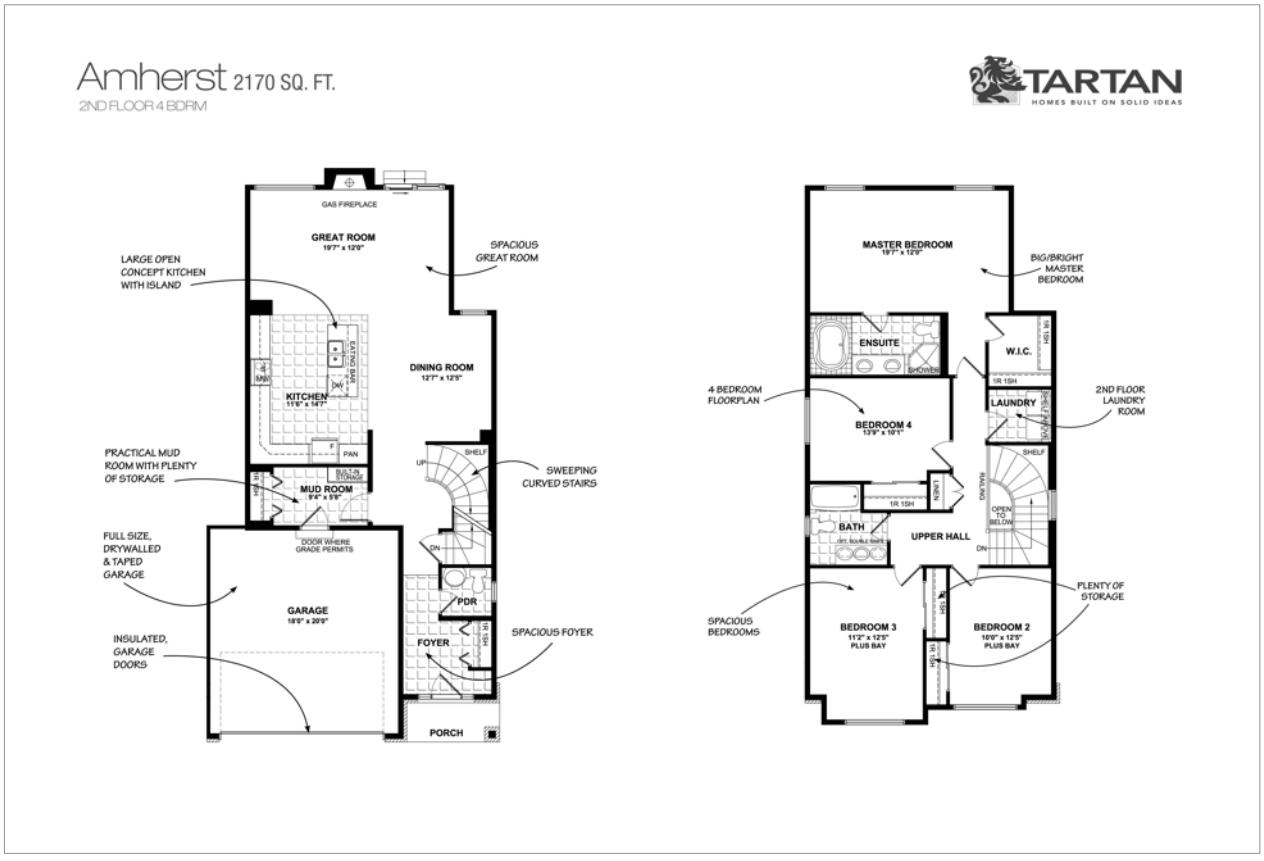


Figure 1.5 – Average two-storey house, 2010s source: Tartan Homes n.d.

Figure 1.6 – Examples of existing house renovations in Convent Glen North; Left: Garage converted to living space; Right: Addition built above garage source: photos by author 2014

Part of the solution to the changing family units that occupy these older houses may be to introduce an accessory unit. Accessory units may be created in basement or upper levels of existing houses in order to address smaller households, the aging population, rental shortages, and increased housing costs (CMHC 1989). Another form of accessory unit, often called a granny flat or a garden suite, is a small, autonomous accessory unit built in the backyard (either attached to or detached from the main house). Such an accessory unit allows for autonomy for an elderly population who would not necessarily be in a position to go up and down the stairs in a basement suite. Special zoning sometimes has to be introduced in order to allow garden suites.

More affordable housing is both inevitable and desirable as housing prices rise far faster than inflation and housing starts to sprawl further and further from city centres. New homeowners buy further and further away from the city due to lower housing costs, in new developments. While affordability has always been a factor for homebuyers, there is also a growing social trend towards sustainability. Densification is one way to address both of these issues.

1.3 Research Question

The research question is useful for delineating a direction for the research as well as for establishing goals and objectives. The starting point for this research is:

> *How can houses built in the 1960s, 1970s, and 1980s be modified affordably and sustainably to accommodate and attract contemporary users whose family units, interactions, and activities continue to evolve?*

A sub-question is: *Are the houses built for the baby boomer generation*[1] *still a viable housing option for today's families?*

1.4 Goals and Objectives

The primary goal of this study is to explore affordable and sustainable modification options for the typical detached and semi-detached single-family home. The objectives of the research are: 1) to explore, through primary source investigation, whether or not these options are viable; 2) to identify which options are the most economical and environmentally friendly; and 3) to ascertain what elements of each option homeowners are actually interested in and willing to adopt.

1.5 Intended Audience

The intended audience of this report is researchers, architects, and policy makers who are interested in and working on renovations for homes that were built in Canada in the 1960s, 1970s, 1980s, and even through the 1990s. The purpose is to create a study that successfully adds to the research and knowledge base in the areas of adaptability, affordability, and sustainability of mid to late twentieth century Canadian housing.

1.6 Methodology

The approach of this research study is through review of existing literature and by way of primary source investigation. The literature review looks at topics and themes including the meaning of home, privacy, gender issues surrounding the home, changing values, changing

[1] The baby boomer generation is defined as those born between 1946 and 1965 (Statistics Canada 2012(c)).

family structures, the effects of interior design, adaptable spaces, homes made for conversion, energy efficiency, and environmental sustainability.

The primary source investigation was conducted at houses of various styles in the Convent Glen North neighbourhood in Ottawa, Ontario (**Section 1.7**) and was comprised of anonymous questionnaires as well as, for interested homeowners, follow-up interviews. The existing conditions and possible solutions were then analysed. The goal of this research is primarily to produce concrete solutions based on findings from the literature review and on homeowners' needs, wants, and financial constraints.

1.7 Scope of Work

The research focuses on the Convent Glen North neighbourhood in Orléans, Ottawa, Ontario (**Figure 1.7**). A brief description of the neighbourhood can be found in Chapter 3. While the neighbourhood context is important in any urban design / architecture project, the report will focus more specifically on the individual house rather than the larger neighbourhood. Houses in this particular neighbourhood have been chosen because of the author's familiarity with the neighbourhood and its role within the larger context of the city, the architecture vernaculars of the area, and the specific common complaints of residents about their houses.

Figure 1.7 – Convent Glen North; Left: Aerial photo of a portion of the neighbourhood source: Google Maps 2013; **Right: Typical street** source: photo by author 2014

Several aspects of the houses are examined: interior design, possible changes to interior layout, updates for energy efficiency and sustainability, precedents of house renovations/ expansions, and accessory units. Because of the limitless number of possible variables, not every option for modification is illuminated and/or explored. Due to the potential size of this research

topic, the report only looks at single detached and semi-detached houses in this specific neighbourhood.

1.8 Research Outline

The many factors that contribute to the need for changes in the 1960s, 1970s, and 1980s houses are outlined in the following chapters of this report. Options for changes are suggested as well.

Chapter 2 provides an analysis of existing literature on topics surrounding the subject of the report, including the meaning of home, changing values, changing family structures, adaptable spaces, and homes made for conversion.

More information is provided in Chapter 3 about possible solutions, including open floor plans, secondary units, and accessory units. Chapter 3 details the primary source investigation through which the research was conducted. The primary source investigation was comprised of questionnaires and interviews, drawings, and analyses of existing conditions and possible solutions.

Chapter 4 completes the report with a summary of the information and key findings, and provides recommendations, insights, and solutions for adaptability, affordability, and sustainability of these older houses and the neighbourhood in which they are found.

CHAPTER 2 – LITERATURE REVIEW

2.1 INTRODUCTION

The primary goal of this study is to explore affordable and sustainable modification options for the typical single-family home. The objectives of the research are to investigate whether or not these options are viable, which options are the most economical and environmentally friendly, and what elements of each option actual homeowners are interested in and willing to adopt.

In order to come up with alternative options for house modifications, it is necessary to understand changes that have happened between the 1960s and the 2010s. Changes have occurred in family demographics and family/home life and activities, as well as in interior design, house design, and the architectural ideals of homes. There have also been notable changes in energy standards and understandings of sustainability. All of these have affected to some degree the way in which homes are used and occupied.

2.2 MEANING OF HOME

The Canadian Oxford Dictionary (2001) defines home as: "The place where one lives permanently, especially as a member of a family or household." While this definition is a good starting point, there are many connotations of the word "home." In addition to being "the place where one lives," "home can … be seen as a centre of emotional significance, of familiarity and belonging" (Sixsmith 1986:282). Homes are not just shelter but also a place where people feel comfortable, where they can relax, and where they can be themselves (Marcus 1995, Ward 1999).

In many ways, home has meant the same thing for centuries: it is shelter, of course, yet it is also a refuge from the outside world, a comfortable place where one can be oneself. "Home" is independent of architectural style as well as socio-demographics. "Home" is a universal concept, regardless of culture, language, etc. (Booth 2012). While the most important meaning of home has not changed from the 1960s to the 2010s, many aspects of how Canadians live and their expectations of what a home is have changed in the last fifty years.

2.3 THE CHANGING CANADIAN LIFESTYLE

2.3.1 PRIVACY

Privacy and notions of personal space may not seem to have changed much in the last forty to fifty years, but there are a few things that indicate a dramatic shift (**Figure 1.2**, page 2). In 1961, the largest percentage of households contained five or more people and the average house size was 149m^2 (1600 sqft). This works out to about 30m^2 (320 sqft) of space per person. In 2011, the largest percentage of households contained only two people and the average house size was 230m^2 (2480 sqft), which is 1.5 times larger than the average house size in 1961. With fewer people living in larger houses, each person gets about 115m^2 (1240 sqft), which is nearly four times the amount of space occupied per person fifty years earlier (Statistics Canada 2012(b)).

Privacy within the home has also changed. In the 1960s and 1970s, the master bedroom was near the other (children's) bedrooms. In newer houses from the 2010s, the master bedroom is somewhat removed from the other bedrooms, with bathrooms, closets, the laundry room, etc. separating the master bedroom from the others (**Figure 2.1**).

With more space and more privacy, people have more opportunities for seclusion and time to pursue individual interests (Ward 1999). Additionally, larger houses provide greater opportunities for activities within the house that formerly would have been located elsewhere (e.g. home theatre and home office). Privacy is also used as a coping mechanism for stress, something that is becoming more and more prevalent in today's society (Radics and Gracanin 2011). Notions and expectations of personal space and privacy have changed over time, due to a variety of factors (e.g. change in lifestyle), and they are both issues that need to be addressed when modifying existing suburban housing.

2.3.2 CHANGING FAMILY STRUCTURE AND DYNAMICS

In the 1960s and continuing into the 1970s, the family was composed of a father, a mother, and several children, also known as the "nuclear family". The man was the breadwinner while the woman was a homemaker (Luxton 2011). Over the last forty years the number of traditional families has declined, and other household arrangements have increased (**Figure 2.2**) (Darling 2005, Statistics Canada 2012(b)).

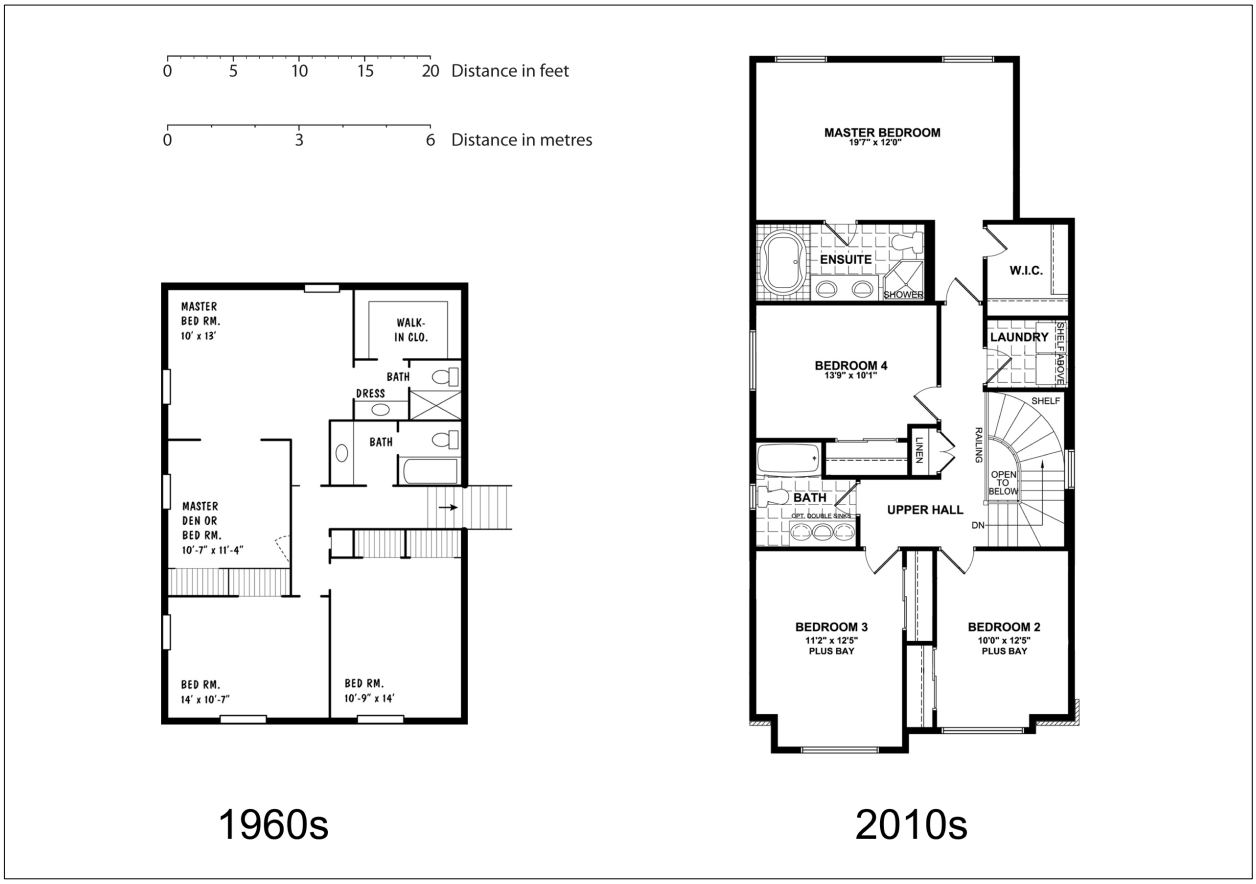


Figure 2.1 – Master bedroom location in relation to the other bedrooms, 1960s vs. 2010s sources: Ethan 2010 (left) and Tartan Homes n.d. (right)

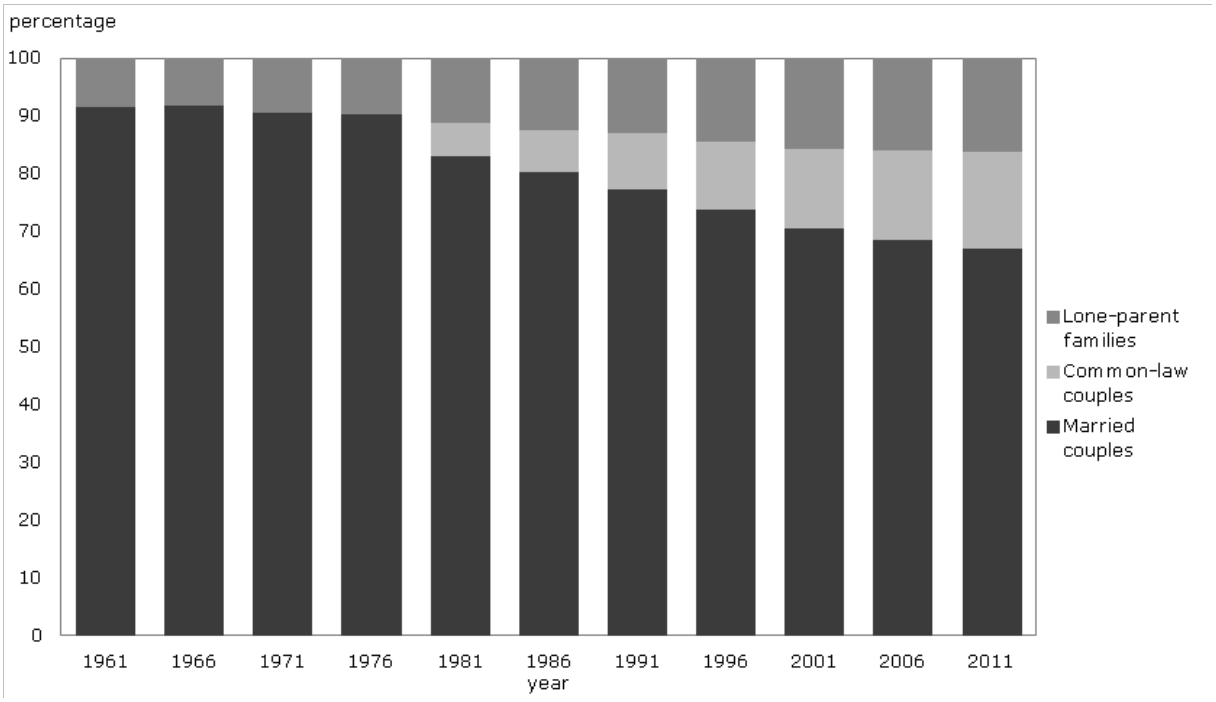


Figure 2.2 – Distribution (%) of census families by family structure, 1961 to 2011 source: Statistics Canada 2012(b)

In addition to married couples, common-law couples, and lone parent families, there are also more multi-generational families: the older population is staying in their homes longer (but often need care) and more young people are staying at home longer – in Canada in 1981 26.9% of young adults (age 20-29) lived with their parents and by 2011 that number rose to 42.3% (in Ontario specifically, 50.6% of young adults still lived with their parents in 2011) (ESDC n.d.(c)). Changing and evolving family units that no longer fit into the traditional definition of "family" are becoming increasingly common, and existing houses will need to be renovated and adapted to accommodate these new families and their needs (Ward 1999). These new family demographics may promote the splitting of homes to accommodate smaller and/or multi-generational families.

Not only have there been changes to family demographics, but also to roles of the occupants within the home. Since the early twentieth century the kitchen especially has been the woman's domain (Cieraad 2010, Ward 1999). During the 1960s and 1970s, while more women joined the workforce, they were still nearly entirely responsible for the running of the household (Statistics Canada 2012(b)). It wasn't until the last decade of the twentieth century that gender began to play a less dominant role in the household hierarchy (Cieraad 2010). In many families today both parents work, which is no longer considered unusual, as well as take on tasks within the home (Gilbert 2005, ESDC n.d.(a)). Women increasingly have been joining the workforce, with about 62% of women working (the percentage of women in the workforce is the same for women with and without children of any age), while men's participation in the workforce has decreased somewhat to about 73% of men working; in 1976, 77.7% of men worked and only 45.7% of women (**Figure 2.3**) (ESDC n.d.(a), Statistics Canada 2014).

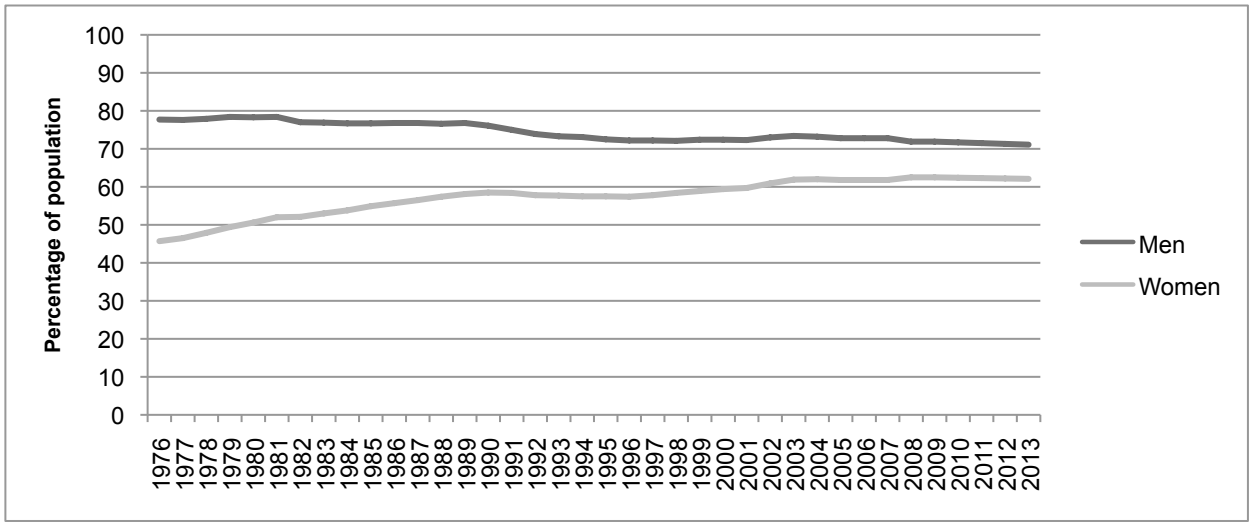


Figure 2.3 – Labour force participation by gender source: ESDC n.d.(a), Statistics Canada 2014 (graphic by author)

There have been many changes to family and personal values starting in the latter half of the twentieth century. These include spending more time with their children, more time telecommuting, more time at work, and more leisure time at home (Pear 2006, OEDC n.d., Statistics Canada 2011). The progression from the twentieth to the twenty-first century has also brought challenges in terms of modern activities within the 20th century home. For example, in the living room (in Ontario), the focus used to be the hearth; that was replaced by the television, which in some ways, has, in turn, been replaced with satellite, watch-on-demand, Netflix, and Internet (Ward 1999). The living room is by no means the only space in the home to be affected by changing family demographics, different home-based activities, and rapidly evolving technology. For instance, an extra bedroom is used as a home office and basement rooms are turned into rec rooms with televisions and video game consoles, and into home-gym rooms.

Figure 2.4 – Living rooms; Left: 1960s source: Kueber 2010; **Right: 2010s** source: HomesDIR 2014

2.4 Adaptable Spaces, Homes Made for Conversion, and Accessory Units

With the changes to family structures and activities in the home, occupants have adapted their houses as best they could out of necessity. The more adaptable and flexible the spaces, the more occupants are able to rearrange interior spaces for efficient use (Ward 1999). Open floor plans are the most adaptable as residents can arrange furniture and install partitions to suit their needs. Adaptable housing, such as the Grow Home and the Next Home, is designed according to

this open floor plan principle in order to be able to adapt to a large variety of different scenarios and to respond to demographic shifts (Friedman 2002).

While houses built in the 1960s, 1970s, and 1980s were not designed to adapt to the homeowners as their families grow and change, lessons and principles from adaptable housing will be important for modifying 1960s, 1970s, and 1980s houses. Adaptable housing should be easily modified for: family transformations, preparing for old age, avoiding unnecessary relocation (avoiding having to move houses), and affording modifications in stages (Friedman 2002). Housing can be adapted by manipulating volumes (i.e. urban configuration, unit typology, condition of attachment, and ground relation), by changing spatial arrangement (i.e. dimensions and proportions, access, and circulation), by adding or dividing spaces, and/or by the manipulation of subcomponents (i.e. façade, structure and assembly, and services) (Friedman 2002).

In 1989 the Canada Mortgage and Housing Corporation came out with a publication entitled, "Made to Convert Housing." Made-to-convert housing is intended to address smaller households, an aging population, rental shortages, and increased housing costs. These housing units are designed as a single, multi-floor unit with the intention that the unit can be divided into two or more smaller units. **Figure 2.5** shows a two-storey suburban house with a secondary basement unit. Another way to adapt existing houses is to add a small secondary unit in the backyard, either attached to or detached from the main house (**Figure 2.6**). Many, if not most, single-family houses built forty to fifty years ago were built with backyards large enough to accommodate a backyard secondary unit.

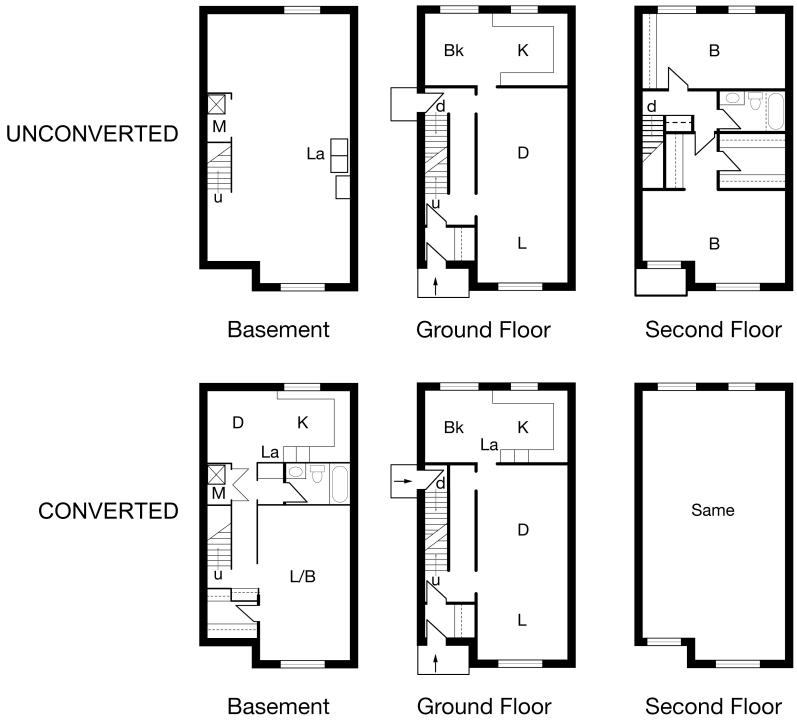


Figure 2.5 – Housing built for basement conversion source: CMHC 1989:23 (redrawn by author)

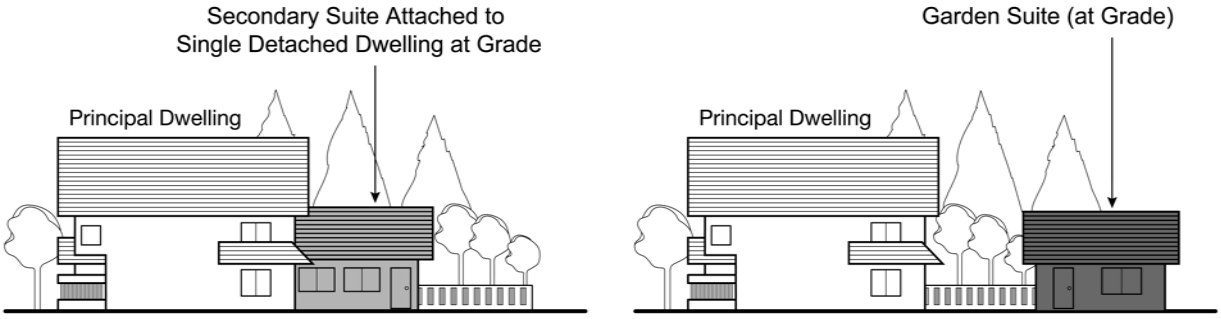


Figure 2.6 – Backyard secondary units source: RDN 2013 (adapted and redrawn by author)

2.5 SUBURBS

2.5.1 TRADITIONAL SUBURBS

The Canadian Oxford Dictionary (2001) defines a suburb as: "a residential district lying originally just beyond or now usually within the boundaries of a city or town." Suburbs are the way of life for 60% of Canadians, but suburbs as we know them did not exist until seventy years ago (Hodge and Gordon 2014).

By 1931, the majority of Canadians lived in urban areas, but urban development and housing construction halted during the Great Depression and during World War II (Hodge and Gordon 2014). In 1946, the Central Mortgage and Housing Corporation (the Canada Mortgage and Housing Corporation, or CMHC, as of 1979) was created to help "house returning war veterans" as well as "administer the National Housing Act and the Home Improvement Loans Guarantee Act, and provide discounting facilities for loan and mortgage companies" (CMHC n.d.).

Marriage rates peaked after the Great Depression and again at the end of WWII (ESDC n.d.(b)). There were also an additional 3.5 million births between 1946 and 1965 – the baby boom (Hodge and Gordon 2014). These new families caused "sudden increases in demand for housing, schools, playgrounds, and health and other social services" (Hodge and Gordon 2014:109).

In the late 1940s on Long Island, New York, real estate developers Levitt & Sons built Levittown, which became the image of mid-century suburban development (**Figure 2.7**). As a result, Levitt & Sons came up with an innovative way to build many homes quickly. Construction of the housing development was set up much like Ford's famous automobile assembly line, with many different work crews, each with a dedicated task (e.g. plumbing, electrical wiring, or roofing) in order to streamline construction and keep costs down (Ruff 2007). "To meet the deadlines, the Levitts divided the building process into 27 separate steps—a mass production technique that would serve the company for years to come. At the top of its game, Levitt & Sons was capable of [completing] one house every 16 minutes" (Ruff 2007). Additionally, after WWII, "people wanted the full package—the affordable house, the new appliances, the suburban lifestyle—and they wanted it right away" (Ruff 2007). Levitt & Sons' assembly-line technique for the construction of suburban developments was adopted across North America.

Figure 2.7 – Levittown, Long Island, New York, 1957 source: Liebowitz 1957

"A suburban single-detached home offered privacy, more space, personal control, green surroundings, and a long-term real estate investment that many families preferred over a rental unit in the city" (Hodge and Gordon 2014). This suburban style of living became possible, not only with Levitt & Sons' affordable construction technique, but also with the advent of mass automobile availability and use. Since suburbs are built on the peripheries of cities, public transportation is often not convenient, and cars are a necessity. Suburban shopping centres (including grocery stores) are surrounded by parking lots and are designed to be reached by car, for convenient transportation of purchases (Ward 1999, Dunham-Jones and Williamson 2009).

In the 1950s, Canadian cities grew in both density and area (Hodge and Gordon 2014). The 1950s suburbs moved away from the standard bungalows of the 1940s towards more "spacious, convenient, and modern living" (CMHC n.d.). The "CMHC introduced Mortgage Loan Insurance, taking on mortgage risks with a 25% down payment, making home ownership more accessible to Canadians" (CMHC n.d.).

In the 1960s, "houses became bigger and, for the first time, incorporat[ed] the basement as living space." "During the 1970s, affordability became a major factor in the home buying process" (CMHC n.d.). The marriage rates rose in the 1970s (ESDC n.d.(b)) and the baby boomers were buying houses. "To help make housing more affordable, builders reduced lot sizes and increased the density of developments" (CMHC n.d.). Houses got larger and "more luxurious" in the 1980s and "research and development [was being conducted] on indoor air

quality, ventilation, and moisture" (CMHC n.d.). Since then, research has continued in areas of energy efficiency, resource conservation, and environmental sustainability.

2.5.2 Alternatives to Traditional Suburb Design

In the last two decades of the twentieth century, suburbs began to lose some of their sheen. Suburbs came to be regarded as "lacking the excitement, diversity, culture, or sophistication of residents or life in the city" (Canadian Oxford Dictionary 2001: "suburban"). Suburbs began to expand, creating unpopular "urban sprawl." Additionally, traditional suburbs are designed without mixed uses (i.e. only residential, with specific areas with stores and schools), built for a single income bracket, and with the assumption that everybody will drive everywhere (Duany, Plater-Zyberk, and Speck 2000). "Some suburban streets began to resemble a wall of garage doors" (Hodge and Gordon 2014:119). "The conventional design of subdivisions over the past four to five decades has tended toward curvilinear streets and cul-de-sacs bounded by arterial roads" (Hodge and Gordon 2014:279). Most North American subdivisions look like "collections of individual homes rather than true neighbourhoods" (Duany, Plater-Zyberk, and Speck 2000:111). "Lower-density suburban family housing is popular but unsustainable" (Kochan, 2007).

In the 1980s and 1990s there was a move towards more traditional neighbourhood developments, notably the Congress for the New Urbanism (CNU) founded by Andres Duany, Peter Calthorpe, Elizabeth Moule, Elizabeth Plater-Zyberk, Stefanos Polyzoides and Dan Solomon (CNU n.d). The New Urbanism promotes "walkable, mixed-use neighbourhood development, sustainable communities, and healthier living conditions" (CNU n.d). The principles of New Urbanism are: walkability, connectivity, mixed-use and diversity, mixed housing, quality architecture and urban design, traditional neighbourhood structure, increased density, green transportation, sustainability, and quality of life (New Urbanism n.d.).

The New Urbanism bases its design principles on pre-automobile societies, with "traditional architecture and building patterns that facilitate walking and that create strong urban identities" (Grant 2006:3). "New urbanism challenged conventional subdivision design…to revert to a modified, traditional gridiron of streets, to mix housing types, and to produce more compact, less land-consuming residential areas" (Hodge and Gordon 2014:279).

However, New Urbanism has sometimes been regarded as looking only to the past and not planning for the future. Additionally, New Urbanism has been criticised as having little affordable housing in practice and creating homogeneous neighbourhoods (although not intentionally, as one of the principles is diversity of people) as well as not being accessible, with narrow, multi-storey units (difficult for the aging population) (Hodge and Gordon 2014).

An alternative to the New Urbanism emerged, called Smart Growth. "Smart Growth refers to land use and development practices that limit costly urban sprawl, use tax dollars more efficiently, and create more liveable communities" (Curran 2003 qtd. in Tomalty and Alexander 2005:1). The principles of Smart Growth are not dissimilar to the principles of the New Urbanism. However, they do address the shortfalls of New Urbanism:

> "denser, mixed-use development in greenfield areas [only when it is necessary to build a new development]; intensify the existing fabric [wherever possible] rather than expand into greenfield areas; take advantage of specific intensification opportunities; increase transportation choice and reduce car usage; increase supply of new affordable housing; improve range of housing types; preserve agricultural lands; preserve lands essential to maintaining regional ecosystem functions; direct employment to strengthen the core and designated sub-centres; and provide infrastructure to reduce ecological impacts of development" (Tomalty and Alexander 2005:4).

2.6 Sustainability and Energy Efficiency

While there is a move towards more sustainable neighbourhood designs, existing neighbourhoods can decrease their environmental impact both through using sustainable energy sources as well as through updates and renovations to the homes to increase energy efficiency.

2.6.1 Sustainability

The general, widely used definition of sustainability is "Development which meets the needs of the present, without compromising the ability of future generations to meet their own needs" (Brundtland 1987 qtd. in Basiago 1995:110).

> "Broadly speaking, 'sustainability' is embodied in four principles: futurity (a concern for the welfare of future generations), equity (the fair sharing of economic benefits and burdens within and between generations), global environmentalism (a recognition of the

global dimension of ecological problems associated with use or depletion of natural capital by one or some at the cost of others), and biodiversity (the maintenance of the integrity of ecological processes and systems)" (Basiago 1995:118).

Suburbs must be allowed to adapt and change (urban revitalization) in order to comfortably accommodate future generations. As they stand today, the burdens of the suburbs appear to outweigh the benefits. Benefits of the suburbs include more green space and privacy. The burdens, the aspects of suburbs that will need to change in order for them to remain a viable and sustainable option for future generations, include: aging infrastructure; "car-centric" design, which adds to the depletion of fossil fuels and increased air pollution; skyrocketing housing prices create the need for new residential developments in greenfields far away from city centres, which makes them a more affordable housing option, yet increases urban sprawl and dependency on vehicles; and an overuse of energy sources (electricity and water) to support consumer lifestyles. Suburbs can be designed or adapted to be more sustainable through integrating more renewable energy sources, reducing the dependency on cars through a more efficient public transportation system along with more opportunities for active transportation (walk or cycle), increasing density, and preserving greenfields.

2.6.2 SUSTAINABLE ENERGY

"[Sustainable energy's] popularity…depends on what the public perceives as economical" (Kelley 2008:147).

Solar energy

Photovoltaic cells silently generate electricity from sunlight and create no noise pollution (Kelley 2008). Modular photovoltaic panels are installed on roofs or in fields, either on a static stand, facing south, or on a pivoting system where the panels follow the sun. In the summertime (solar zenith), solar panels can be used to completely offset the operation of air conditioning units (Kelley 2008). In the winter, sunlight reflects off the snow and increases solar panel production, and, counter-intuitively, "panels operate more efficiently in cooler temperatures" (Kelley 2008:141). After initial purchase expense and worries that they will not work in the winter due to snowfall (Hamilton 2011), the other arguments for not installing solar panels are that their production uses too many natural resources (however, the primary material in solar panels is

silicon, the same non-toxic material that is used to make glass, and "one of the most common elements on Earth") (Kelley 2008:141), and that the amount of energy generated will never recoup the amount of energy used to make the solar panel (however, "the amount of energy used in producing the cells and other components, including the panel and mounting frames, will take the panel under two and a half years to generate once it is installed") (Kelley 2008:141).

Solar water heating systems are installed on roofs. The principles of solar water heating are to "heat as much water as possible while the sun is available" and to "keep the water hot after the sun goes down" (Kelley 2008:144). In North America, the two most common uses are for domestic hot water and for swimming pools. The most common argument for not installing this kind of system in Canada is that the pipes will freeze and break over the winter. However, these systems are protected against freezing by "[using] a heat exchanger in the storage tank and antifreeze circulates in a closed loop pipe between the solar collectors. The collector pipes are encased in glass vacuum tube that reduce the heat loss" (Kelley 2008:148).

Passive solar heating refers to using solar energy to heat the interior spaces of a building – the sun, just by coming in the windows, heats the room (Ching 2008, Kelley 2008) and the heat is then stored in a thermal mass (often concrete) and released slowly into the space over the course of the night. Buildings designed with passive solar heating systems are oriented with a southern exposure in order to take advantage of the angles of the sun throughout the year. This kind of system will not work for suburban retrofits – suburbs were built with no consideration to solar orientation, only to maximize the number of houses on a given parcel of land. Even for houses built with accidental southern window exposure, these wood-frame houses are not built with thermal masses (usually concrete), and would be difficult and costly to retrofit.

Wind power

Wind power is harnessed through turbines and generators that convert the kinetic energy of wind into electricity (Ching 2008). Small wind turbines (1-3 watt generators) can be used to power homes, and this was common for farmhouses in the United States until the 1950s (Kelley 2008). The major concerns over wind turbines (small or large) are the aesthetics (many people find them extremely ugly), noise, and the danger to birds (this has been mitigated since the first wind farms were built in the 1970s) (Ching 2008, Kelley 2008).

Hydropower

60% of Canada's electricity generation comes from hydropower. Hydroelectric power is created when river water stored behind a dam is released though a channel to a turbine, which generates electricity (CHA 2014, Ching 2008). No water is consumed, wasted, or lost in the generation of hydropower. Hydropower is the most efficient source of electrical energy, as it converts over 90% of available energy into electricity (CHA 2014). "The primary advantage of hydropower, beyond its lack of carbon emissions, is that its production can easily be controlled to keep pace with demand" (Kelley 2008:174). Hydropower is an excellent source of renewable, sustainable energy for cities, but it is not practical, and usually not even possible, as a source of energy for individual homes.

Geothermal

Geothermal energy (the earth's internal heat) can be used for heating and cooling. The sun heats the earth's surface throughout the year and the ground maintains a constant temperature of 10-15°C (50-60°F) several feet below the surface (GeoSmart Energy 2012, Ching 2008). Geothermal systems use this constant temperature by "combining a series of loops installed outside underground with a heat pump system inside that looks very similar to a conventional furnace" (GeoSmart Energy 2012, Kelley 2008:171). In urban areas, closed vertical loops, 55-165m (180-540ft) deep, are installed (rather than horizontal, pond/lake, or open loops, all of which work better in rural settings) because they do not require too much land (GeoSmart Energy 2012).

Water (or an antifreeze solution) transfers the temperature from the earth through the closed loop system into the heat pump inside the building. The water then returns through the loop system to be reheated by the earth. "In the winter, the heat pump acts as a furnace, distributing the heat using the system's heat exchanger and compressor. In the summer, it acts as an air conditioner, collecting the heat from [indoors and] distributing it into [the] domestic hot water tank or back into the earth through the loop system" (GeoSmart Energy 2012). Geothermal systems use much less electricity than "standard electric heating and cooling systems because they rely on the consistency of the underground temperature and are not called upon to deal with extreme heat or cold" (Kelley 2008:173).

2.6.3 Energy Efficiency

Retrofitting existing homes to be more environmentally sustainable and energy efficient begins with sealing drafts and improving insulation. Houses built between the 1950s and the 1980s are relatively drafty and not well insulated, which both result in higher heat losses and higher heating/cooling bills (CMHC 2012).

The air leakage can be determined with a blower door test. A blower door test is conducted by mounting a variable-speed fan in an adjustable panel in an exterior door of the house. The fan draws air out of the house at a constant speed, which causes air to flow into the house through openings or cracks in the structure. The air leakage is measured by the rate of airflow required to keep the house at a constant pressure (CHBA 2011).

One of the ways to decrease air leakage, improve insulation, and improve energy efficiency (by decreasing the leakage of conditioned air) is by replacing original windows and doors. In part, simply replacing the doors and windows, and sealing around the doors and windows more effectively than the original construction, will help to decrease air leakage. However, houses built as recently as the 1980s had wood, single-glazed windows. By replacing these with double or triple glazing, the windows have a higher thermal insulation value. Double or triple glazing consists of two or three sheets of glass respectively with a hermetically sealed air space between the sheets. The air space is often filled with an inert gas, such as argon.

Energy efficiency will also be improved by replacing original appliances (including furnace and air conditioner) with Energy Star (see below) rated appliances, windows, HVAC (heating, ventilation, and air conditioning) systems, light bulbs, etc. For example, "today, an Energy Star clothes washer uses about 70% less energy and 75% less water than a standard washer used 20 years ago" (EPA n.d.). Energy Star was created in 1992 by the U.S. Environmental Protection Agency as a voluntary labelling program for identifying and promoting energy-efficient products in order to reduce greenhouse gas emissions (EPA n.d.). In 2001 Canada (through Natural Resources Canada) became an international Energy Star partner (NRCan May 2014). Energy Star products are third-party certified. In addition to using Energy Star identifications of high efficiency products, Canada also uses its own *Energy Efficiency Regulations* (to set minimum energy performance standards) and EnerGuide, which is Canada's version of Energy Star, but applies only to "major appliances, room air conditioners, and some heating and ventilating equipment" (NRCan May 2014).

Another way in which homes can be retrofitted is to reduce the consumption of water. Firstly, low flow or dual flush toilets can be installed in older homes to reduce water consumption. Standard toilets consume 13L of water per flush (the norm until nearly the turn of the millennium) while low-flow toilets use 6L, and dual flush toilets use either 3L or 6L per flush, depending on which button is pushed. Secondly, to reduce water consumption further, rain barrels can be installed outdoors to collect water to use in the garden. Thirdly, a greywater system could be retrofitted into houses to decrease water consumption. Greywater is the wastewater from sinks, baths, showers, and washing machines (water from kitchen sinks and dishwashers is often excluded from greywater due to the concentration of food particles and grease; wastewater from toilets is blackwater). Greywater systems treat/ filter and recycle greywater for use in toilets and in gardens (Ching 2008). Greywater recycling can reduce water usage by up to 40% (Langston 2012). Greywater storage tanks can be installed in the house, but smaller scale systems can also be installed, where lavatory sink water is filtered and disinfected in a small tank under the sink then pumped into the toilet reservoir (Sloan 2010).

2.7 CONCLUSION

Understanding the changes that have occurred in family demographics, family activities, house designs, comfort, and environmental awareness is key for exploring affordable and sustainable modification options for the typical single-family home. However, these ideas cannot be integrated into a neighbourhood without community support, and research conducted in an existing suburban neighbourhood built in the 1960s to 1980s will provide a better understanding of how different factors have and continue to change the neighbourhood.

Current homeowners will be able to provide insight as to their definition of home, their views on privacy in and around the home, how their family structure and dynamics have changed over time, and how they have adapted their houses to address these needs. Additionally, measures homeowners have taken to make their homes more sustainable and energy efficient, as well as their use of sustainable energy sources, will reveal popular opinion and knowledge level of advances made in these areas since the 1960s to 1980s.

CHAPTER 3 – PRIMARY SOURCE INVESTIGATION

3.1 INTRODUCTION

The purpose of this study is to identify strategies for affordable modifications to single-family homes, either detached or semi-detached. For this study, we primarily focus on those modifications that would increase energy efficiency and sustainability and would provide more affordable housing options in the neighbourhood. It considers what options are viable, what the typical resident can afford, and what elements of each option actual homeowners are interested in and willing to adopt.

More specifically, the study aims to validate the assumptions made in Chapter 2. First, how much have family units actually changed in the last forty to fifty years? How have demographics changed? Who lives in older suburbs today as compared to those who lived there originally? Second, how are rooms being used? Are they being used for their originally intended purposes? What activities take place in the home now that previously did not? Third, what kinds of modifications have been made or are planned to be made, either to accommodate new activities or to increase energy efficiency and environmental sustainability? Last, are the current occupants interested in adding accessory units to their homes? What are other options for tackling issues of affordability, adaptability, densification, and urban sprawl?

3.2 METHODOLOGY

I delivered over 2,100 letters of invitation to participate in an anonymous questionnaire (and if they wanted, also a home-interview). These invitations went to single-detached and semi-detached houses in Convent Glen North. The letter asked that interested residents contact me by phone, text message, or email to request a questionnaire. I received 231 requests for questionnaires and delivered 225 (six requests were made past the deadline for requesting a questionnaire) pre-addressed, stamped envelopes each containing an anonymous questionnaire and consent form, which, as per McGill's Research Ethics Board, did not have to be signed due to the anonymity of the questionnaire. I received 186 questionnaires back; one of those was blank (return rate of 82%). The anonymous questionnaire consisted of a total of twenty-six questions in five sections with questions about demographics, past/present/future/dream renovations, and options for modifications for affordable housing and densification. The questionnaire can be found in **Appendix 1**. Once the questionnaires were returned, they were

removed from the envelopes and numbered in the order they were received. The questionnaire responses were then entered into Excel spreadsheets for ease of data analysis.

Follow-up interviews questions were devised based on results from questionnaire data, including questions about sustainable energy use (mostly questions about energy efficiency and sustainability because many respondents had not mentioned anything in the questionnaire besides replacing windows/doors and furnace/A/C) and additional solutions for affordable housing for the neighbourhood. Approximately twenty people initially expressed interest in a follow-up interview, but only seven people have consented and answered questions. Like the responses to the questionnaires, this information was entered into Excel spreadsheets.

3.3 THE STUDY NEIGHBOURHOOD

The research was focused in Convent Glen North, Orléans, Ottawa, Ontario (Highway 174 splits the neighbourhood into North and South) (**Figures 3.1-3.2**). It is Orléans' most north-westerly neighbourhood. I chose this as the study neighbourhood as I grew up here and lived here for nearly twenty years, and I am very familiar with the neighbourhood as well as its context within the City of Ottawa.

Orléans was originally the francophone parish of St. Joseph d'Orléans, which was founded in 1860 and was granted an official post office (Elizondo 2010). In 1922 St. Joseph d'Orléans (thought to be named after Ile d'Orléans in Quebec) became an incorporated police village, meaning that it became semi-autonomous from the Gloucester Township, with its own municipal police force (Elizondo 2010). Orléans became part of the Regional Municipality of Ottawa-Carleton in 1974 and in 2001 it was amalgamated into the City of Ottawa (**Figure 3.3**). Orléans is recognised by the Government of Ontario as being spelled with an acute accent on the "e" (Gilbert and Tremblay 2007).

In 1885 the Grey Sisters of Charity of Ottawa bought 202 hectares (500 acres) of farmland, where the neighbourhood of Convent Glen is now located. The Sisters built the Saint-Louis Residence (a continuing-care seniors' residence, **Figure 3.4**) in 1953, and in 1970 they sold the rest of the land "to the Costain and Minto developers who built a large residential development and named it 'Convent Glen' in honour of the sisters" (Elizondo 2010:5).

Figure 3.1 – Convent Glen North source: photos by author 2014

Figure 3.2 – Convent Glen North source: photos by author 2014

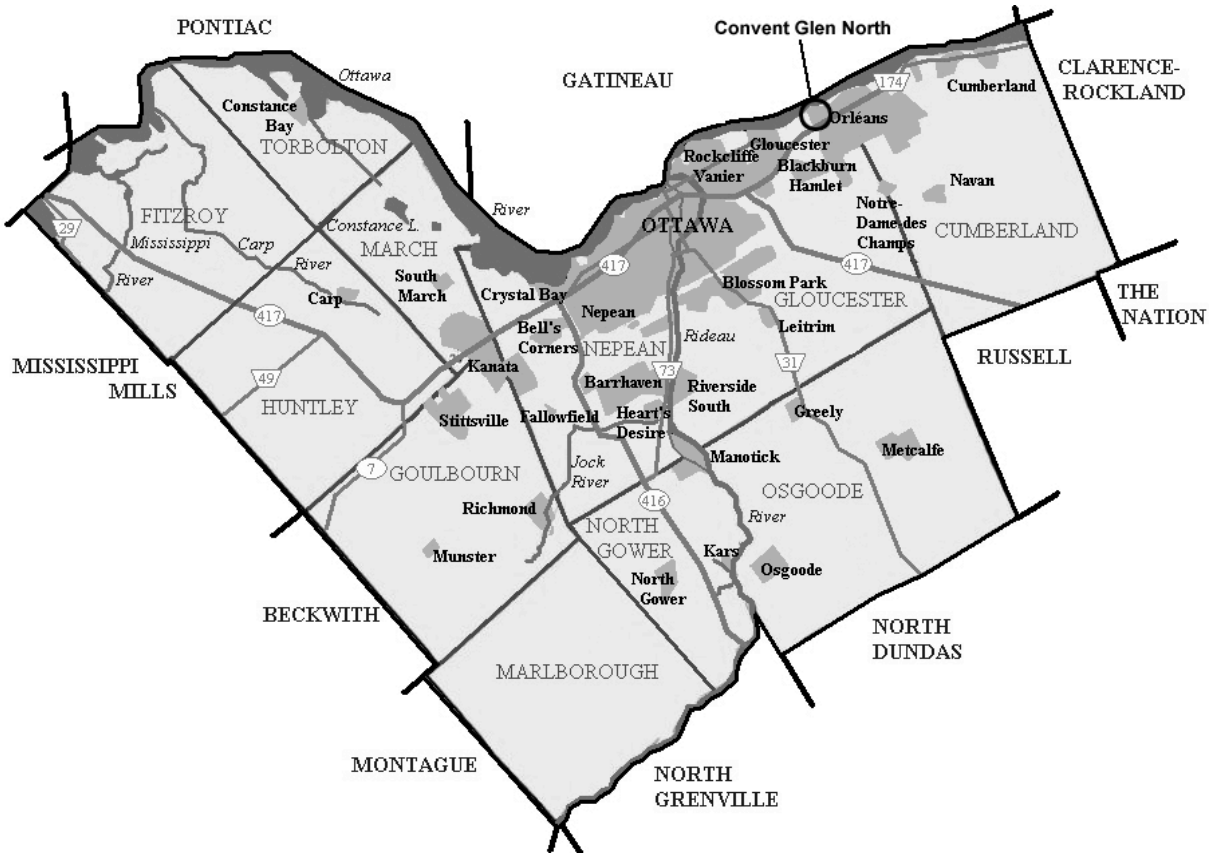


Figure 3.3 – Incorporated City of Ottawa (incorporated municipalities are highlighted) source: Wikipedia 2005

In 1971 the population of Orléans was 6,000; 24,000 in 1981; and almost 108,000 by 2011 (Gilbert and Tremblay 2007). Orléans is connected to downtown Ottawa by Highway 174 (which joins Hwy 417), and it has become a bedroom community of Ottawa, with the same street and house designs throughout, which "[reflect] the socioeconomic homogeneity of its residents" (Gilbert and Tremblay 2007).

The residential areas of Convent Glen North (**Figure 3.4**) were surveyed by H.J. Martin of Farley & Martin Ltd. for Costain Estates Limited (H.J. Martin 1975) based on principles from the Radburn, New Jersey, USA plan, which was designed by Clarence Stein and Henry Wright in 1928 (Hodge and Gordon 2014). The principles of this design include: "the superblock … with major roads on the perimeter so that through traffic would not intrude into housing groups, extensive use of cul-de-sacs [and crescents], and parks as the backbone of the neighbourhood, with open space left in the centre of superblocks and joined from one to the other in a continuous park" (Hodge and Gordon 2014:82-83).

The majority of Convent Glen North is zoned as R1W or R1WW[2] (detached houses), with several streets zoned as R2C or R2N[3] (some detached but mostly semi-detached houses) and R3Y (row houses) (City of Ottawa 2014, City of Ottawa n.d.(c), City of Ottawa n.d.(d)). Due to the need to focus the study, only residents of detached and semi-detached houses were invited to take part in this research. R1 subzone conditions can be found in **Table A.1**. R2 subzone conditions can be found in **Table A.2**. Both tables can be found in **Appendix 2.**

While Convent Glen North was designed as a car-centric neighbourhood, cars are by no means the only way to get around. Based on the website Walk Score (2014), Orléans has a "walk score" of 54/100 ("somewhat walkable: some errands can be accomplished on foot"), a "bike score" of 83/100 ("very bikeable: flat as a pancake, excellent bike lanes; biking is convenient for most trips"). The Ottawa River Pathway (not open to motor vehicles) runs along the Ottawa River and is often used by cyclists as well as dog walkers, roller bladders, joggers, and walkers, and it passes through Convent Glen North (**Figure 3.5**).

[2] R1 zoning allows: bed and breakfast; community garden; **detached dwelling**; diplomatic mission; group home; home-based business; home-based daycare; park; retirement home, converted; and *secondary dwelling unit*.

[3] R2 zoning allows: bed and breakfast; community garden; **detached dwelling**; diplomatic mission; duplex dwelling; group home; home-based business; home-based daycare; **linked-detached dwelling**; park; retirement home, converted; *secondary dwelling unit*; and **semi-detached dwelling**.

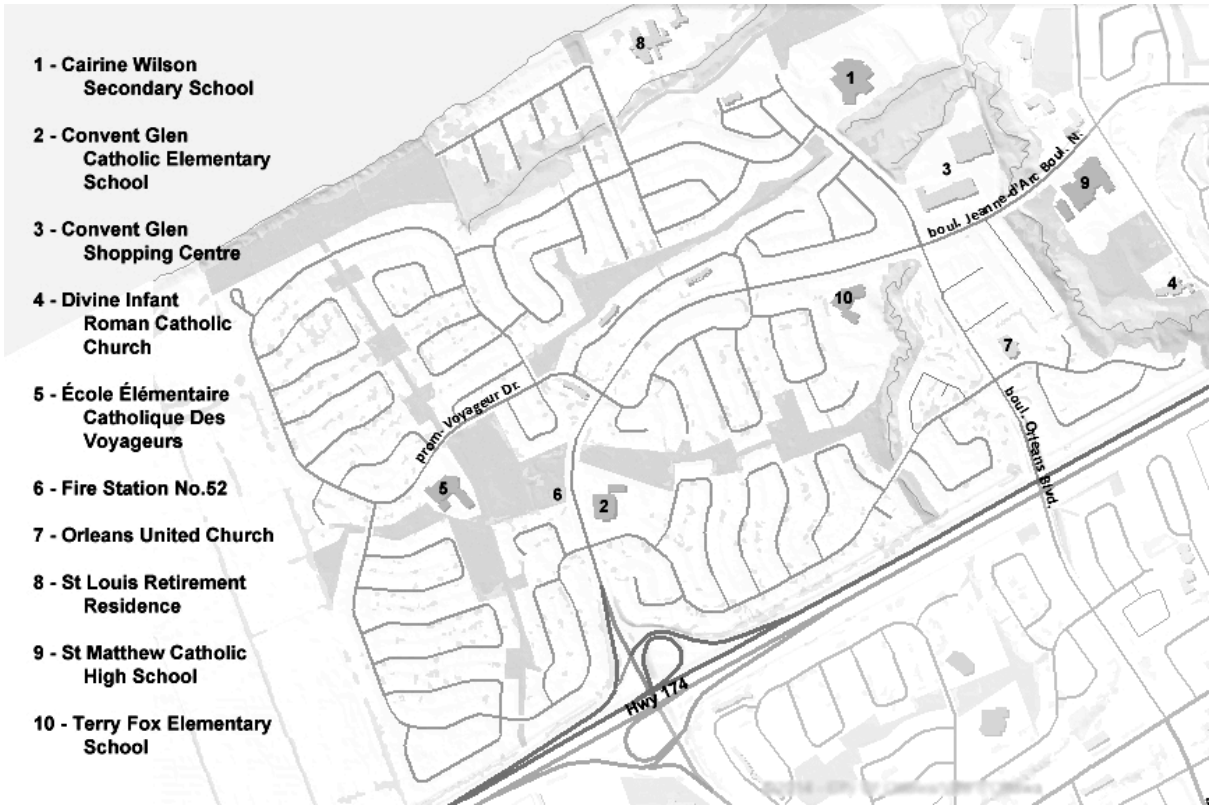


Figure 3.4 – Radburn-like plan of Convent Glen North (cul-de-sacs, crescents; parks as backbone) source: City of Ottawa 2014 (labels added by author)

Figure 3.5 – Bike paths in Convent Glen North source: adapted from Walk Score 2014

Orléans has a "transit score" of 48/100 ("some transit: few nearby public transportation options") (Walk Score 2014). However, the designation of "few nearby public transportation options" is not necessarily accurate: "Ottawa [has] developed North America's most effective busway rapid transit system [OC Transpo]" (Hodge and Gordon 2014:130). OC Transpo extended city bus service to Orléans in 1972 when Convent Glen began to be built (Elizondo 2010).

The main OC Transpo Transitway begins in the east end of Orléans (runs along Hwy 174) and passes through downtown Ottawa, then continues south-west. Jeanne d'Arc Transitway Station is no more than a ten to fifteen minute walk from most houses in Convent Glen North, and there are five local and express buses (**Figure 3.6**) that run through the neighbourhood that also stop at Jeanne d'Arc station (**Figure 3.7**). Bus route 95 runs along the Transitway, with a bus arriving every three minutes during morning and afternoon rush hours and every six minutes during the rest of the weekday (OC Transpo 2014), and on this bus route, from Jeanne d'Arc Station, commuters can travel downtown in twenty-five minutes, even in rush hour (without transferring buses) (**Figure 3.8**).

Figure 3.6 – OC Transpo express bus in Convent Glen North source: photo by author 2014

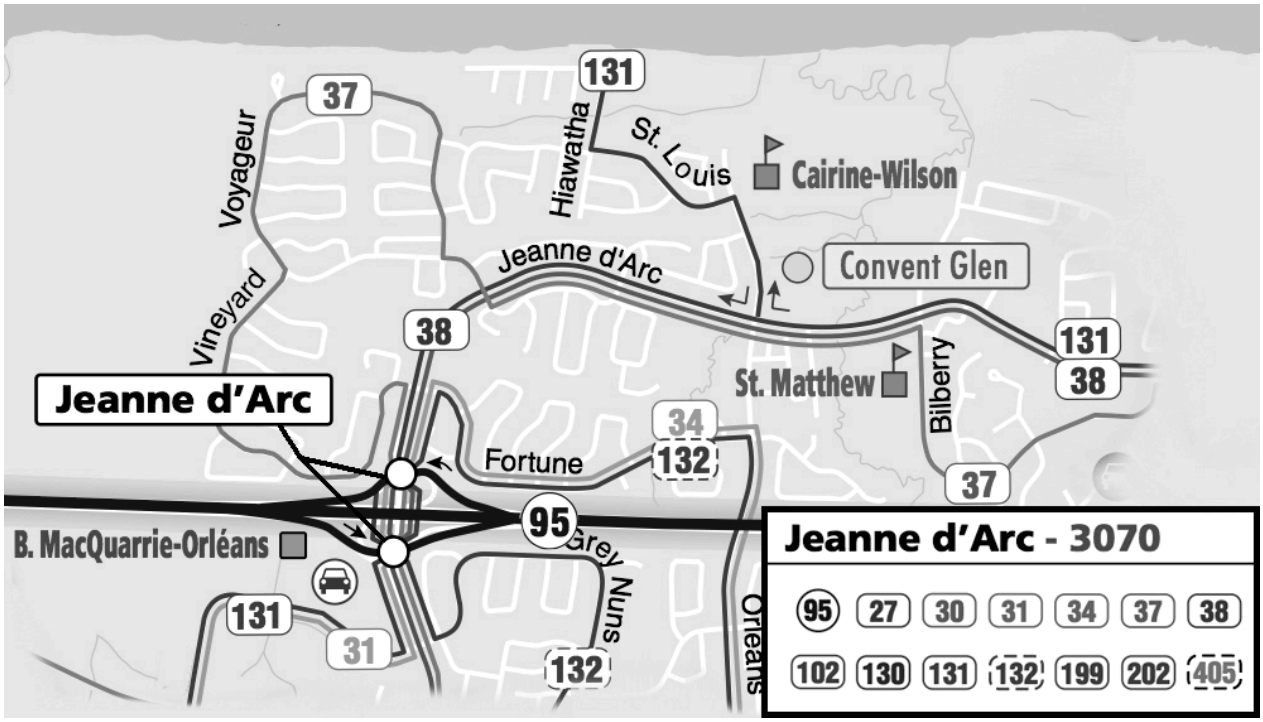


Figure 3.7 – OC Transpo bus routes in Convent Glen North source: OC Transpo 2013

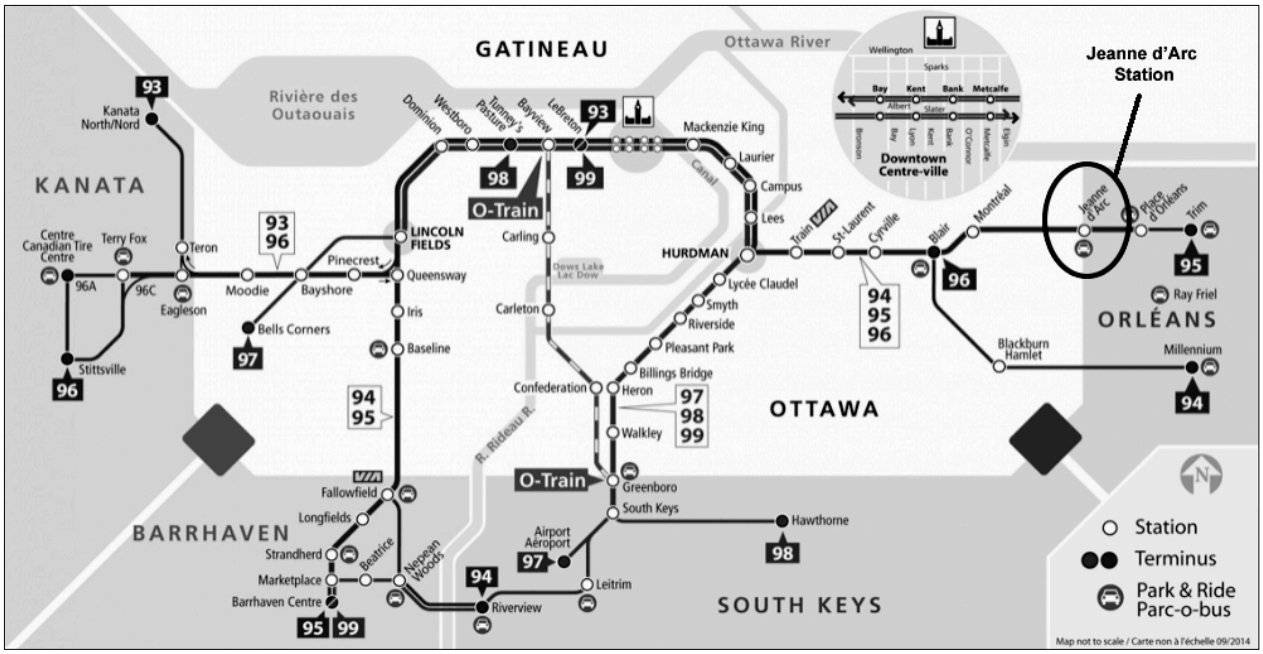


Figure 3.8 – OC Transpo Transitway source: OC Transpo n.d.

The average household income in 2005 in Ottawa was approximately $85,100, and approximately $99,800 in Orléans (City of Ottawa 2006).[4] In Ottawa, 20% of households spend 30% or more of household income on shelter-related expenses, while only 14% do in Orléans (Statistics Canada 2012(a)). In Ottawa, 34% of residences are rented compared to only 8% in Orléans (Statistics Canada 2012(a)). Orléans is composed of mostly single-detached houses and was largely built in the 1970s and 1980s (**Figure 3.9**).

Until the housing boom of the 1970s, Orléans was almost entirely Francophone. After that, Anglophones began to (and continue to) outnumber the Francophones in Orléans (Elizondo 2010). As of the 2011 Census, only 30% of Orléans residents have French as their mother tongue (**Figure 3.10**). Although Anglophones outnumber Francophones two to one, this is not apparent in the neighbourhood. Many Francophone professional offices and Francophone-owned businesses are located on St. Joseph Blvd, Orléans' main street and the centre of the old village of St. Joseph d'Orléans (Gilbert and Tremblay 2007). There are many cultural programs and facilities that serve the Francophone community (Gilbert and Tremblay 2007). These include healthcare services, daycares, elementary schools, high schools, and the Alphonse-Desjardins Campus of the Cité Collégiale Trades Centre (Gilbert and Tremblay 2007, Elizondo 2010). There are also sports (especially soccer programs), leisure, and cultural activities, many of which are organised by the Mouvement d'implication francophone d'Orléans (MIFO), and Empire Theatres hosts the *Festival du film francophone d'Orléans* (Gilbert and Tremblay 2007).

Anglophones and Francophones occupy the neighbourhoods evenly – there are no "English" or "French" neighbourhoods. "In a survey by University of Ottawa researchers in the 1990s, Francophones stressed that their neighbourhoods were bilingual" (Gilbert and Tremblay 2007). Orléans has a "bilingual identity" (Gilbert and Tremblay 2007), and this fits with my personal observations and impressions of the neighbourhood: anywhere you go, you hear French as often as English; everyone speaks English, whether it is their mother tongue or not; and if children do not go to a Francophone school, many are in a French-immersion program (where the school day is almost entirely in French, but the parent-teacher meetings are in English). At Terry Fox Elementary School (TFES), the public school in Convent Glen North, an average of 74% of students are in the Early French Immersion program, and 26% in the English program (TFES 2009).

[4] More recent statistics are not available for Orléans specifically

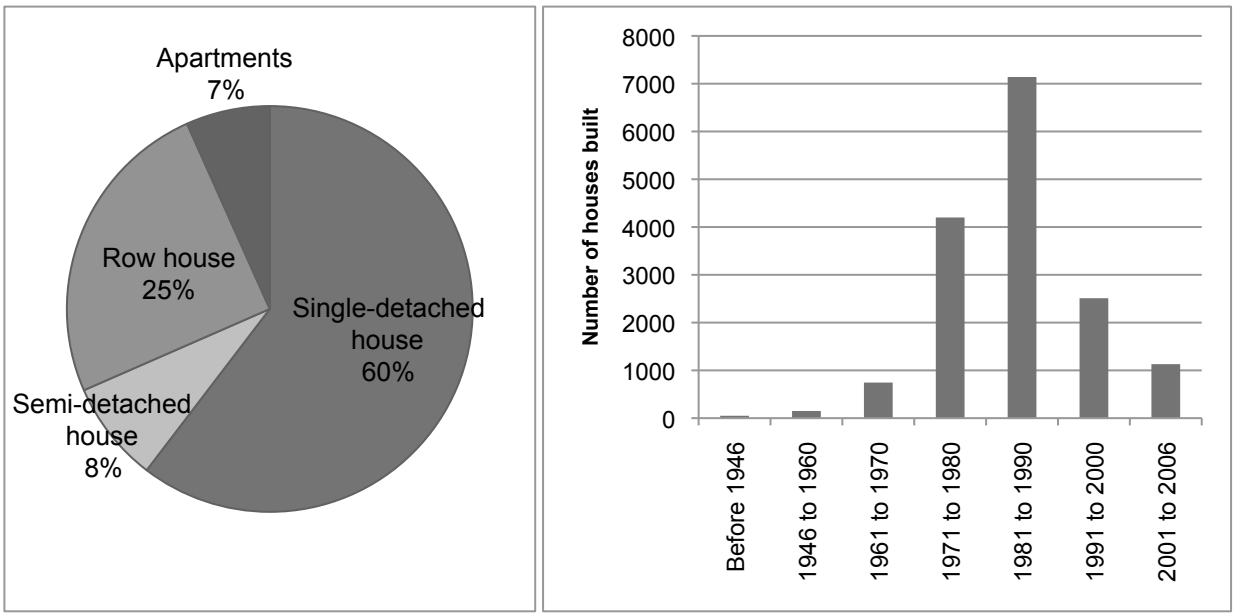


Figure 3.9 – Orléans; Left: Structural type; Right: Period of construction source: Statistics Canada 2012(a) (graphics by author)

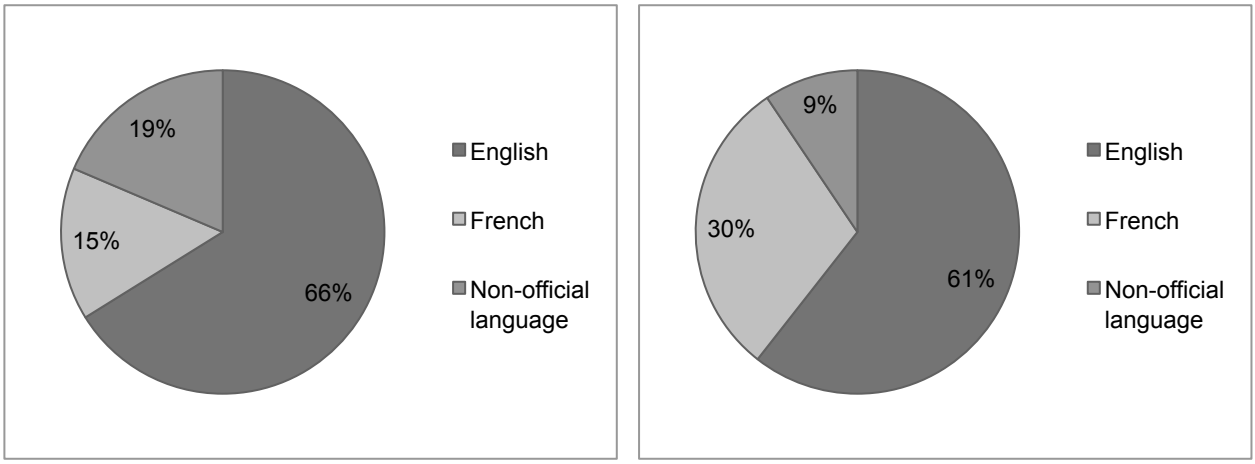


Figure 3.10 – Mother tongue; Left: Ottawa; Right: Orléans source: Statistics Canada 2012(a) (graphics by author)

3.4 QUESTIONNAIRE RESULTS

3.4.1 DEMOGRAPHICS

Demographic questions were asked in the questionnaire to determine how accurately Convent Glen North (CGN) is represented by Census data for Orléans Ward 1 (**Figure 3.11**). The questions were also asked in order to determine the general ages of the residents, as well as most common family structure.

All data pertaining to Orléans is from Statistics Canada's 2006 Census (Statistics Canada 2012(a)). All numbers for Convent Glen North come from the questionnaires.

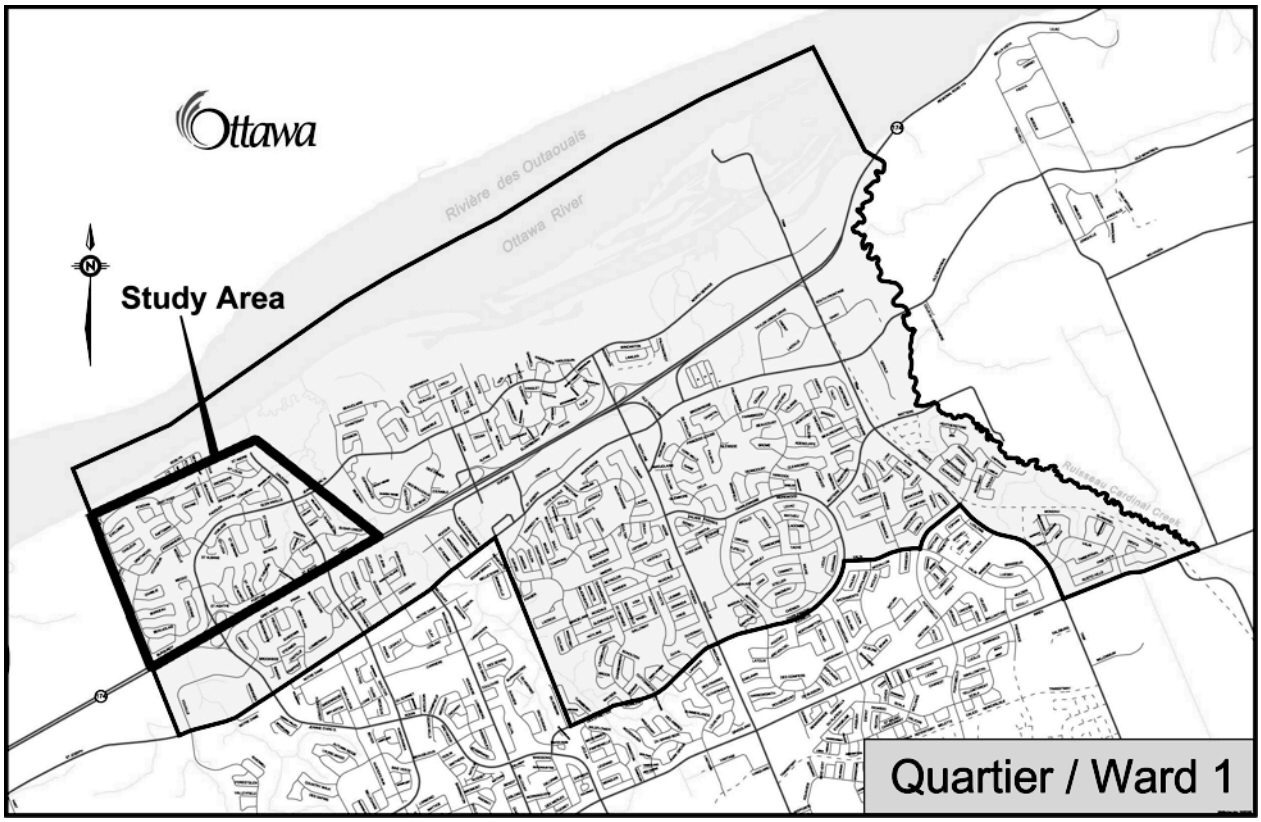


Figure 3.11 – Orléans Census data collection area in relation to study neighbourhood source: City of Ottawa 2006

When looking at the data, it is important to note that the demographics of the respondents do not necessarily correlate to the Census data. The two most likely explanations for this are: firstly that the demographics are a reflection of Convent Glen North, which may vary from the demographics of the greater Orléans area; and secondly that the demographics represented by the respondents to the questionnaire are not an accurate reflection of Convent Glen North's true

demographics, but reflective of the individuals who were interested in and had the time to fill out the questionnaire. In order to mitigate this discrepancy, the questionnaire data is presented collectively as well as split into specific demographics, such as respondent households with children living at home and without children living at home, where notable discrepancies exist in answers given based on demographic group.

According to Statistics Canada 2012(a), the average number of persons in a private household in Orléans is 2.9. As per the questionnaire, there are 2.6 persons per household in Convent Glen North, with an average of 3.7 persons in households with children, and an average of 2.0 persons in households without children (**Figure 3.12**).

60% of the questionnaire respondents live with their partner, and most of these respondents are between the ages of 55 and 75 (**Figure 3.13**). 34% of respondents live with their partner and children, 3% with their children (single parent families), 2% live alone, and 1% live with "other" (for example, boarders). None of the respondents have their parents living with them.

As indicated by Statistics Canada 2012(a), most children living at home in Orléans are aged 6-14 and the results of the questionnaires indicate that this is also true just within Convent Glen North. The average number of children living at home per Census family in Orléans is 1.2 (Statistics Canada 2012(a)), while there are 1.8 children per family who answered the questionnaire. Additionally, there is also a higher percentage of children aged 25+ living at home in Convent Glen North (16%) compared to Orléans as a whole (9%) (Statistics Canada 2012(a)) (**Figure 3.14**).

The questionnaire data suggests that Convent Glen North is mainly composed of households whose residents are couples in their sixties, without children at home, and whose household annual income is over $81,000 (**Figure 3.15**). Based on my own observations of the neighbourhood, this may be an accurate representation of Convent Glen North demographics. There are of course families with children, but there appear to be more retirement-age couples without children. Declining enrolment at neighbourhood elementary schools also supports this observation (**Figure 3.16**). For example, the enrolment at Terry Fox Elementary School (the public school in Convent Glen North) was 565 in 2000 (TFES 2009) and by 2013 it was 231 (OCDBS 2013).

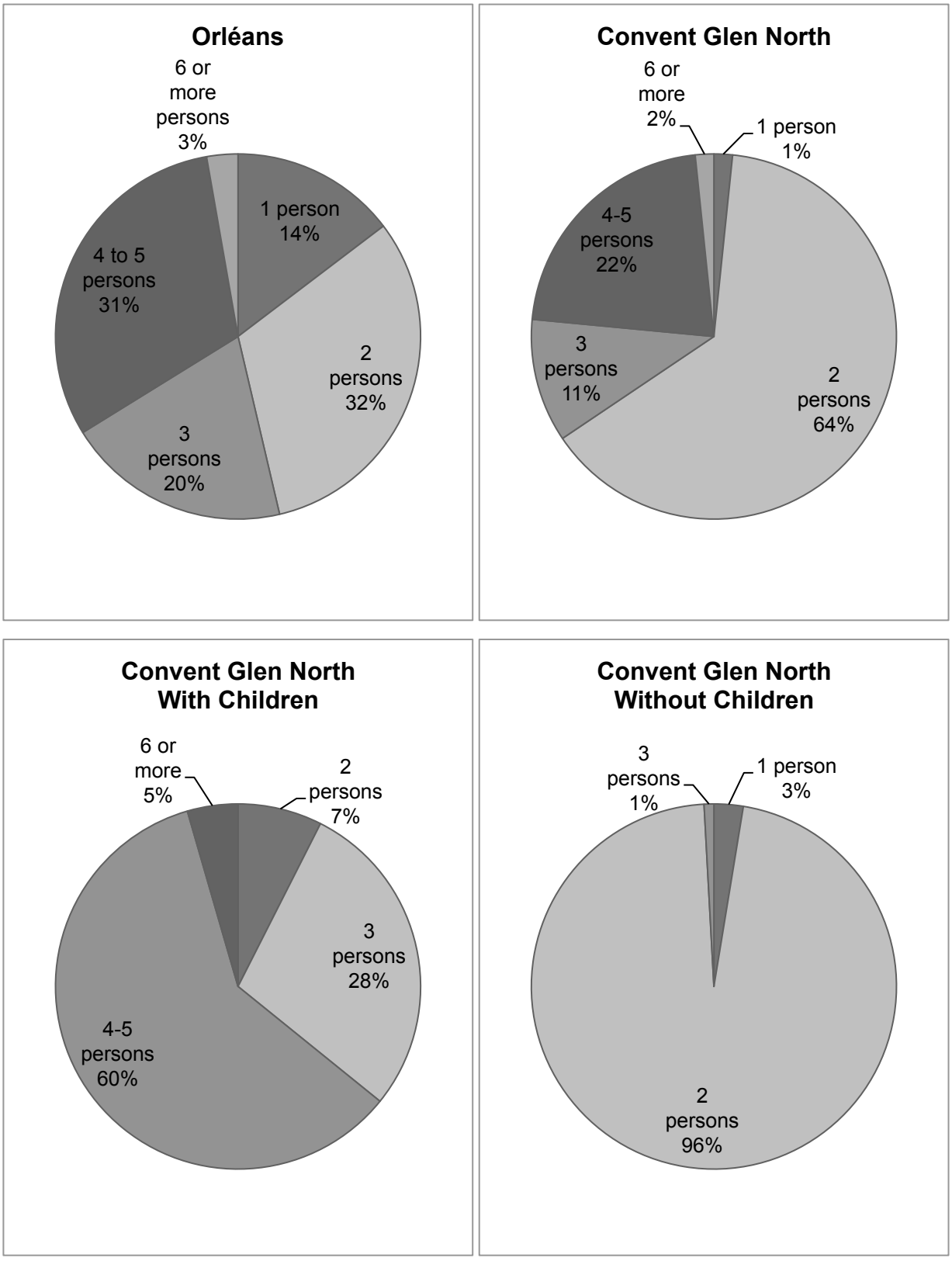


Figure 3.12 – Household size

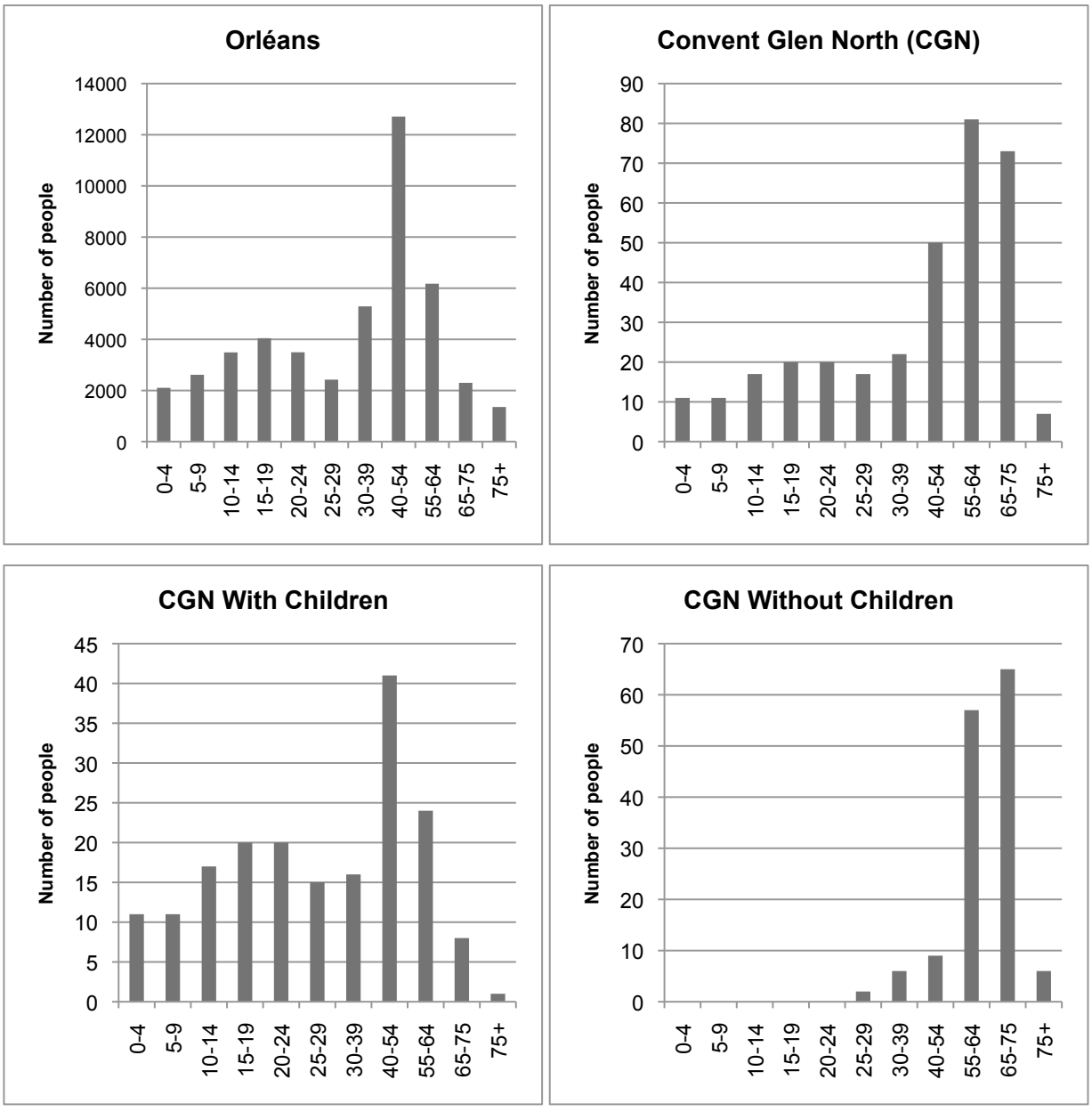


Figure 3.13 – Total population by age groups

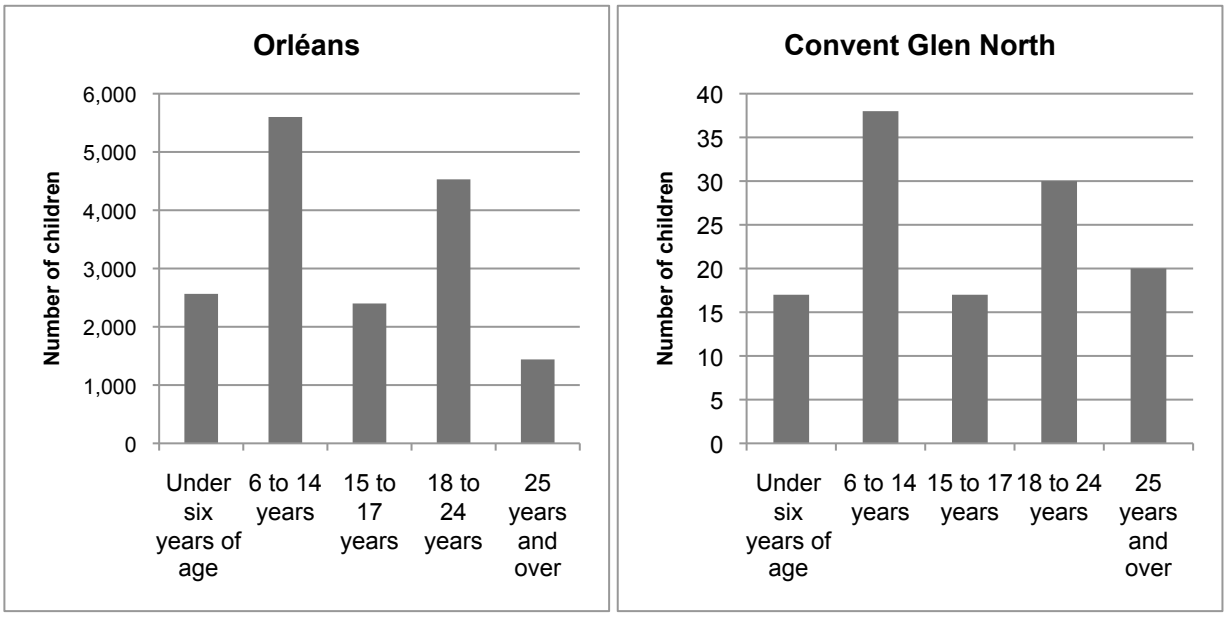


Figure 3.14 – Total number of children at home

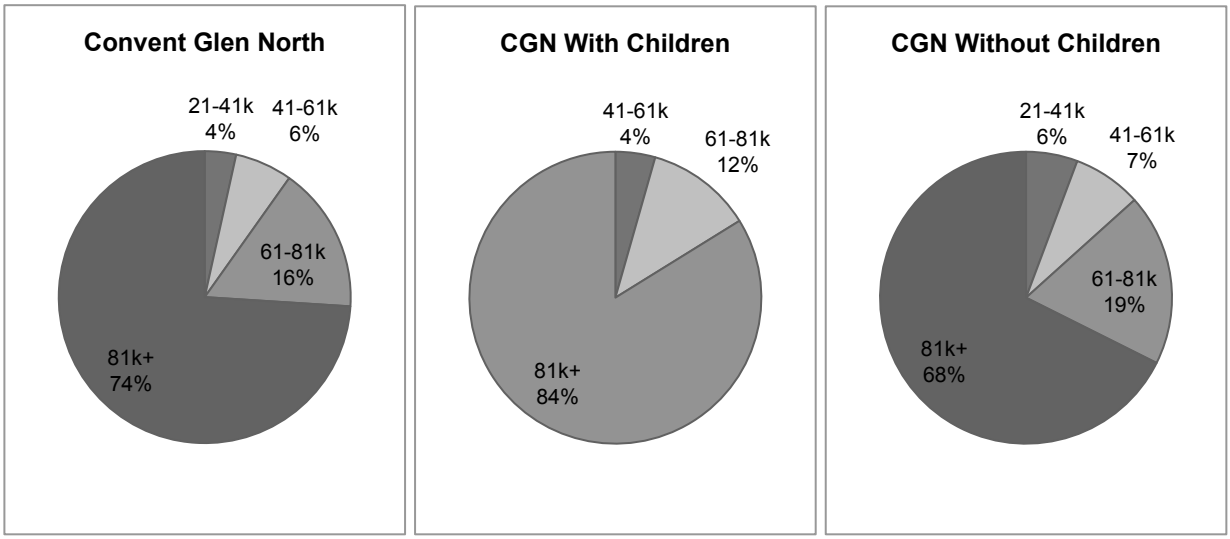


Figure 3.15 – Household incomes

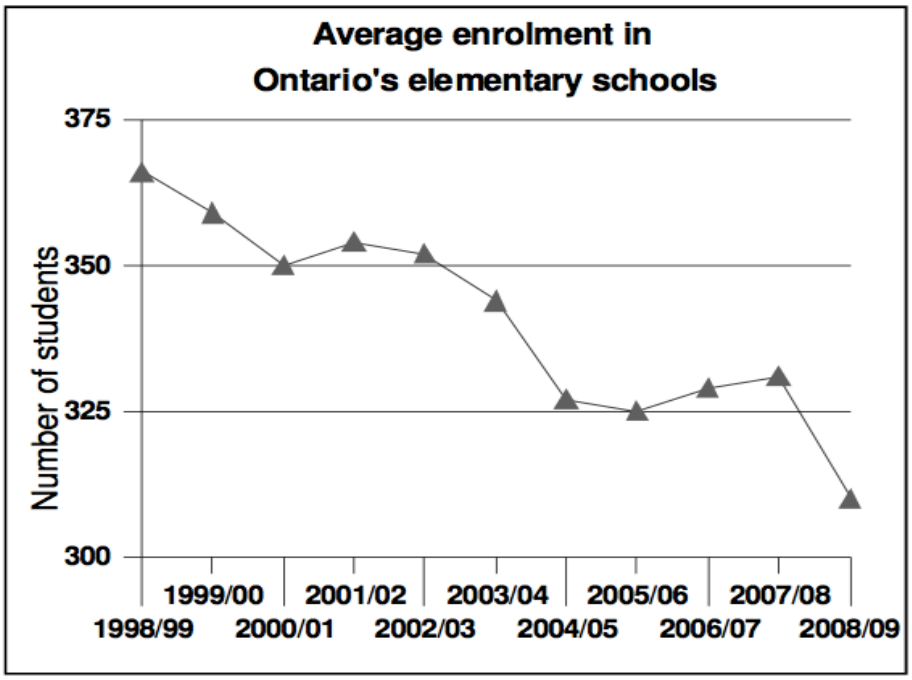


Figure 3.16 – Declining enrolment in elementary schools in Ontario source: PFE 2009

3.4.2 Room Uses

The single-detached and semi-detached houses in Convent Glen North were marketed to baby boomers starting their own families. In the 1970s when the neighbourhood was planned, there was still the assumption that families consisted of a mother, a father, and several children. The houses are designed with, on the ground floor, a living room, a family room (some houses were designed without), a dining room, a kitchen, a powder room, and in half the houses, a laundry room; on the second floor, a master bedroom (in the single-detached houses this often includes either a complete ensuite or an ensuite powder room), two or three bedrooms, and a bathroom; and in the basement, a laundry room in half the basements, and the rest of the basement left for the occupants to use how they chose (**Figure 3.17**) (Svirplys 2014).

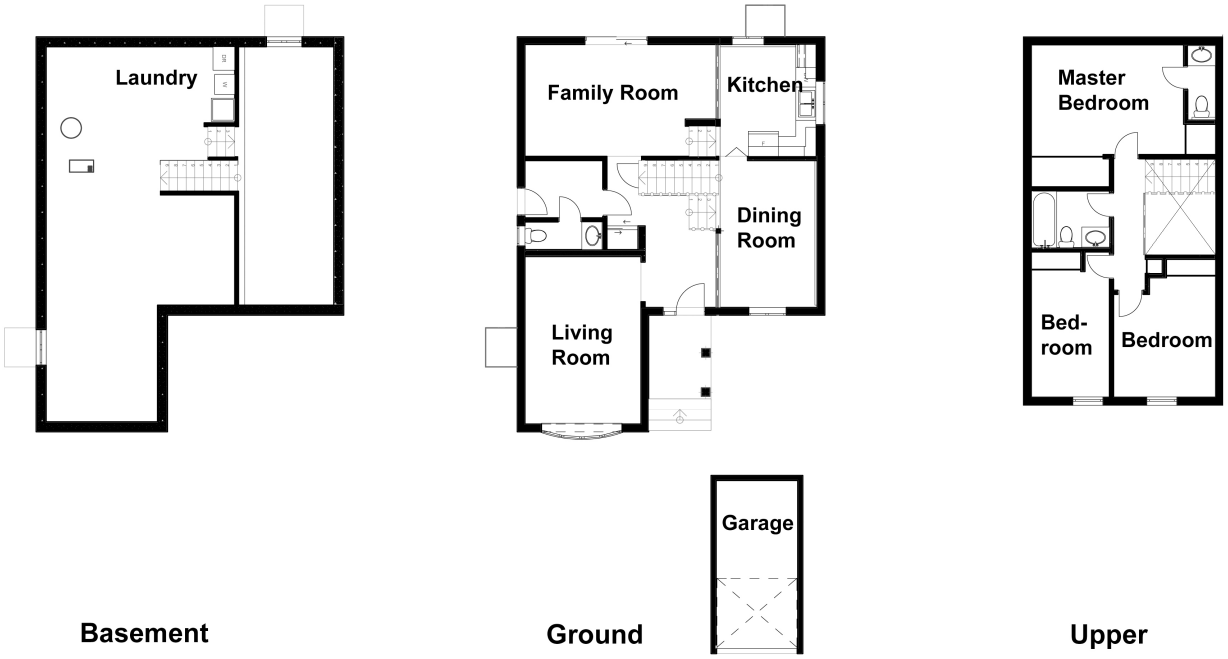


Figure 3.17 – Split-level house in Convent Glen North source: measured and drawn by author 2014

Families have grown, shrunk, and changed since the time the neighbourhood was built, so questionnaire respondents were asked how they currently use the rooms in their houses.

Two rooms were reported to always be used as intended: the kitchen (cooking and eating; only 10% of houses have kitchens that are too small to eat in) and the master bedroom. The other rooms, while used as intended by some (whether always or rarely), have been adapted to changing family units (e.g. families with fewer children, couples whose children have moved out), and to changing activities in the home (e.g. home offices or home gyms, which were uncommon in the 1970s; new technologies in the home, such as computers, laptops, and wireless Internet).

The dining room is always used as intended by 33% of households, often used as intended by 26%, sometimes by 28%, and rarely or never by 13%. Between meals, the dining room is also used for a variety of activities, nearly equally split between computer (including laptop), hobby (including sewing), homework, office, and paperwork (e.g. taxes) (**Figure 3.18**). 13% of respondents noted that the dining room was used only for its intended

use, but used only rarely, for example when guests come over, or for holidays (notably Christmas and Easter).

Regarding the formal living room and informal family room: 53% of households use the formal living room as intended, and 81% use the informal family room as intended. Other uses of both rooms include informal TV rooms, music rooms, offices/dens, and play areas for children or grandchildren. 9% of respondents noted that the formal living room was used only for its intended use, but used only rarely, again, when guests come over, or for holidays.

Overall, 54% of households used bedroom 1 as intended; 37% for bedroom 2; and 13% for bedroom 3, although 40% of houses do not have a third bedroom. For families with children, 96% used bedroom 1 as intended; 56% for bedroom 2; and 24% for bedroom 3, although 38% of houses do not have a third bedroom (note: some of the children have bedrooms in the basement). For families without children, 34% of households used bedroom 1 as intended; 22% for bedroom 2; and 7% for bedroom 3, although 40% of houses do not have a third bedroom. For families without children at home, the bedrooms that are used as intended are likely used by visiting children who have moved out or are away at school, or other visiting family members such as grandchildren. The most common "non-intended" uses for bedrooms are as a guest room, as an office, and as a storage room (**Figure 3.19**).

47% of the houses have a laundry room on the ground floor (often in the back hall, rather than a separate laundry room); the other 53% have the laundry in the basement and have storage in the back hall instead. 97% of households use the basement for storage. The most common uses for the basement in addition to storage (and laundry) are: rec room, office, workshop, and exercise room (**Figure 3.20**).

These results confirm that households adapt their spaces to their current needs, by changing what rooms are used for. For example, if there are no longer children in a bedroom, it becomes instead a home-office or a guest room.

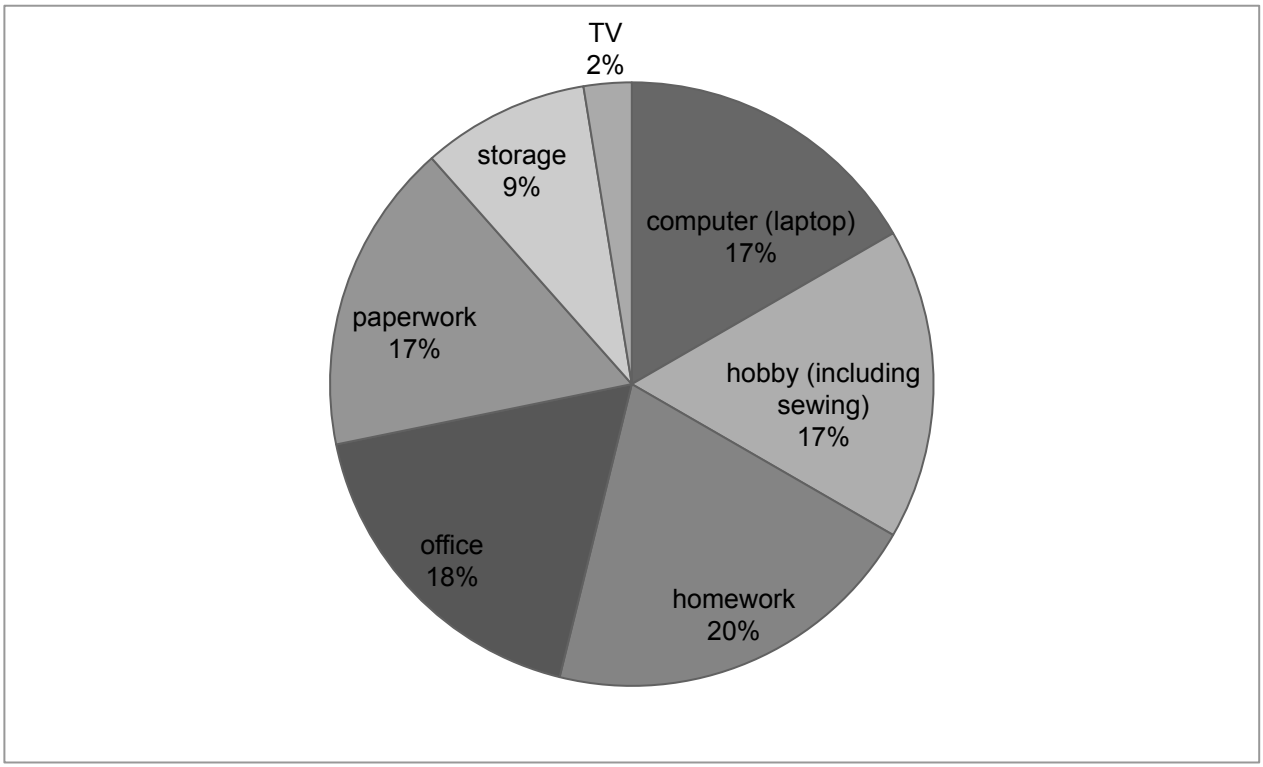


Figure 3.18 – Alternate dining room uses

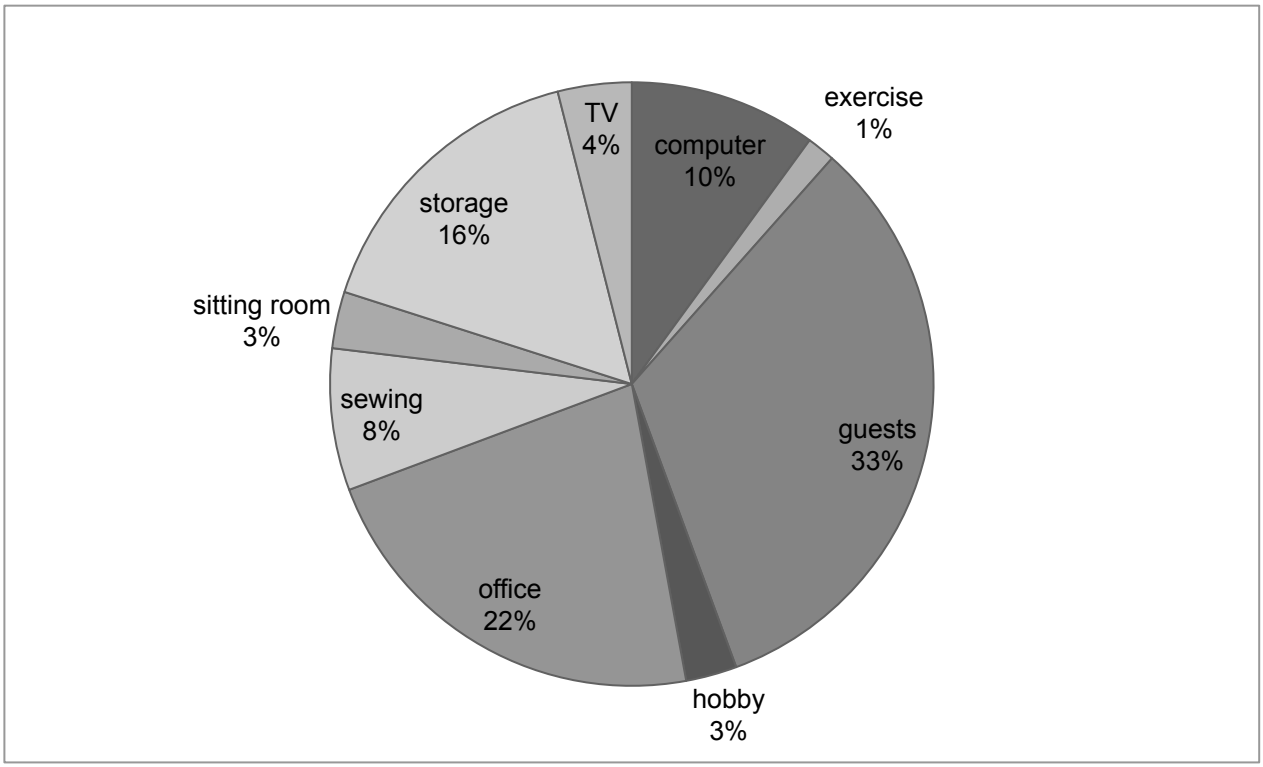


Figure 3.19 – Alternate bedroom uses

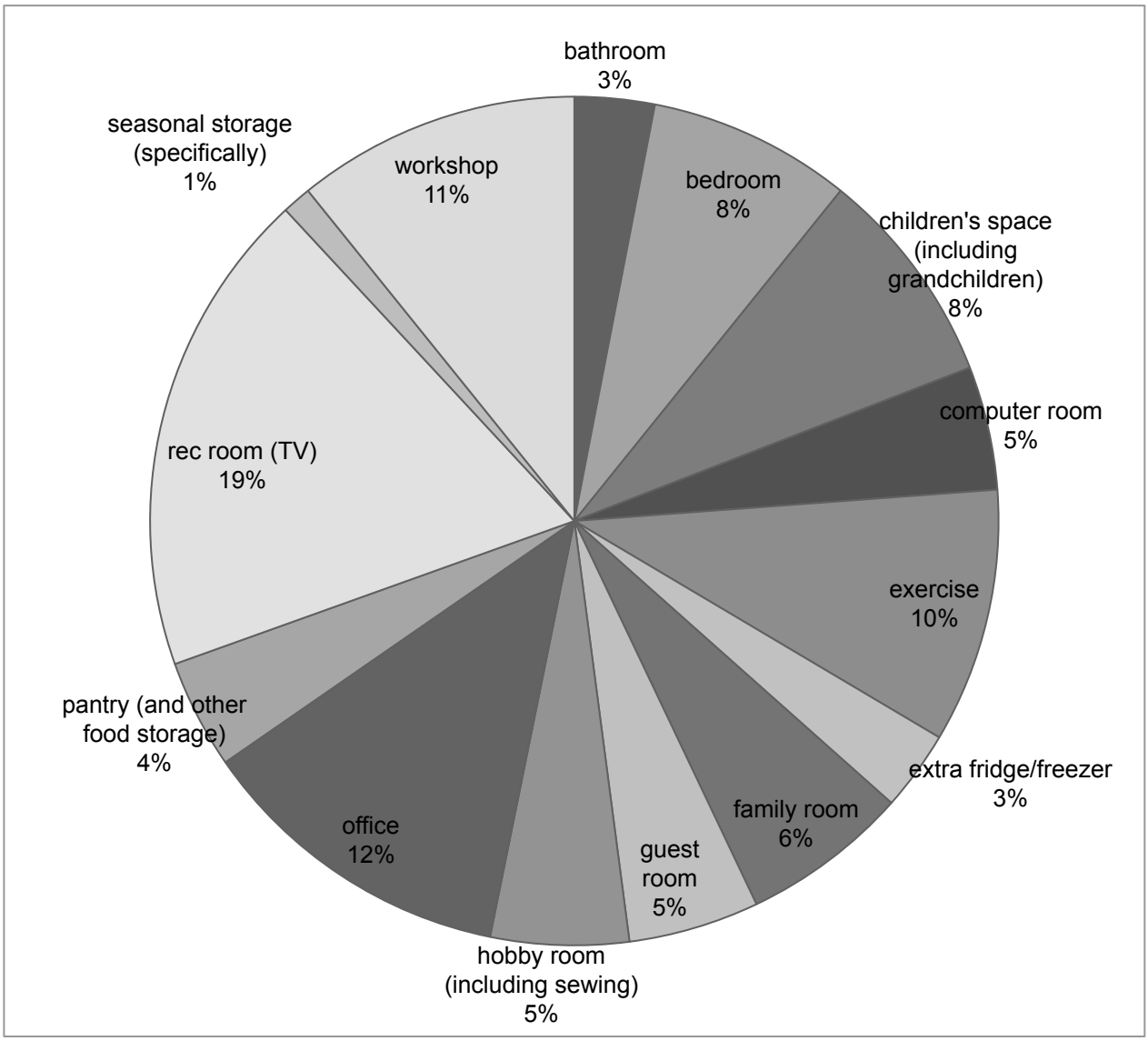


Figure 3.20 – Basement uses in addition to storage and laundry

3.4.3 MODIFICATIONS

Most of the respondents' houses were built in the late 1970s and early 1980s (**Figure 3.21**). The overall average length of time respondents have owned their houses is 20.2 years, with an average of 13.5 years for households with children and 24.1 years for households without children. 15% of respondents are the original homeowners (6% of respondents with children living at home are original homeowners and 20% of respondents without children living at home are original homeowners).

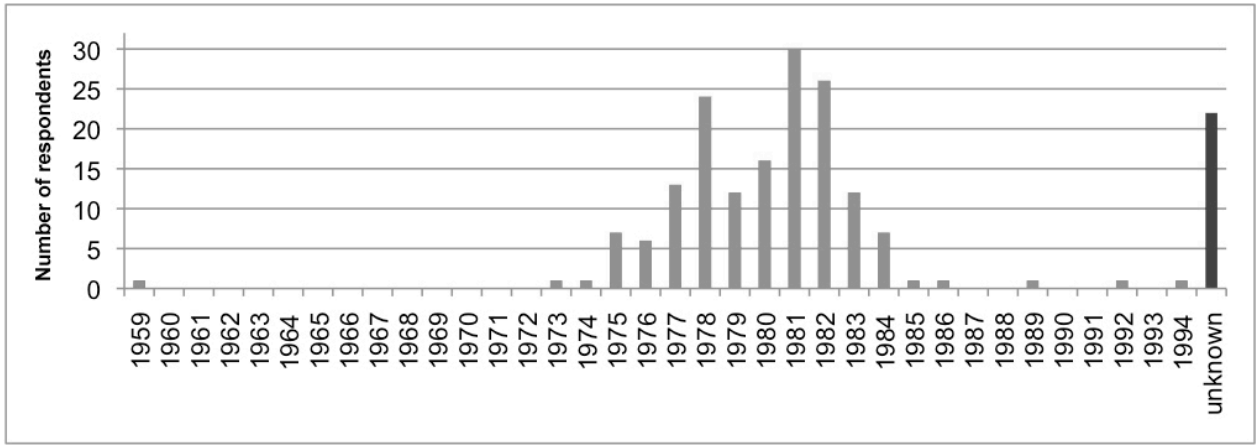


Figure 3.21 – Year house built as indicated by questionnaire respondents

56% of respondents indicated that modifications had been made to the house before they moved there and 9% were unsure if modifications had been made. The reasons current homeowners believed the modifications were made by previous owners were fairly evenly split, with the most common reasons being changing room use and increasing home value (**Figure 3.22**). This suggests that previous homeowners had already begun adapting the houses and that they made modifications to increase the sale price of the house.

96% of current homeowners have made modifications to their houses. 100% of households with children have made modifications to their house, while 94% of households without children have made modifications. The four most common reasons for the modifications made are: updating, increasing energy efficiency, maintenance, and aesthetics (**Figure 3.23**). These results suggest that homeowners are keen to modify their houses for comfort and modern (energy efficient) conveniences, according to the latest trends in interior design, as well as for maintaining and updating their houses in order to keep them contemporary and in good repair.

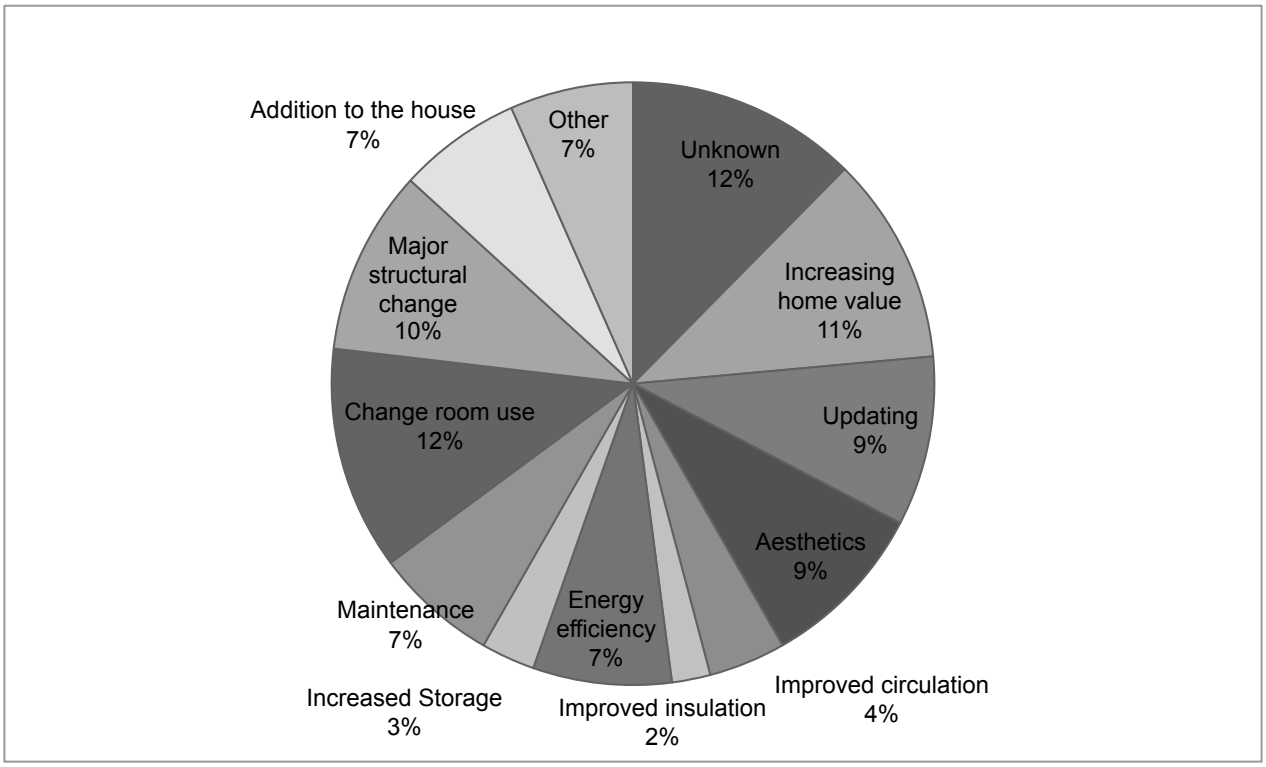


Figure 3.22 – Reasons for modifications by previous homeowners (as stated by current homeowners)

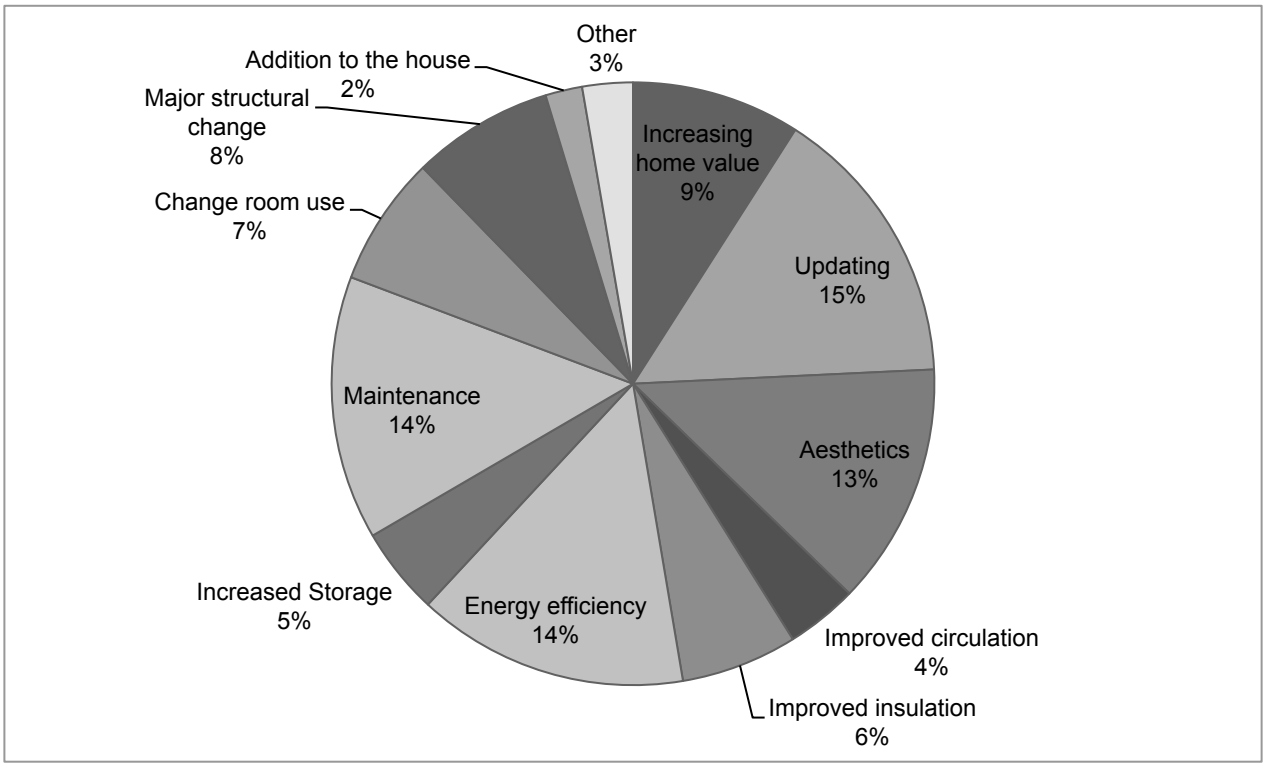


Figure 3.23 – Reasons for modifications by current homeowners

71% of households are planning modifications in the future, with the highest percentage of homeowners (21%) able to spend $5,000-$10,000 on modifications in the next five years (whether they are planning modifications or not) (**Figure 3.24**). Answers to the questionnaire suggest that homeowners are interested in updating and/or changing the interior design aesthetics and in the newest technologies (especially for energy efficiency), as well as maintaining comfort levels and addressing current and near-future needs. Additionally, most homeowners (88%) are in a financial position to make significant modifications.

Questionnaire respondents were asked what modifications they had made to the house (in an open text box). The most common modifications made by current owners (or modifications they are planning to make in the next five years) are installation of ceramic tiles or hardwood floors (most of the houses in Convent Glen North would have had laminate/vinyl and carpeting), renovations of the kitchen and bathrooms, and replacing the roof shingles (**Figure 3.25**).

Respondents were asked to rate, when considering home modifications, the importance of accommodating future needs, adding a sense of personal style, adding value/equity to the home, budgetary constraints, do-it-yourself, improving usability of a space/area, increasing energy efficiency, making use of existing structure, preventative maintenance, and using eco-friendly products (construction materials) (**Figures 3.26-3.27**).

The results suggest that homeowners are most concerned about increasing energy efficiency (more information about questionnaire results about energy efficiency can be found in **Section 3.5.1** below) and least concerned about accommodating future needs and making use of existing structure.

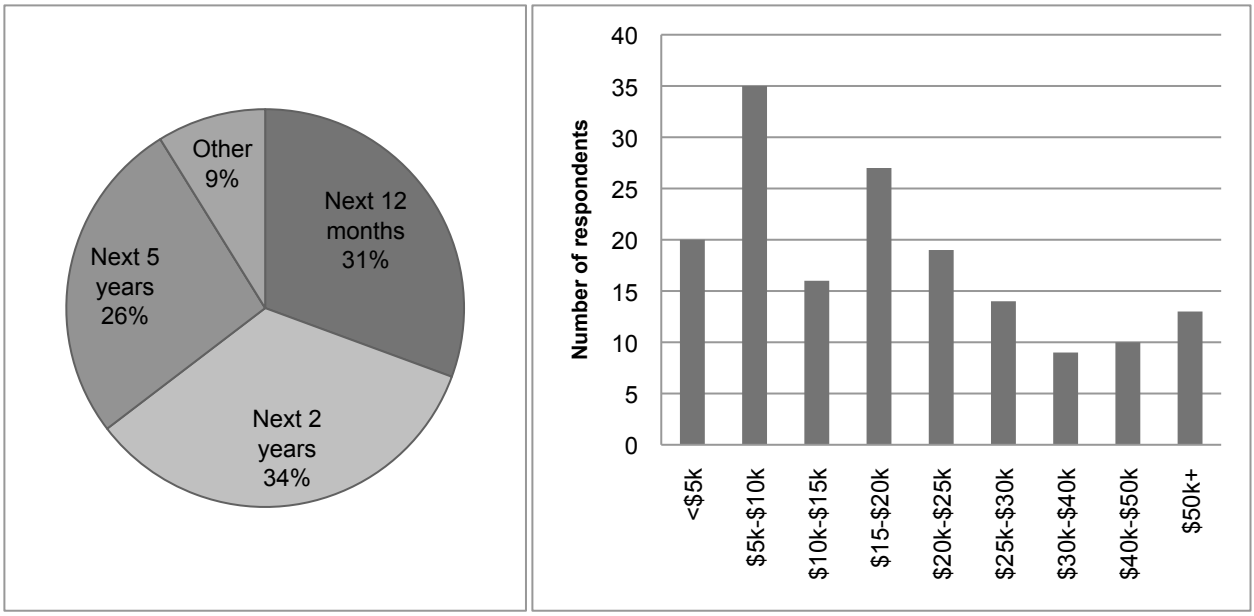


Figure 3.24 – Left: when homeowners are planning to make modifications; Right: amount homeowners state they are able to spend on renovations over the next five years

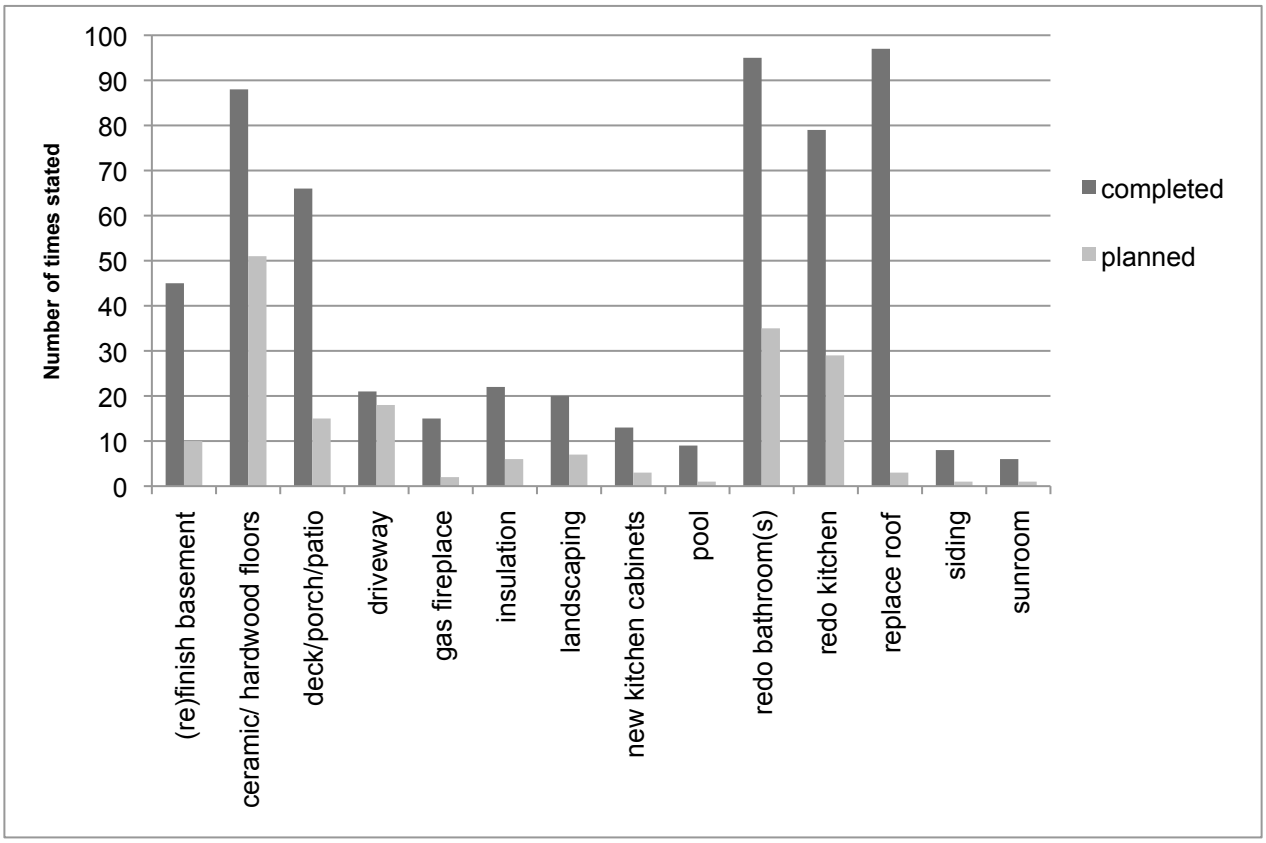


Figure 3.25 – Modifications made by current homeowners or that are planned in the next five years

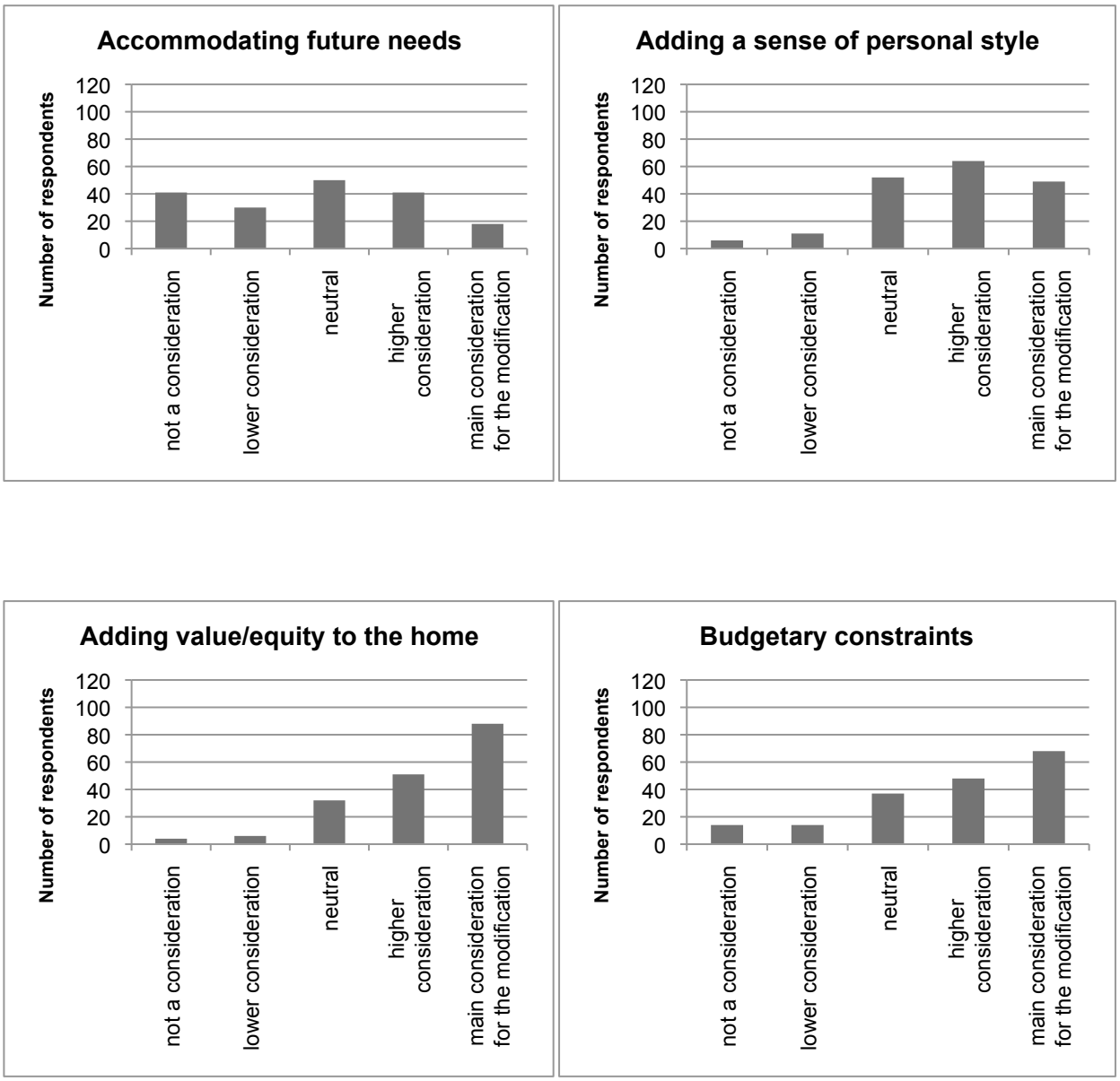


Figure 3.26 – Factors considered when planning a modification

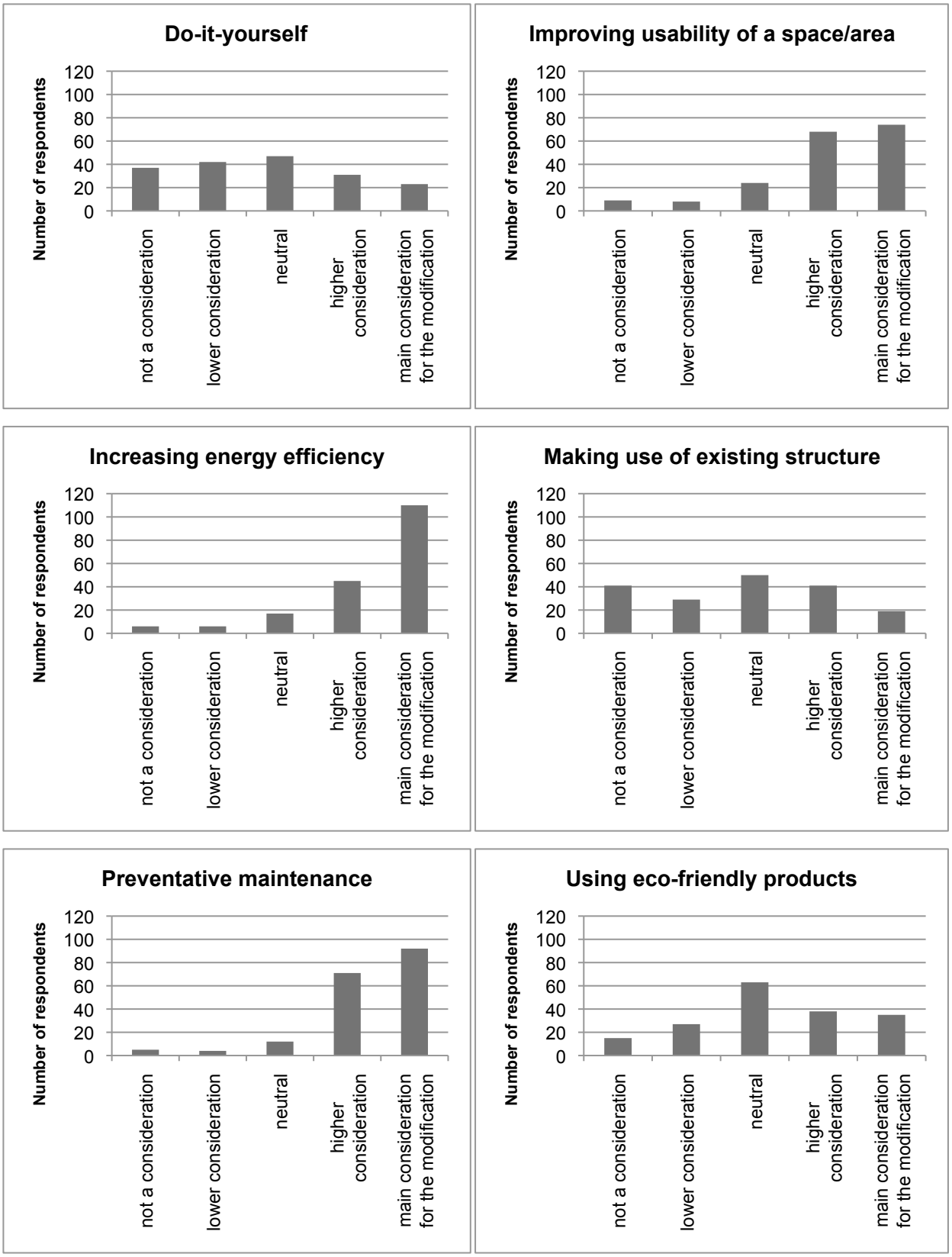


Figure 3.27 – Factors considered when planning a modification (continued)

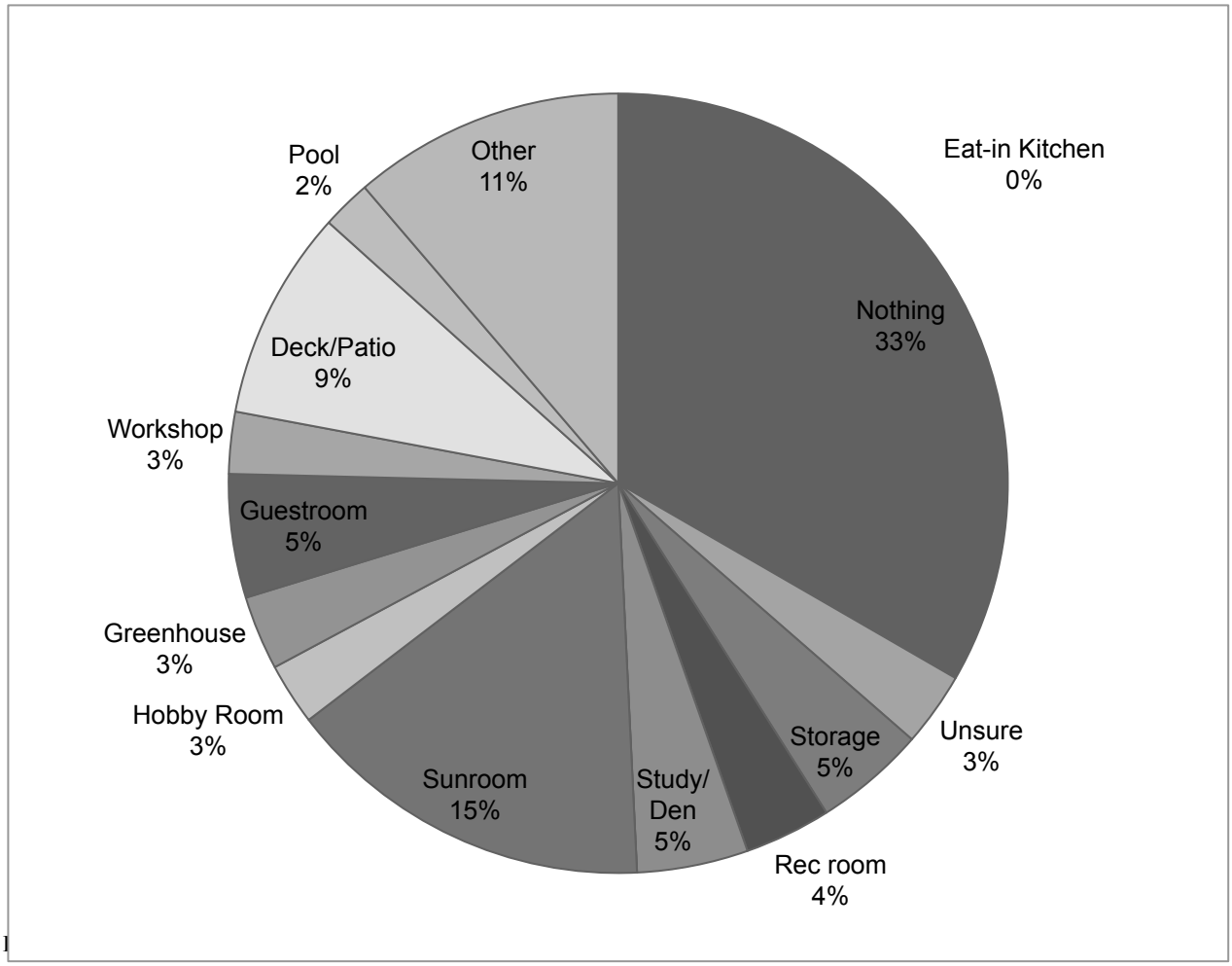
Respondents were asked (from a list) what space their house was missing (**Figure 3.28**). A full third of the homeowners said that their house is missing nothing. The most popular option given by the other homeowners was a sunroom. As a personal observation, my parents and closest neighbours have often indicated a lack of storage space. This was only reflected by 5% of respondents. However, it appears that many households use extra bedrooms for storage. The low response to the need for storage might also be explained by the growing popularity of self-storage units. The self-storage industry made $8 billion in profits in 2006 and there are approximately 3,000 self-storage facilities in Canada, with, as of 2006, 0.2m^2 (2.5 sqft) of self-storage space per Canadian (King 2007, SSA 2013).

No respondent felt their house was missing an eat-in kitchen, despite 10% of respondents indicating that their kitchens are too small to eat in. Many of the houses in Convent Glen North were designed with very small kitchens (one respondent described them as "galley kitchens"). However, 25% of respondents have remedied this (what is now viewed as a flaw in the) original design by enlarging their kitchens, either by knocking out a wall between the kitchen and an adjacent room or by building an addition to the house (**Table 3.1**). A further 19% would enlarge their kitchens in a dream renovation.

	Knock out wall between kitchen and dining room	Knock out wall between kitchen and family room	Knock out walls between kitchen and both dining room and family room	Knock out a kitchen wall (unspecified)	Kitchen expanded through house addition
Actual	15	11	4	3	13
Dream renovation	7	4	0	0	8

Table 3.1 – Kitchen enlargements

Homeowners were asked, if they had an unlimited budget, what modifications they would make to the house. Interestingly, some respondents said they would do nothing; others said they would either move the whole house to a new location or demolish the existing house and start from scratch. However, the most common dream modifications are: renovating the kitchen and bathrooms and adding a sunroom (**Figure 3.29**). This suggests that the kitchens and the bathrooms were poorly designed (poor layout), have outdated, inefficient appliances and fixtures,



and/or were decorated in a dated style and colour palette. Additionally, with such a short summer season, when it is warm enough to sit outside in Canada, it is easy to understand the appeal of a four-season sunroom.

The most common modifications, completed, planned, or dream, are: the installation of ceramic or hardwood flooring and renovations of bathrooms and kitchens (**Figure 3.30**).

The results of this section of the questionnaire support the idea that homeowners modify their spaces to suit their current family needs and current expectations of comfort and style. Additionally, homeowners have made modifications that guarantee their investment, such as replacing the roof shingles, as well as modifications to increase the value of their homes (whether made for this reason or not) such as renovating the kitchen and bathrooms, and replacing carpet and vinyl laminate with hardwood and ceramic flooring.

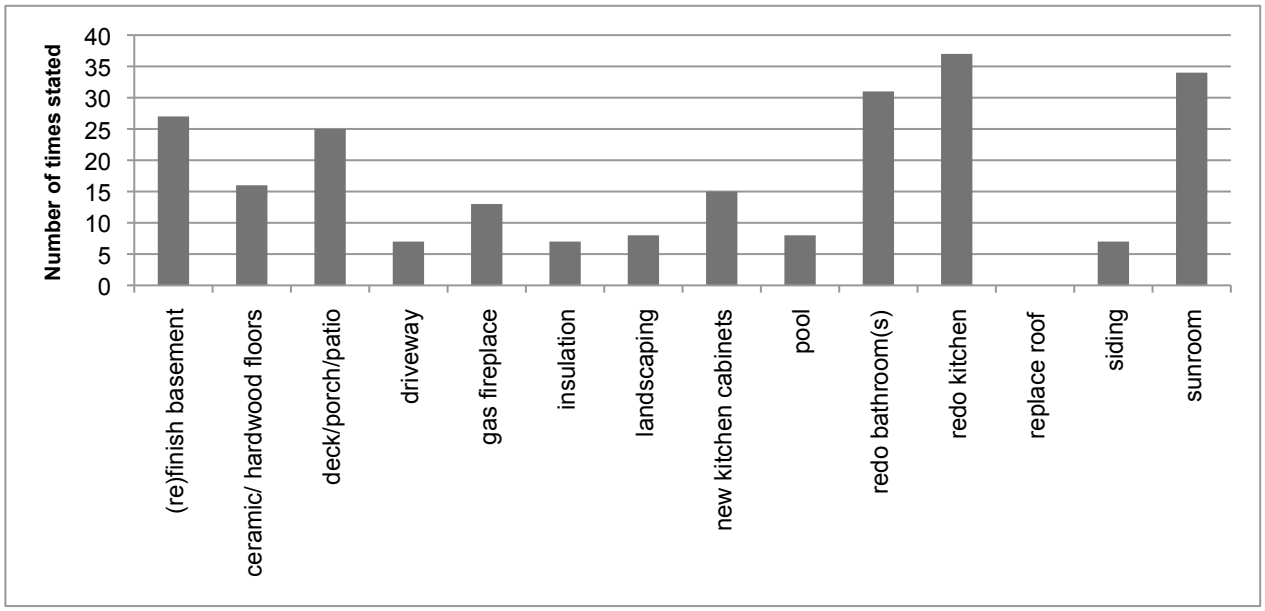


Figure 3.29 – Dream modifications

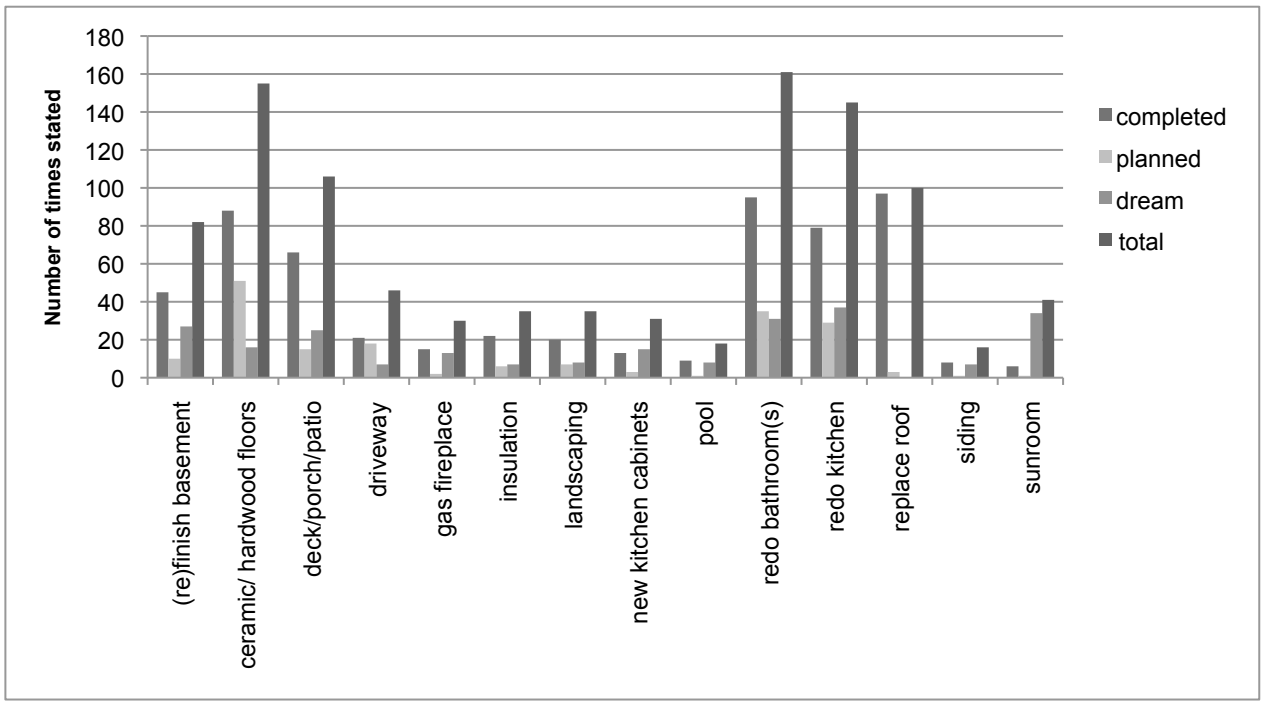


Figure 3.30 – Modifications

3.4.4 SPACE NEEDS

Questionnaire respondents were asked whether or not their house satisfies their current space needs, i.e. whether they feel their house is presently large enough for their lifestyle. Respondents were also asked whether they had modification plans for their homes based on future needs (e.g. starting a family, starting a home based business, retiring, or making modifications for aging-in-place). In **Section 3.4.3** above, homeowners indicated that when considering modifications, accommodating future needs was the least important consideration. Additionally, homeowners were asked if they would be comfortable in a smaller house at the present time, and also if they would be comfortable in a smaller house in the future (**Figure 3.31**). The results varied between households with children living at home (**Figure 3.32**) and households without children living at home (**Figure 3.33**).

These results suggest that homeowners often are not planning for their future needs, but rather are 'living in the moment,' and that suburban homeowners are used to a particular lifestyle. 47% of households overall and 57% of households without children say they would be comfortable in a smaller home today, but perhaps are not moving because of the inconvenience of downsizing and the expense (e.g. paying a realtor, paying movers, etc.). There is also a question of investment (equity) and emotional attachment for many of the older homeowners who now live only with their partners but who raised their children in their current home.

3.4.5 ADAPTABILITY

In the questionnaire homeowners were presented with three different options for adapting their homes and the neighbourhood in order to provide more affordable housing options in Convent Glen North.

Option 1: Basement Apartment

Homeowners were asked, if budget were not a constraint, would they make modifications to their houses to allow for a conversion to create a basement apartment (**Figure 3.34**). The basement unit would be intended for university students or young adults (likely their own children), who do not have a lot of money. In 2013, student debt averaged at $29,520 per person in Ontario (BMO 2013) and the youth unemployment rate was at 16-17.1% in Ontario (Geobey 2013).

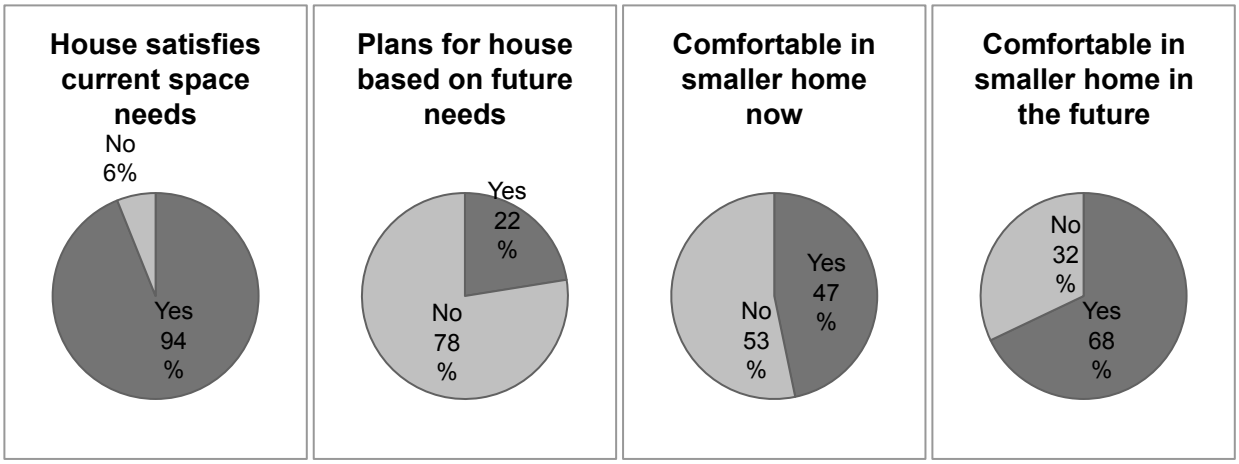


Figure 3.31 – Space needs: all respondents

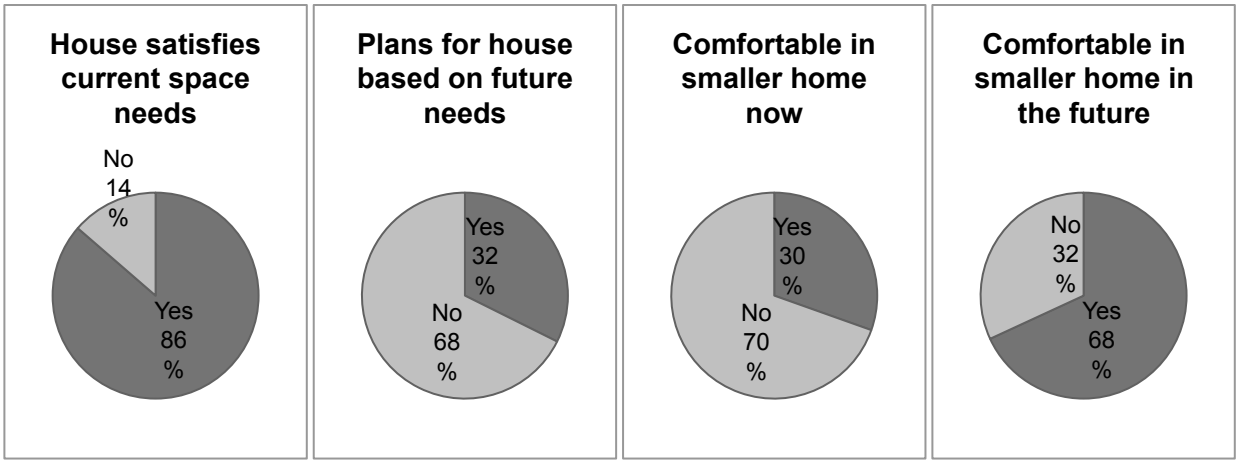


Figure 3.32 – Space needs: respondents with children at home

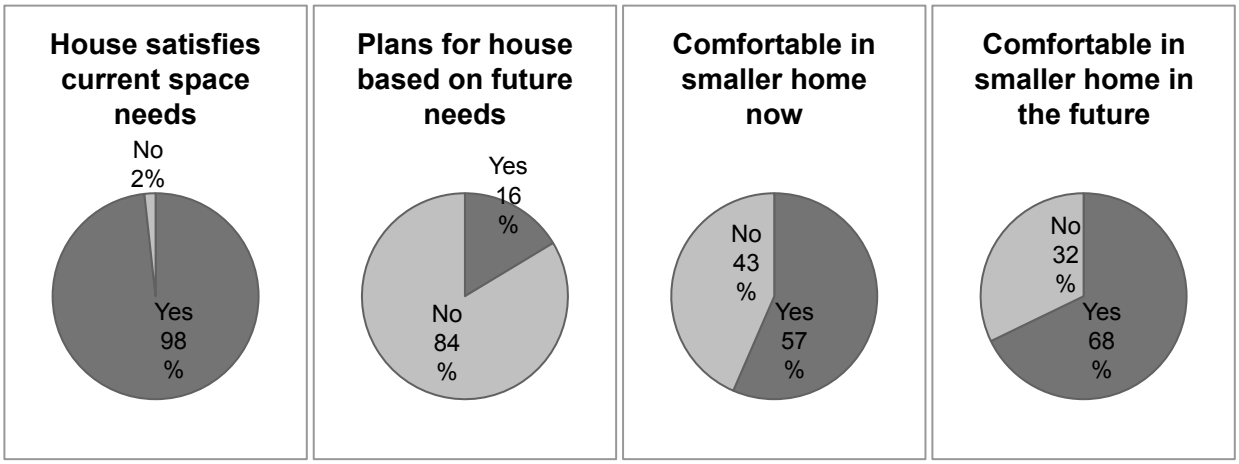


Figure 3.33 – Space needs: respondents without children at home

The answer as to whether homeowners would make modifications to their houses to allow for a conversion to create a basement apartment was a resounding no at 84%; 79% of households with children answered no, while 88% of households without children answered no. There was no particular demographic group that *would* build a basement apartment in terms of age group, income, or household size.

The homeowners were also asked how a basement apartment would affect their quality of life, positively or negatively, then asked to explain their choice in an open text box. 82% said it would affect their quality of life negatively; 78% of households with children believed it would be negative and 88% of household without children said it would be negative. The most common negative reason given was loss of privacy (**Figure 3.35**). Positive reasons included increased income (if renting), helping family (if for adult children rather than renters), and shared maintenance responsibilities.

The homeowners were asked how basement apartments on their street would affect the sense of community on the street, positively or negatively, then asked to explain their choice in an open text box. 79% said it would affect the sense of community negatively; 72% of households with children believed it would be negative and 84% of household without children said it would be negative. The most common negative reason given was too many extra cars/too much traffic (**Figure 3.36**). Positive reasons included increased diversity and better sense of community.

The most common negative reason given, if the homeowners themselves built a basement apartment and if their neighbours did the same, was too many extra cars/too much traffic (**Figure 3.37**).

Figure 3.34 – Basement apartment conversion (this house model has a detached single-car garage, not shown, to the right of the main front door) source: drawn by author 2014

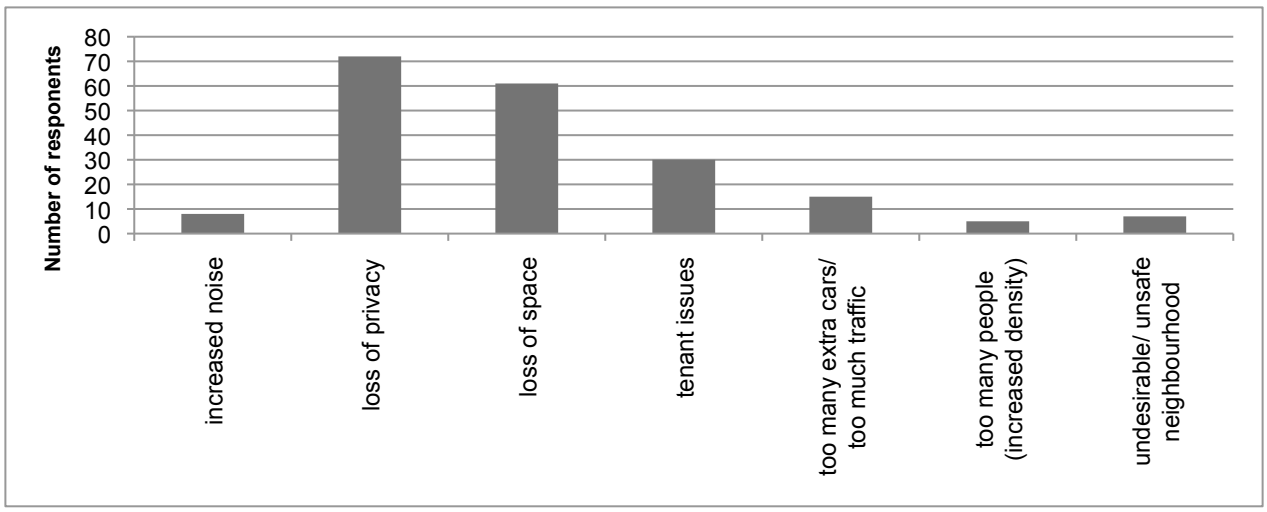


Figure 3.35 – Negative reasons for basement apartment in own home

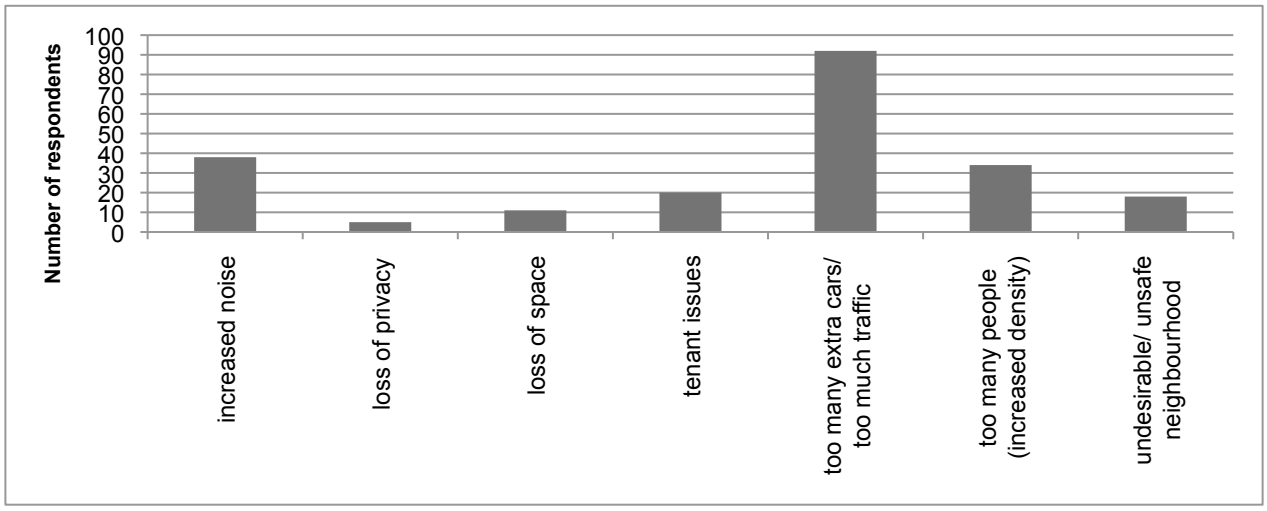


Figure 3.36 – Negative reasons for basement apartments in other houses on the street

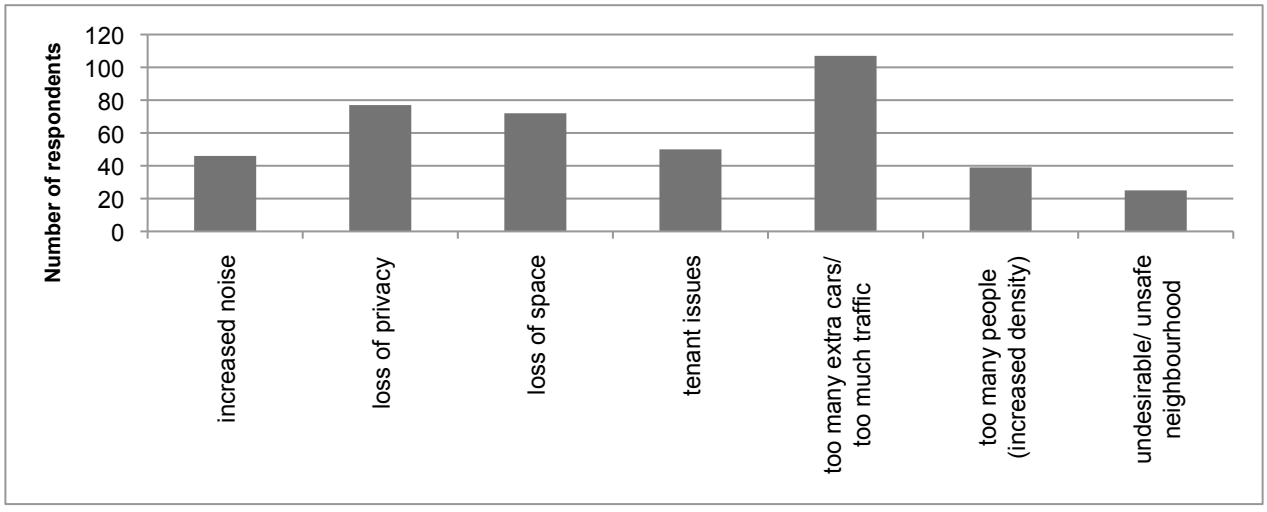


Figure 3.37 – Negative reasons for basement apartment in own home and in other homes on the street

Option 2: Secondary Suite/ Garden Suite/ Granny Flat

Homeowners were asked, if budget were not a constraint, would they build an addition on the back of the house or a separate building at the end of their backyards as an autonomous apartment (**Figure 3.38**). This secondary suite would be intended for young adults (likely their own children), who do not have a lot of money, or their own elderly parents, who would like to live close to family for assistance or for peace of mind, and who may not have enough money to move into a retirement or care home.

The answer to this option was also a definite no at 83%; 73% of households with children answered no, while 90% of households without children answered no. There was no particular demographic group that *would* build a garden suite in terms of age group, income, or household size. Adding a secondary unit that more likely would be used by elderly parents (garden suite) was viewed slightly less negatively than a secondary unit that more likely would be intended for young-adult children (basement suite).

The homeowners were also asked how a secondary suite would affect their quality of life, positively or negatively, then asked to explain their choice in an open text box. 79% said it would affect their quality of life negatively; 71% of households with children believed it would be negative and 85% of household without children said it would be negative. The most common negative reason given was loss of yard space (**Figure 3.39**). Positive reasons included helping family (if for adult children or especially for elderly parents) and increased income (if renting).

The homeowners were asked how secondary suites on their street would affect the sense of community on the street, positively or negatively, then asked to explain their choice in an open text box. 75% said it would affect the sense of community negatively; 66% of households with children believed it would be negative and 82% of household without children said it would be negative. The most common negative reason given was too many extra cars/too much traffic (**Figure 3.40**). Positive reasons included better sense of community, helping family (if for adult children or especially for elderly parents), and more community members.

The most common negative reason given, if the homeowners themselves built a secondary suite and if their neighbours did the same, was tied between loss of yard space and too many extra cars/too much traffic (**Figure 3.41**).

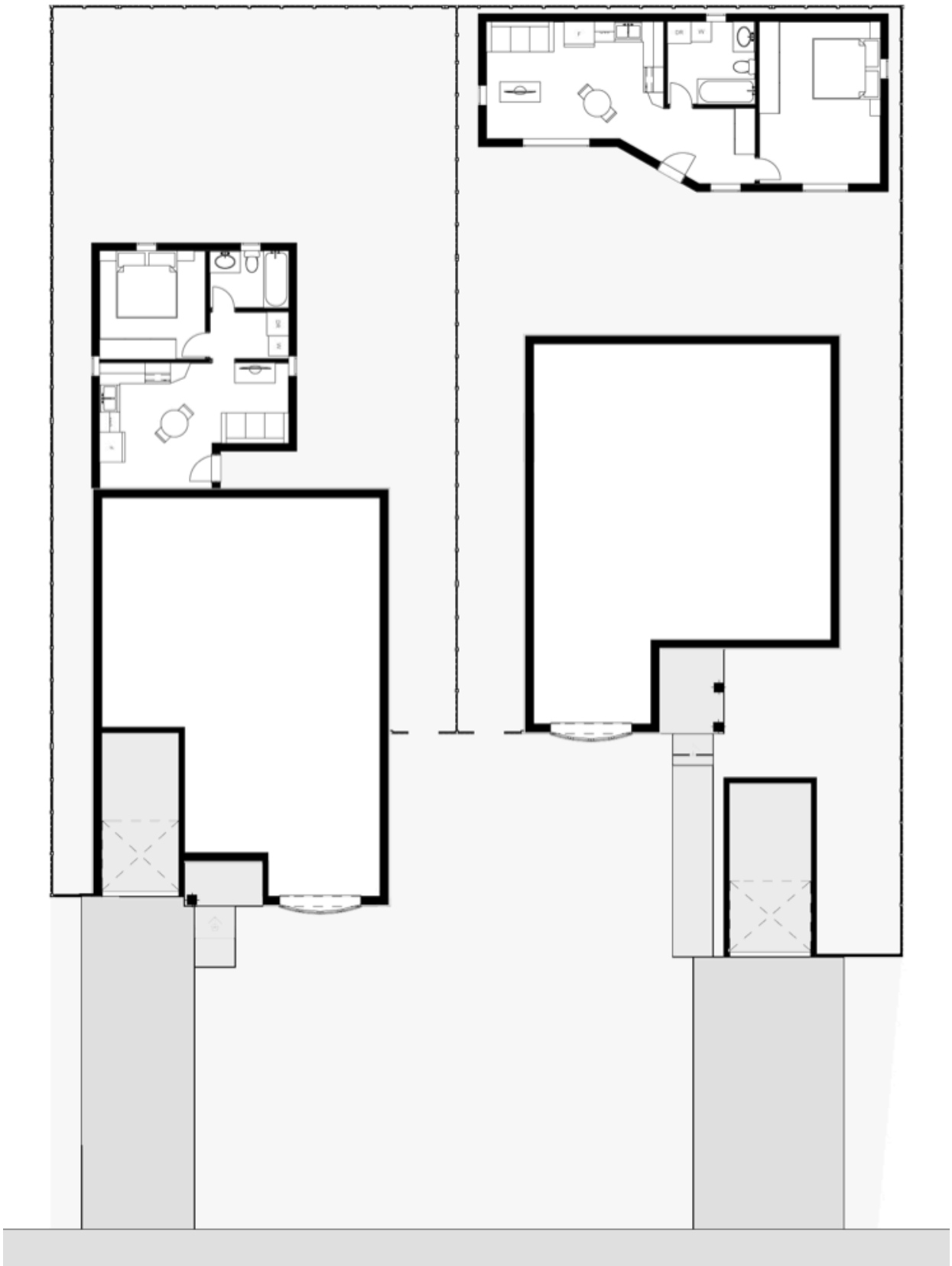


Figure 3.38 – Secondary garden suites (attached, left; detached, right) source: drawn by author 2014

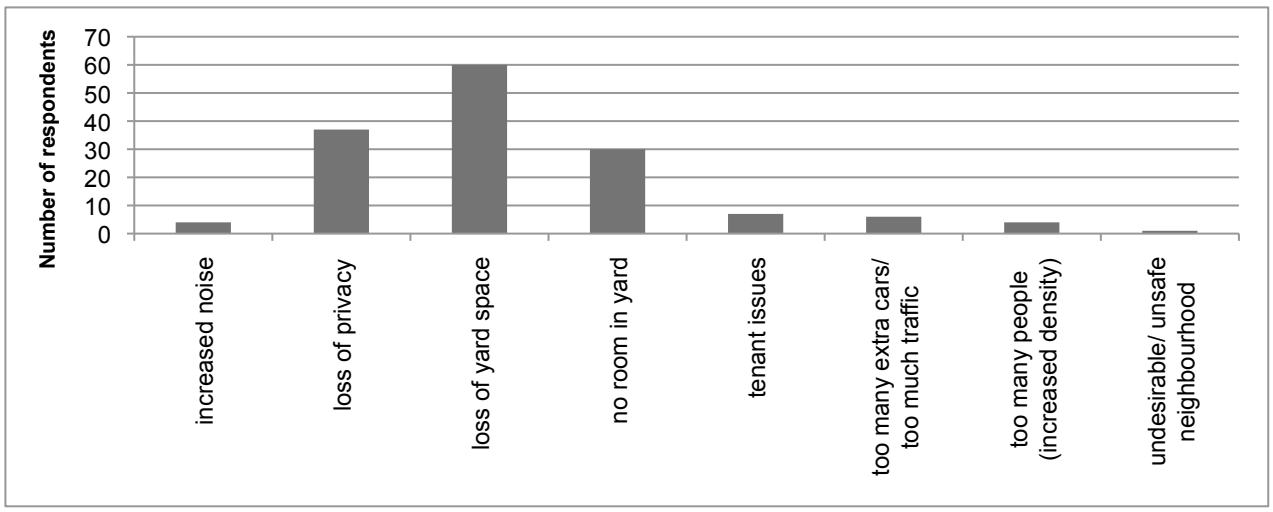


Figure 3.39 – Negative reasons for garden suite in own backyard

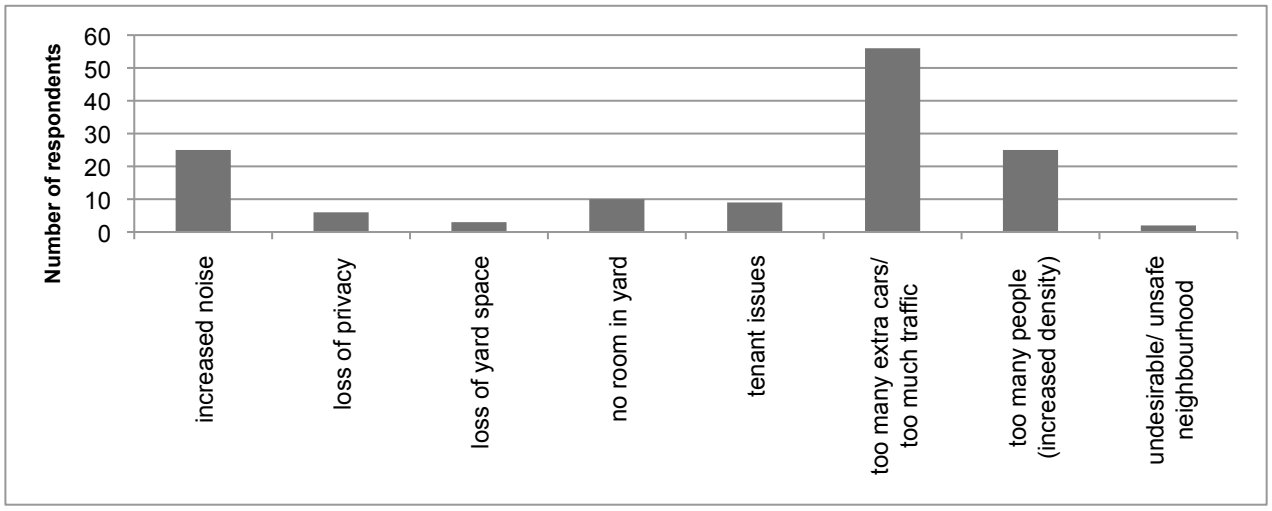


Figure 3.40 – Negative reasons for garden suite in the backyards of other houses on the street

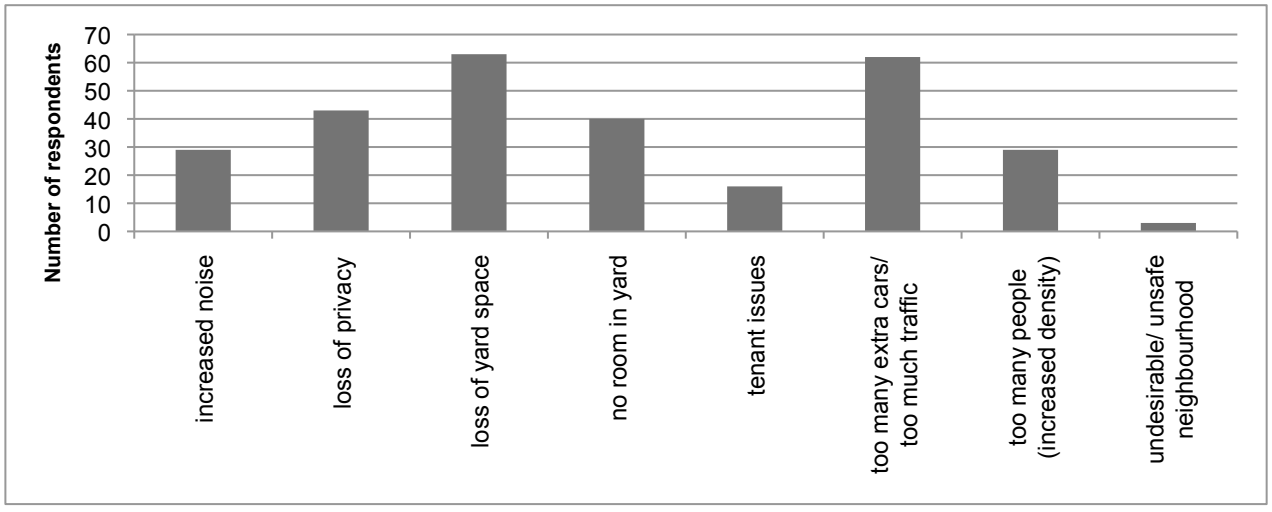


Figure 3.41 – Negative reasons for garden suite in own backyard and in the backyards of other homes on the street

Option 3: Infill Unit

Homeowners were asked, if budget were not a constraint and if allowed by zoning regulations,[5] would they sell their side yards for a substantial sum of money (minimum of $50,000) in order to build a row-house infill between their house and their current neighbour's house (**Figures 3.42-3.46**). The infill unit would be intended for young families (who don't have a lot of money and who likely have student debt) who want to live in an established neighbourhood like Convent Glen North with so many good schools, parks, and other amenities, or for retired couples who don't want to leave the neighbourhood but who no longer need a 3- or 4-bedroom house.

The answer to this option was an overwhelming no at 96%; 97% of households with children answered no, while 95% of households without children answered no. This option was viewed as the most negative proposal, possibly because infill units would actually change the look of the neighbourhood, as opposed to basement and garden suites that would not be visible from the street.

Of the eight respondents that *would* sell their side yard for the construction of an infill unit, six live with a partner (these couples are in the 55-75 age range), and two live with a partner and children. The household income of all but one respondent is above $81,000. This suggests that for the respondents who would sell their side yards for infill housing, it is not necessarily a decision based on financial need, but a willingness to introduce affordable housing in the neighbourhood.

The homeowners were also asked how an infill unit next to their house would affect their quality of life, positively or negatively, then asked to explain their choice in an open text box. 96% said it would affect their quality of life negatively; 97% of households with children believed it would be negative and 96% of households without children said it would be negative. The most common negative reason given was no room/not feasible followed by loss of yard space (**Figure 3.47**). It is important to note that the average space between houses in Convent Glen North is four metres (13ft); in some areas there really would be no space for a reasonable infill unit, with only 1.5m (5ft) between houses, but in other areas (especially on cul-de-sacs) there is 7.5m (25ft) between houses. Many respondents wrote "no room, only 10ft between

[5] Under current zoning restrictions in Convent Glen North, infill housing would not be permitted due to setback and minimum lot size restrictions – see **Appendix 2**

houses," and one person wrote "could not be done, we have 25 feet between the homes." Most respondents would not be familiar with narrow house designs, nor expect them to be possible in a typical suburban neighbourhood. Positive reasons included providing more affordable housing and income from sale of side yard.

The homeowners were asked how infill units on their street would affect the sense of community on the street, positively or negatively, then asked to explain their choice in an open text box. 91% said it would affect the sense of community negatively; 92% of households with children believed it would be negative and 90% of household without children said it would be negative. The most common negative reason given was too many extra cars/too much traffic (**Figure 3.48**). Positive reasons included more community members and increased diversity (especially children and young couples), and better sense of community.

The most common negative reason given, if the homeowners themselves sold their side yard for an infill unit and if several neighbours did the same, was no room/not feasible followed by too many extra cars/too much traffic (**Figure 3.49**).

Figure 3.42 – Four metre (13ft) wide (from outside wall edge to outside wall edge) infill house; living area: 116m^2 (1,252 sqft) source: drawn by author 2014

Figure 3.43 – Four metre-wide infill house, street elevation source: drawn by author 2014

Figure 3.44 – Four metre-wide infill house, rear elevation source: drawn by author 2014

Figure 3.45 – Four metre-wide infill house, street view source: created by author with ArchiCAD 17, 2014

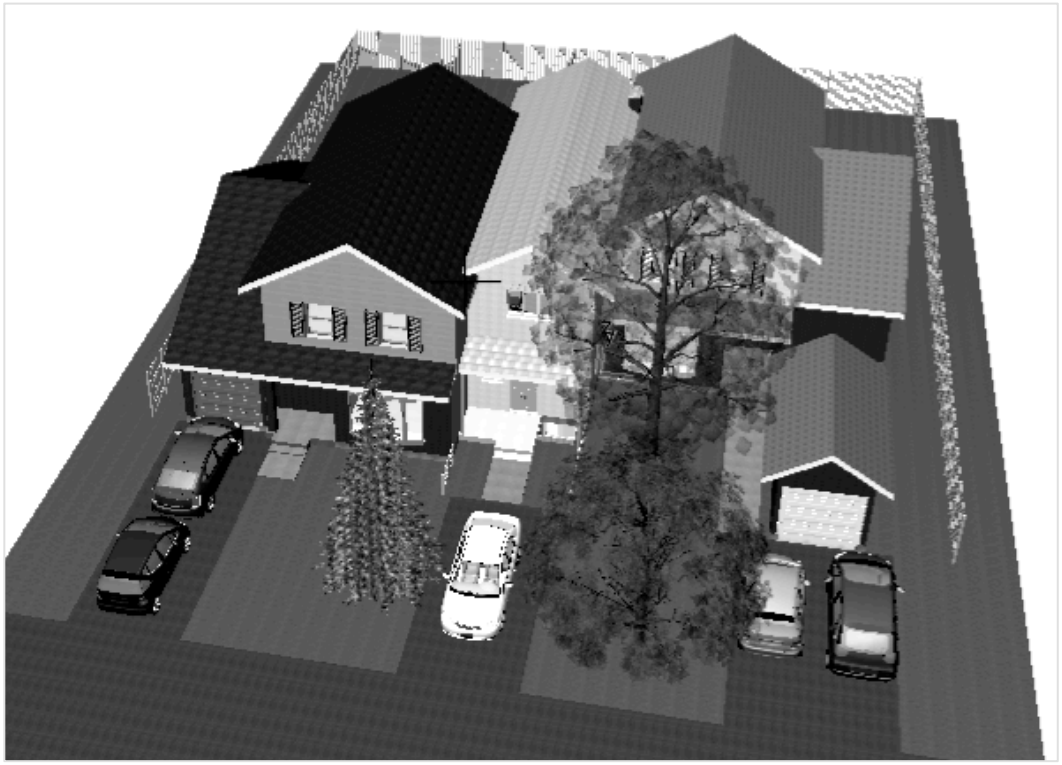


Figure 3.46 – Four metre-wide infill house, aerial view source: created by author with ArchiCAD 17, 2014

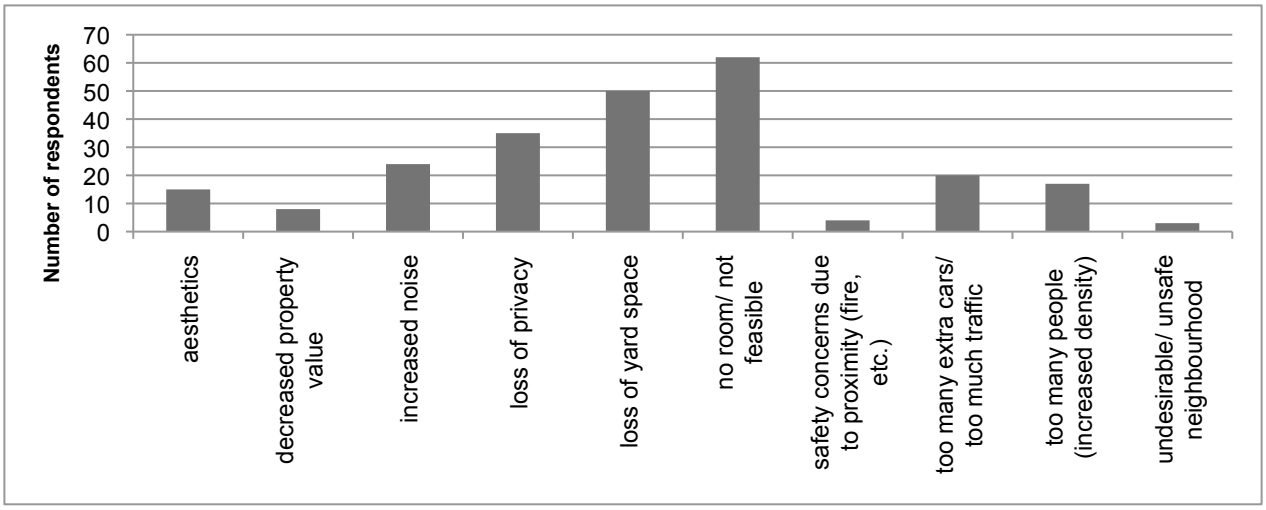


Figure 3.47 – Negative reasons for infill unit next to own house

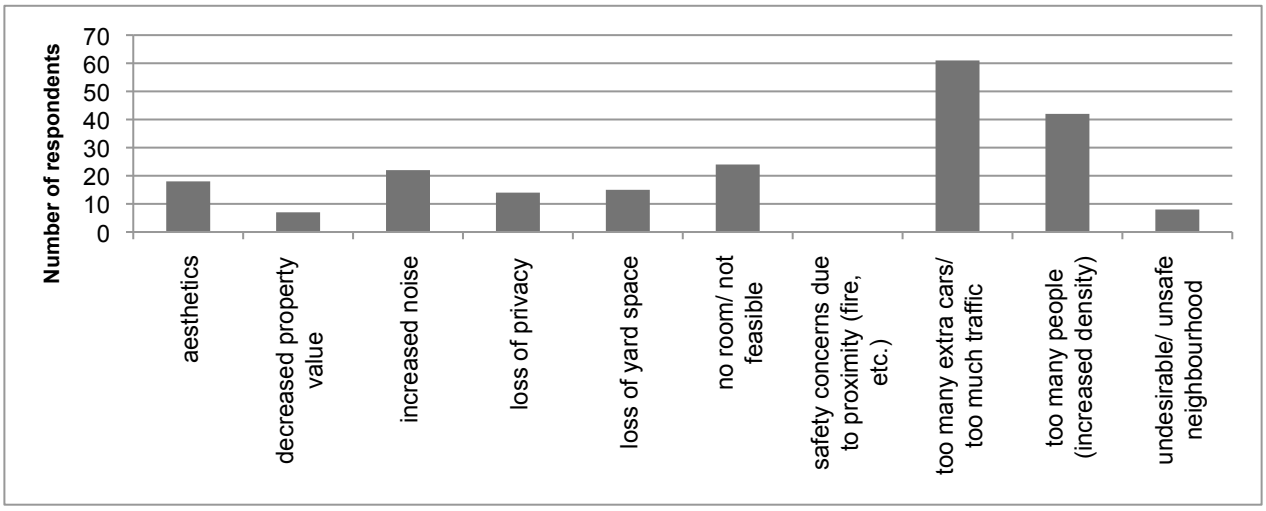


Figure 3.48 – Negative reasons for infill units on the street

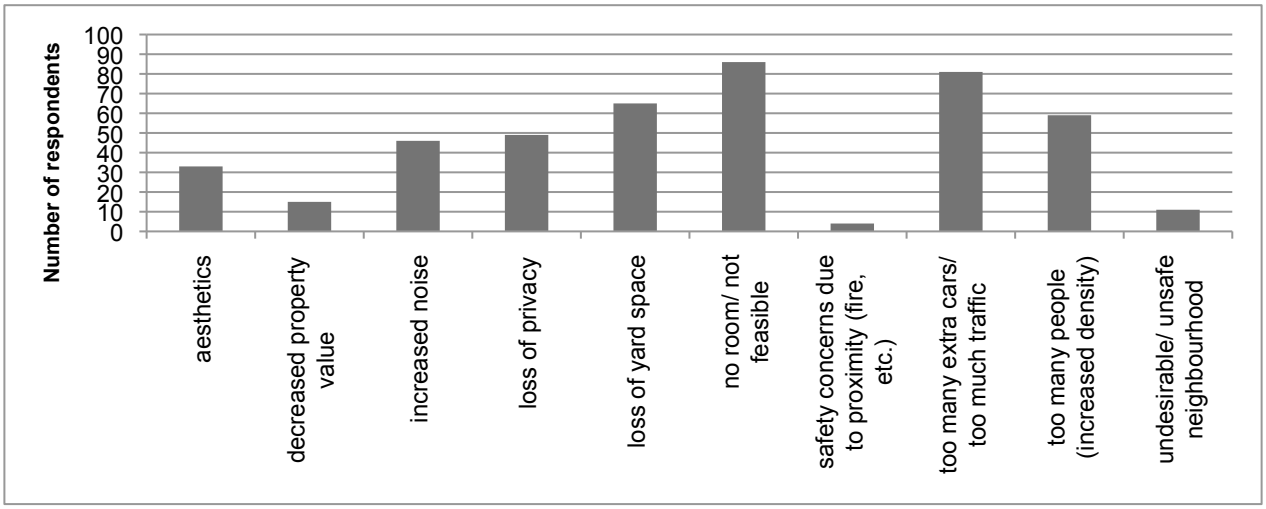


Figure 3.49 – Negative reasons for infill units next to own house and on street

Six respondents (3%) would be willing to build a basement apartment or a garden suite but not an infill unit; four respondents (2%) would be willing to build any of the three options.

Respondents' reactions to all three affordable housing options were, overall, negative. Their responses indicate that part of the reason they chose to live in a suburban neighbourhood was for the privacy and yard space, and the neighbourhood's lower density. None of the potential benefits of affordable housing outweighed the perceived negative impacts on their lifestyle choices.

For all three proposed modifications for affordable housing, the most common reason given for not wanting them was the number of extra cars/too much traffic. If the garden suite is to be used for elderly parents, it is likely that it would be one parent and not a couple. This would only add one car to the driveway (most driveways in Convent Glen North – not counting the space in the garage – can hold two to four cars). It is also conceivable in some cases that the occupant no longer drives. If the infill unit is purchased by a retired couple that wants to stay in the neighbourhood but no longer needs a large house, they would have at most two cars (two people = two cars), both of which could fit on the driveway of the infill unit, which would be set far enough back from the street to allow this.

However, when all three units (basement, garden, infill) are designed with young adults in mind, it is unlikely that there would be many, if any, cars added to the neighbourhood. Many studies and reports[6] have found that adults aged 16 to 34 are not buying cars. They either cannot afford the price of a car plus maintenance, insurance, and high fuel prices, or they prefer to take public transit or use active transportation (walk, cycle, etc.). In Convent Glen North, this is more than possible (see **Section 3.3** above). An informal poll I conducted of seventy-six friends and friends-of-friends indicates that 39% of people aged 20 to 35 plan never to own a car, with the most common reasons for this being a preference for public transit and/or for active transportation (walking, cycling, etc.) (**Figure 3.50**).

Thirty-eight respondents (21%) also stressed that Convent Glen North is a *family neighbourhood* and that any of the three proposed modifications for affordable housing would negatively change the *family* character of the neighbourhood because the occupants of the basement unit, garden suite, and infill house would be young adults, young couples (who may be

[6] For example: Buss 2014, Davidson 2014, Deloitte 2014, LeBeau 2014, Tencer 2013, Thompson and Weissmann 2012, Tullman 2013, and Tuttle 2012.

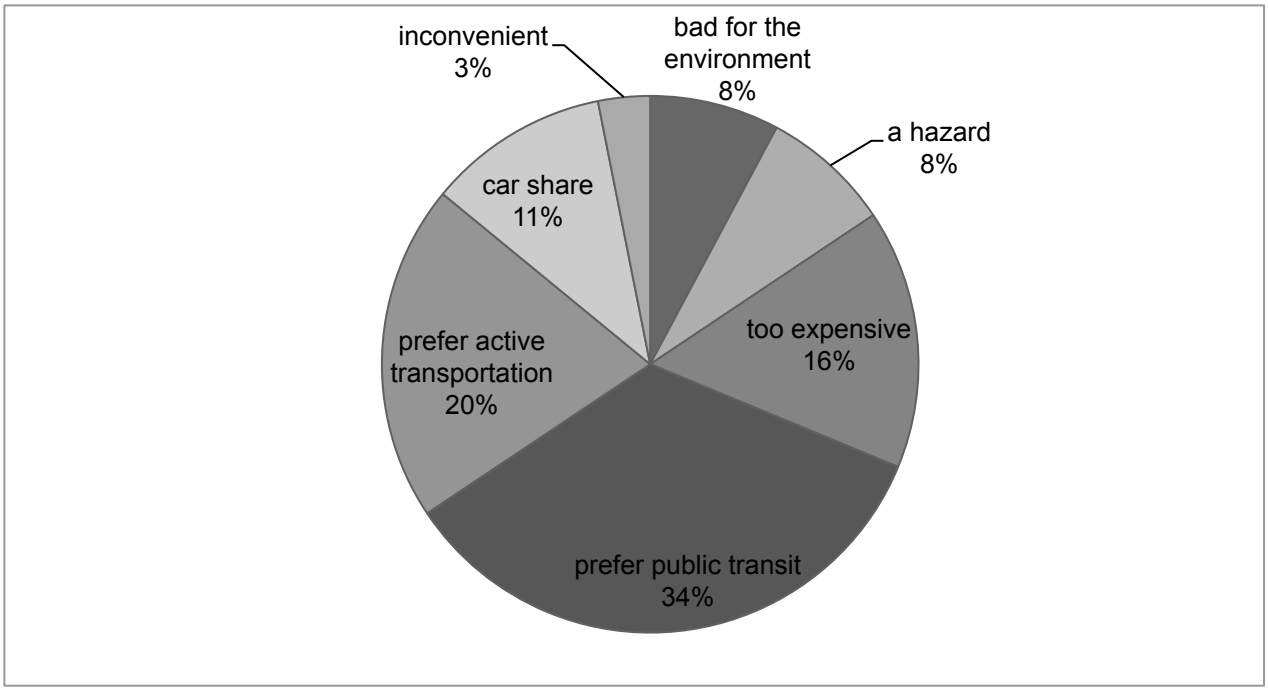


Figure 3.50 – Reasons for planning never to buy a car

planning to have children), young families, and elderly parents. Ironically, 82% of the people who emphasized that this is a *family* neighbourhood are couples without children living at home, with the average ages of these couples in the 55 to 64 year range.

This suggests that suburbs are still viewed as places for nuclear families and that even couples whose children have now moved out still view themselves as nuclear families. Alternatively, this could represent a desire to maintain the homogeneity of the neighbourhood (whether in household composition or income bracket). When answering the section of the questionnaire that proposed the three options for affordable housing, many questionnaire respondents seemed to feel that their neighbourhood and way of life was being threatened. Several homeowners indicated that they had worked hard to be able to buy their houses and that the people who cannot afford a house in Convent Glen North should live somewhere else. Several respondents also suggested that bringing in the type of person who cannot afford the typical house in Convent Glen North (and who would benefit from the affordable housing options) would bring crime and "undesirables" into the neighbourhood.

The current average house price in Convent Glen (North and South) is $471,521 (Hamre 2014). The average house price in Ottawa in 1978 was $59,134 (Bradie 2014). In 2014 dollars

this is $203,414.[7] This indicates that housing prices in Convent Glen North have more than doubled since the neighbourhood was built. One questionnaire respondent, who is not an original homeowner but has owned the house for twenty-seven years, wrote: "at the time it was affordable to have a house in this neighbourhood." The average house price in Ottawa in 1987 was $119,612 (Bradie 2014), which is $219,841 in 2014 dollars – still half of what houses sell for today. With the average length of time that all questionnaire respondents have owned their houses being twenty years, it is possible that many of these respondents may not realise how much housing prices have increased. (Twenty years ago the average house price in Ottawa was $147,543, which is $217,513 in 2014 dollars, again still half of what homes are selling for today.) The average income per person in Ottawa in 1994 (in 2014 dollars) was $34,365, and in 2011 (in 2014 dollars) was $45,925 (Statistics Canada 2013).[8] In constant 2014 dollars, housing prices have increased by 116.8% in the last twenty years while income has increased by only 33.6% in the same time frame.

3.5 Interview Results

Once questionnaire data had been collated, it became apparent that there were topics that were not expressly covered in the questionnaire and that respondents had not mentioned themselves. Questionnaire respondents who had indicated that they would be interested in an interview were contacted and invited to answer follow-up questions by e-mail. Seven people answered follow-up questions.

3.5.1 Sustainability

Many of the follow-up questions focused on sustainable energy. Only 30 of the 185 original questionnaire respondents (16%) mentioned anything related to sustainability (whether it was something installed by a previous owner, something the current owner had installed, something the current owner was planning to install, or something the current owner would install in a dream renovation) (**Table 3.2**).

[7] All translations into 2014 dollars calculated through the Bank of Canada's (n.d.) inflation calculator.
[8] Data specific to Orléans is not available.

	Installed by previous owner	Installed by current owner	Current owner is planning to install in the next five years	Dream renovation
Solar panels	1 (but removed by current owner)	1	1	3
Solar domestic hot water	1	0	0	1
Tankless/on-demand domestic hot water	0	2	0	2
Low-flow toilets	1	7	2	0
Dual-flush toilets	0	1	0	0
Greywater system	0	0	0	1
Geothermal heating/cooling system	0	0	0	2
Air source heat pump or air exchanger	1	1	0	0
Net zero house	0	0	0	2

Table 3.2 Sustainability as mentioned by questionnaire respondents

In the follow up, interviewees were asked their thoughts on solar panels, solar water heaters, tankless/on-demand water heaters, low-flow and dual-flush toilets, rain barrels, greywater systems, and geothermal heating/cooling systems (one item at a time). Interviewees were given a basic description of each item in case they were unfamiliar with it. For each of these sustainable energy systems, the homeowners were asked their impression of the system (positive, negative, or neutral), whether the system is positive or negative for homeowners, whether they currently have the system installed in their home and their reasons for or against, and would they chose a home with this system (sometimes with a small premium to the house price) if they were moving to a new house.

None of the interviewed homeowners have solar panels on their homes, though five out of seven view solar panels as positive overall as well as positive for homeowners. The other two respondents viewed solar panels as negative overall as well as negative for homeowners. The main reasons for not installing solar panels are worries about 1) reliability; 2) whether they store

enough electricity for non-sunny days; 3) whether they damage the roof (especially their weight plus snow accumulation in the winter); 4) being are expensive to install; and 5) not being aesthetically pleasing (worries that the aesthetics of solar panels will decrease the value of the home); as well as: "you hear talk about how you can sell energy back to Hydro[Ottawa] but it seems to be more of a myth than a reality." Four out of seven respondents would choose a house with solar panels if they were moving.

These responses suggest that there is not enough information available to current suburban homeowners (especially baby boomers) about solar panels. The homeowners interviewed believed that solar panels would be the sole energy source for the home, and homeowners do not seem to be aware of the Ontario Power Authority's MicroFIT program, which was launched by in the Government of Ontario in 2009 in order to increase renewable energy in Ontario (OPA 2014). The MicroFIT program pays homeowners a guaranteed price over twenty years for the electricity produced by renewable energy generators (of ten kilowatts or smaller) and fed into the provincial electricity grid (rather than worrying about generators and batteries) (OPA 2014). Solar panels will cost between $20,000 and $40,000 to install (depending on the size of the generation system), but with the MicroFit program, there is a guaranteed minimum of 10% return on this investment, meaning that the solar panels will be paid for in ten years (solar panels systems have a twenty-five year warranty) (Wilson 2013). 40% of questionnaire respondents indicated that they are able to spend more than $20,000 on home modifications over the next five years, so many of these homeowners could feasibly install solar panels.

The solar domestic hot water heaters met with a similar reaction to the solar panels, with similar reasons for not installing them, especially the cost. Four out of seven respondents would choose a house with solar domestic hot water if they were moving. Solar domestic hot water heaters cost about $3,500 to install and can save homeowners 35-55% on their water heating bill (Boone 2011). However, solar domestic hot water heaters are not included in Ontario's MicroFit program, and the roof space is probably better used for solar electricity generation.

Tankless/on-demand domestic hot water heaters received a very mixed reaction, though none of the homeowners have one. Four out of seven would choose one of these water heaters, and two would choose traditional water heaters. Reasons for not installing a tankless/on-demand water heater included not working as advertised and wasting resources. A Consumer Report

(2008) indicates that these are not effective systems in Canada due to inconsistent water temperatures, high up-front costs ($1,200 compared to $300 for a standard hot water tank; and high-efficiency models cost even more) that take more than twenty years to be recouped through heat-energy savings, and higher maintenance requirements (need to be serviced once a year to prevent calcium build-ups in the system). This system would need to be improved before pushing these as energy savers in houses.

Low-flow or dual-flush toilets were popular with all seven homeowners. All seven would choose these over standard toilets. The main reason given for installing them was to conserve water. One person included that they replaced their toilets with a government incentive rebate. Questionnaire data does not suggest that many people have low-flow toilets in their homes, but it is more likely that people did not think to include this information in the questionnaire. Based on information and products available on home improvement store websites (e.g. The Home Depot Canada (2014), RONA (2014)), it does not appear to be possible to buy standard 13L toilets anymore. As one homeowner pointed out, low-flow toilets "work as well as traditional toilets."

Working as well as traditional systems seem to be key in getting homeowners to adopt resource-conserving systems. One hypothesis arising from these responses is that until all sustainable energy and resource-conserving systems work the way people are used to (traditional systems), it will be difficult to convince homeowners to switch – no one likes to be inconvenienced, even for the sake of the environment.

Greywater recycling systems were viewed as being positive for homeowners by all but one respondent. The one homeowner who indicated that greywater systems are negative said that: "I feel I [would] need a lot more convincing that the water is truly clean after having been used once already. I also feel that it would be troublesome should the system break down. I fear it would require specialized maintenance." None of the seven homeowners have a greywater recycling system, due to cost and inconvenience of retrofitting an older home and knowing nothing or very little about greywater recycling systems before the interview. Greywater recycling systems are a popular choice if moving to a new home. Retrofitting older homes with a complete greywater recycling system would cost around $2,000 plus new plumbing installation (depends on size of home, number of toilets, etc.) (Smusiak 2011); however, this kind of retrofit would be a major inconvenience to homeowners as walls and floors/ceilings would have to be opened in order to properly install the system (new plumbing). Alternately, Water Saver

Technologies for example, offers a small greywater recycling system (AQUS, which retails for approximately $320) that uses lavatory sink water in the toilet tank in conjunction with city water (Sloan 2010). All questionnaire respondents in Convent Glen North conceivably could afford a small greywater recycling system (which has no renovation inconveniences), and 88% of homeowners indicated in the questionnaire that they are able to spend more than $5,000 over the next five years on modifications, and so could afford a complete greywater system.

A question about rain barrels was included in the interview, though it is not something people typically consider when asked about home modifications. No questionnaire respondents mentioned rain barrels, but five of the seven interviewees have rain barrels (for use in the garden), all seven view them as positive, and of the two people who would not choose a house with rain barrels, one indicated that "our gardening activities are quite limited [and we would not have a use for the collected water]," and the other indicated that they had had maintenance trouble with their rain barrels and now view them as too inconvenient. Rain barrels retail for an average of $100 (e.g. Walmart (2014), Canadian Tire (n.d.)), and likely would be a reasonable investment for most Convent Glen North questionnaire respondents.

Geothermal heating/cooling systems were viewed as positive for homeowners by all seven people interviewed, though none have this system in their homes. Reasons for not having a geothermal system ranged from not knowing much about the system and its pros and cons to cost and lack of local expertise, and concerns that the properties are not suitable for heat pumps. Four out of seven homeowners would choose a house with a geothermal heating/cooling system if they were moving to a new house. While retrofitting suburban houses with these systems is costly, with a geothermal system costing $20,000-$30,000 (CGC n.d.), its initial outlay and time-to-recoup-costs through energy savings are similar to those of solar panels (about ten years). While information about solar panels and solar energy is becoming more available, geothermal heating/cooling systems are not well known. Additionally, solar panels are seen as a fairly easy retrofit (they get bolted onto the roof) while geothermal requires boring holes in the yard (only about 10cm diameter but 120m deep) (GeoSmart Energy 2012). In the Government of Canada's EcoEnergy rebate program that ran from 2007 until 2012,[9] homeowners could receive up to $5,000 back for installing a geothermal heating/cooling system (NRCan Mar. 2014). However,

[9] This rebate program ended in March 2012. The Government set a cap of 250,000 participants due to budgetary constraints (NRCan Mar. 2014).

this rebate program also covered the replacement of original furnaces and air conditioners with energy efficient ones, and as geothermal systems are not well known, uncommon, and even including the government rebate, prohibitively expensive, most homeowners who took advantage of the rebate system would likely have replaced their traditional heating/cooling systems rather than installing a geothermal system. 32% of questionnaire respondents have replaced their furnace and 23% their air conditioning units. 40% of respondents indicated that they are able to spend more than $20,000 on home modifications over the next five years, so many of these homeowners could afford to install a geothermal heating/cooling system.

Interviewees were asked if they had had a blower-door test done on their home. Three out of seven homeowners interviewed had had this test done. 53% of questionnaire respondents have replaced their windows and 18% have replaced their doors (6% of respondent indicated that the windows had been replaced by the previous owner and 2% for doors), with the reason for this modification being energy efficiency. It is unknown how many questionnaire respondents had had a blower-door test done, but identifying and sealing air leaks (beyond what is done when replacing windows/doors) does not appear to be how most people increase their home's energy efficiency.

The results from the interviews as well as the questionnaires suggest that current suburban homeowners do not have enough information about sustainable energy nor energy efficiency beyond the basics of energy-efficient appliances, windows, and furnaces/ air conditioners.

3.5.2 Preferred Housing Typology

In the interview, homeowners were asked their preferred housing typology, first by housing type (detached, semi-detached, row house, apartment, or other, including mobile home), secondly by levels (bungalow, ranch, split-level, two storey, or three storey), and lastly by preference of basement or no basement. Interviewees' choices can be found in **Table 3.3**. All but one person chose the detached house type. Interestingly, the one person who chose semi-detached currently lives in a detached house. I was actually expecting more people to prefer ranch or bungalows, as there are fewer stairs and better allow aging-in-place. Based on the seven interviews, plus the fact that everyone chose to live in Convent Glen North, where nearly all the houses are two-storey or split-level, it appears that detached, two-storey houses with basements are popular.

	Housing Type	Levels	Basement or No basement
Person 1	Detached	Bungalow	Basement
Person 2	Detached	Two-storey	Basement
Person 3	Detached	Two-storey	Basement
Person 4	Detached	Two-storey	Basement
Person 5	Detached	Two-storey	Basement
Person 6	Semi-detached	Two-storey	Basement
Person 7	Detached	Two-storey	Basement

Table 3.3 Interviewees' preferred housing typologies

3.5.3 Additional Solutions for Affordability

Interviewed homeowners were asked if they had any ideas for more affordable housing in the neighbourhood beside the three options proposed in the questionnaire. Three out of the seven homeowners had suggestions. One person suggested building affordable apartment buildings in designated areas, but did not know where these areas would be. Another person suggested house-share programs that connect similar-minded people with housemates. The third person who had suggestions (who does not work in urban planning or a related design field) proposed four different solutions: first, to build four to eight storey mixed-use residential buildings in the oversized Metro (grocery store) parking lot (this parking lot is never even half full, not even before major holidays such as Christmas) (**Figure 3.51**). Second, to use the "fallow land at the top of Orléans Blvd" for four storey apartment buildings (**Figure 3.52**). Third, to convert garages into housing units by replacing the garages with a new unit (with basement), but still attached to the main house so that they can "share water, electricity, etc." Last, to buy two adjacent lots and subdivide into three to four lots. The existing houses would be torn down and replaced with three to four units, and two units would be "given to the former [house] owners, [and the] extra unit(s) would be sold to new owners."

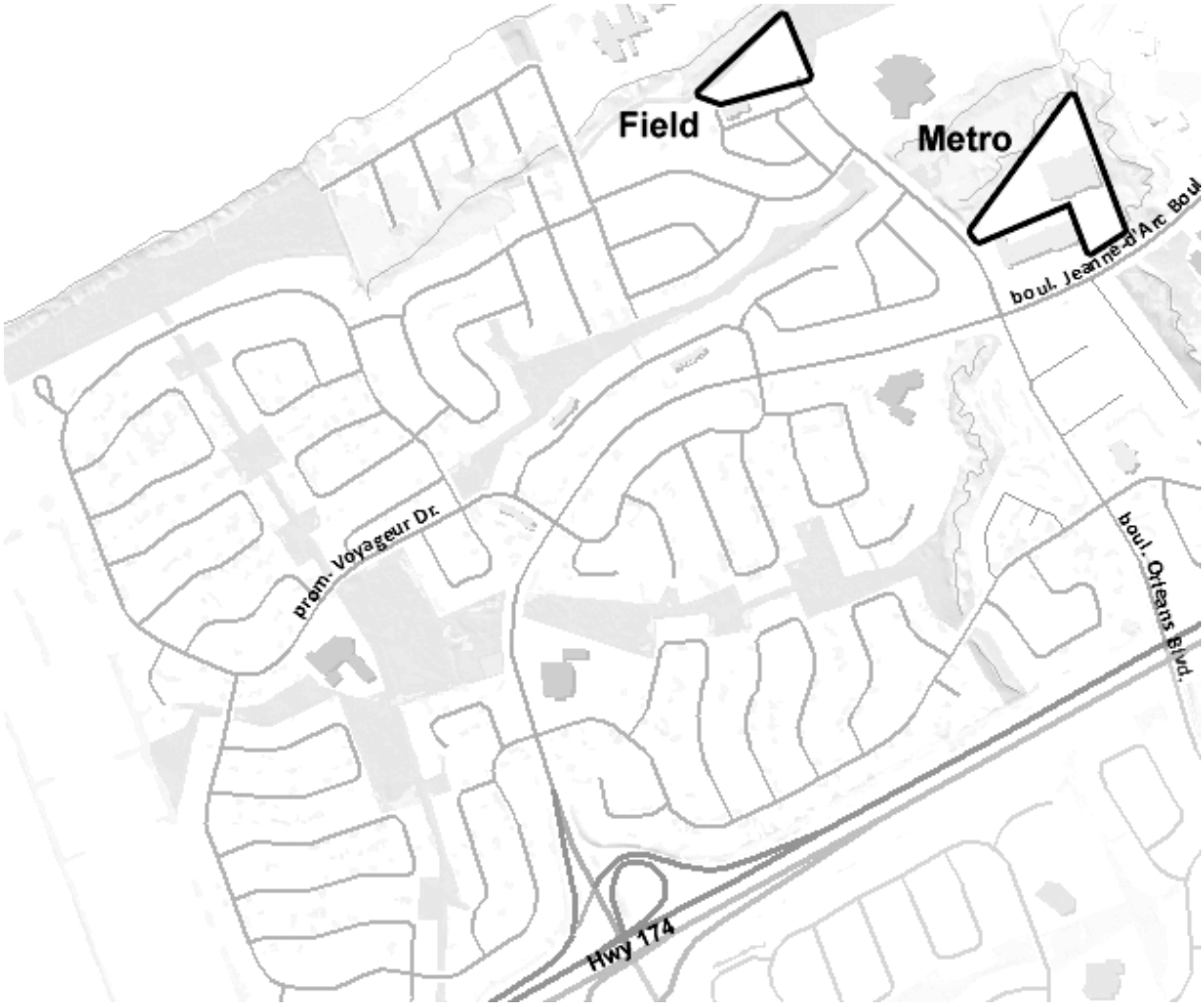


Figure 3.51 – Location of the Metro grocery store and the field at the end of Orléans Blvd. source: City of Ottawa 2014

Figure 3.52 – Left: Unused section of Metro parking lot (looking from Orléans Blvd.); Right: Field at the end of Orléans Blvd. source: photos by author 2014

It is not surprising that most of the homeowners interviewed had no suggestions for adding affordable housing to the neighbourhood; overall, based on questionnaire results (**Section 3.4.5** above), current homeowners do not want the "feel" of the neighbourhood to change, nor "other" people to move into the neighbourhood. The options proposed by the third interviewee are in line with densification initiatives being undertaken all across Canada, though not as often (yet) in suburban neighbourhoods. Convent Glen North is not a likely candidate for densification in the near term. It is separated from downtown Ottawa by several other suburban neighbourhoods that would be densified first as well as by Greenbelt land.

3.6 CONCLUSION

Convent Glen North is an aging neighbourhood and the results of the questionnaire suggest that its residents are aging with it. Most respondent households are couples in their sixties without children at home. As the families have grown and changed over the years, homeowners have adapted rooms for different uses and have made modifications to their homes to match their current needs and expectations of comfort. However, homeowners are often not planning for their future needs. This is shown in part by the reluctance to adopt energy-efficient systems or sustainable energy generation. Residents do not want to be inconvenienced by having to change their lifestyles, and they are concerned about possible extra maintenance (and inconvenience) of these systems. The occupants of the suburban houses in Convent Glen North are comfortable in their homes and their chosen lifestyle, and do not want it to change or be challenged, as indicated by the overwhelmingly negative response to proposals of options for affordable housing, as well as a lack of suggested alternatives from the interviews. Suburbs are still viewed as places for nuclear families and couples whose children have now moved out still view themselves as nuclear families

Overall, the research indicates that efficient, affordable solutions for the future exist and that people in a broad sense are aware of the issues and that there needs to be a solution. However, the individual homeowners within these suburban neighbourhoods are wary of major changes. Homeowners are happy to change their houses to suit their own needs, but are cautious of changes that benefit the broader environment. It is possible that homeowners need to see these kinds of changes adopted successfully on a large scale elsewhere before adopting them themselves.

CHAPTER 4 – MOVING FORWARD

4.1 INTRODUCTION

The starting point for this research was to determine how houses built in the 1960s, 1970s, and 1980s can be modified affordably and sustainably to accommodate and attract contemporary users whose family units, interactions, and activities continue to evolve, and to determine whether the houses built for the "baby boom" generation are still a viable housing option for today's families.

As they stand today, these houses fill the provide homes for families in a traditionally desirable setting. However, this style of building and style of neighbourhood design no longer may be appropriate in terms of household activities and family structure, city design and expansion, energy efficiency and other aspects of environmental sustainability. The cost of demolishing these older neighbourhoods and starting over is too high, but there are ways to better use the space in the neighbourhoods and homes, as well as straightforward solutions for increasing energy efficiency and environmental sustainability.

Firstly, it is important to acknowledge and understand fundamental societal changes. A significant example is the changing family unit; the family unit once consisted of father, mother, and several children, but that is no longer as common today, with single parent families, multigenerational families, and empty nesters.

Secondly, the number and scope of activities that are now conducted in the home has increased considerably since the mid to late twentieth century. For example, many homes now have spaces used as a home office, home theatre, or home gym, all for activities that were previously conducted mainly outside of the home, and most families have Internet connections and computers, as well as televisions with video game consoles, which were inconceivable activities and technologies forty years ago.

Lastly, research and technology in energy efficiency and environmental sustainability has advanced significantly since the homes were built forty years ago. Standards for air leakage, insulation, windows and doors (insulation properties) have been improved, and appliances, furnaces, and air conditioners have become more energy efficient (use less water, electricity, or natural gas). Effective sustainable energy generators and resource conserving systems are now also available to homeowners, when they either did not exist when the homes were built or were too unwieldy, ineffective, or expensive for homeowners to install previously.

This report is intended to add to the research and knowledge base in the areas of adaptability, affordability, and sustainability of mid to late twentieth century housing, for researchers, architects, and policy makers who are interested in and working on renovations for homes that were built in Canada during this time.

4.2 DESIGN

Who uses houses, and how they use them, has changed. Additionally, owner expectations of houses have shifted; ceramic or hardwood flooring, a mostly open ground floor plan, more privacy for the master bedroom, more luxurious bathrooms, and bigger, well equipped kitchens – these have all been addressed in new suburban housing being built.[10] While these particular expectations have been addressed in new housing, homeowners in older neighbourhoods address these expectations by modifying their houses – by replacing flooring, knocking out walls, and renovating bathrooms and kitchens, for example. Homeowners of course make changes and are already planning changes when they move in – but mostly this is the result of near-term planning, with 78% of homeowners having no plans for modifying their houses based on future needs (see **Section 3.4.4**).

With family structures, demographics, and household sizes changing over time, perhaps the ideal house design is one that allows the household to stay in the same house for a lifetime – for example, newly married, with children, empty nest, retired, grandchildren, and lowered mobility.

Bungalows, because there are fewer stairs, are perhaps better suited to the "lifetime" home than the split-level and two-storey homes built in Convent Glen North and in most new suburban developments in Ottawa.[11] Because the bungalow has fewer stairs, there are fewer problems for homeowners with reduced mobility. Additionally, when all rooms are on the main floor, a room may be a child's bedroom at one stage, but is very easily adapted to an office where the homeowner received clients (second floor bedrooms are obviously bedrooms, whereas a ground floor bedroom could just as easily be an office).

[10] For example: Ashcroft Homes (2011), Claridge Homes (2014), Mattamy Homes (n.d.), Tamarack Homes (2014), and Tartan Homes (2014).
[11] Again for example: Ashcroft Homes (2011), Claridge Homes (2014), Mattamy Homes (n.d.), Tamarack Homes (2014), and Tartan Homes (2014).

These “lifetime” homes also need to be designed to accommodate needs of subsequent uses and users, and therefore must be easily changeable, both in room uses and in interior layout. In order for homeowners to make these kinds of changes relatively effortlessly, interior partitions should not be static and difficult to move like the interior walls in current houses – made of wood studs and drywall. Instead, houses could be designed in a more innovative fashion by employing new movable partition systems, such as those being used by Japanese architect Yuko Shibata (**Figure 4.1**).

Figure 4.1 – Yuko Shibata’s “Switch” source: Hamada 2010

Standard new homes, not just high-end “eco” homes, could be designed with sustainable energy generators (such as solar panels) and resource conserving systems (such as greywater recycling systems). However, these generators and systems (namely solar panels, solar water heaters, low-flow or dual-flush toilets, rain barrels, greywater systems, and geothermal heating/cooling systems) must be integrated in the design seamlessly, and must not stand out or

be considered an eyesore (they have to look like the standard suburban houses people expect). Additionally, the homeowners will need a guarantee that these new standard systems will not cause them any inconveniences or extra expense and maintenance compared to the current standard systems. For example, some homeowners see traditional solar panels (**Figure 4.2**) as "ugly" (as noted in **Section 3.5.1**). To encourage all homeowners to install solar generators on their current houses or to choose a house with solar generators if moving, designers perhaps should incorporate coloured solar panels, to match the colour of the roof, or solar shingles, which follow the expected suburban aesthetic (**Figure 4.3**).

Figure 4.2 – Minto's EcoHome – the rear roof features "solar water collectors" and "photovoltaic solar electricity panels" source: Minto Group Inc. 2008

Figure 4.3 – Left: Coloured solar panels match a brown roof; Centre and Right: Solar shingles source: Kenergy Solar 2012 (left and centre), Moore n.d. (right)

4.3 POLICY

4.3.1 AFFORDABILITY

In adapting the existing houses and neighbourhood to provide affordable units, the only zoning change that would need to be introduced would be one that allows infill units between existing houses. The zoning in Convent Glen North already permits secondary units to be built in houses and their yards (i.e. basement apartment and garden suite) (see **Section 3.3**). By promoting the existing zoning and by encouraging flexible zoning, officials can encourage more diversity in the neighbourhood, both in household structure and income bracket.

However, it is not primarily zoning regulations that have prevented the introduction of affordable housing options in suburban neighbourhoods, it is the current homeowners. These homeowners have chosen to live in the suburbs for the accompanying lifestyle: the single family house with a big back yard, garden, two car garage, and two cars – essentially, they have chosen the (North) American dream (Dash 2014, Gallagher 2013). Suburban homeowners want a stand-alone house with yard and are strongly opposed to the densification of their neighbourhoods. Densification encourages people to move further out for more land – just over 10% of the questionnaire respondents indicated that if this were to happen in Convent Glen North they would move out to a less dense neighbourhood. This is unsustainable, as land is a finite resource (which is being consumed by urban sprawl). Planners are designing neighbourhoods along the Smart Growth principles (see **Section 2.5.2**), for example, but these are not as popular with current homeowners. Baby boomers still have the suburban (North) American dream and this mindset will need to evolve before any planning or zoning principles will have any effective impact. The boomers were promised this suburban dream and they are not going to relinquish it. It may be a few years before a new way of thinking will appear. It is likely that Generation Y and the Millennials,[12] those currently aged 18 to 35, will lead the way.

4.3.2 SUSTAINABILITY

Standards and guidelines need to be continuously updated to mandate energy efficiency and sustainable energy sources for both new and existing housing. Ideally, older housing should be held to the same standards as new housing, notably in the areas of energy efficient appliances,

[12] Generation Y is defined by Statistics Canada (2012(c)) as those born 1972-1992, and Millennials as those born after 1993.

windows and doors, and HVAC systems, as well as in the adoption and use of sustainable energy sources. For instance, mandating the installation of solar panels on all houses may become necessary in the future, and older houses can be outfitted with solar generators, just as new houses can/are. However, awareness about options for homeowners needs to be increased – awareness about benefits for the environment, certainly, but more importantly, awareness of benefits for the homeowner (especially those from the baby boomer generation), such as reduced electricity bills, reduced natural gas bills, and reduced water bills.

To encourage homeowners to install sustainable energy and resource conserving systems, government incentives should be introduced from the City of Ottawa, the Government of Ontario, and/or the Government of Canada. For instance, solar panels are currently supported under the Ontario Power Authority's MicroFit program (see **Section 3.5.1**). Incentives to install solar hot water heaters could be created, but roof space is probably better used for solar panels.

The City of Ottawa Drinking Water Services (City of Ottawa n.d.(b)) could provide homeowners with a 10% off coupon for the purchase of rain barrels. The City benefits not only by decreasing the amount of drinking water used (rainwater will be used in the garden in the place of carefully disinfected city water), but also by diverting rainwater from sewer infrastructure (storm sewers).

In order to encourage homeowners to install greywater recycling systems (greywater diverted for use in toilets), the City of Ottawa could introduce a rebate program to cover a portion of the cost of the system (for example, $500-$1,000 would represent 25-50% of the cost of the system itself, not including new plumbing installation and retrofitting costs – e.g. drywall repair). Alternately, the rebate would cover the cost of the taxes on the system and the installation (homeowners would get the system and installation tax-free). Another option would be to reduce property tax for houses that are outfitted with a greywater recycling system, with the rationale being that these house are contributing less waste to the sewage system (using infrastructure less heavily). The City profits by reducing strain on sewage treatment plants (higher percentage of black water and lower percentage of greywater – less waste overall), as well as by lowering the amount of drinking water consumed by households for flushing toilets. In Canada, toilet flushing uses about 30% of a household's drinking water consumption, and one person uses between 10,000 and 30,000 litres of water per year just for flushing toilets (Environment Canada 2013).

From 2007 until 2012, geothermal heating/cooling systems qualified for the Government of Canada's EcoEnergy rebate program (up to $5,000 which would have covered 16-25% of the total cost). It is unclear how many people actually used the rebate for geothermal. It may be useful for the Government of Canada to run a rebate program specifically for geothermal systems that covers at least 25% of the installation cost, or alternately covers the cost of the taxes. Providing geothermal heating/cooling installation rebates would benefit the Government of Canada in three ways. Firstly, an expanded geothermal industry would create more jobs (e.g. installation, maintenance, and factory production). Secondly, geothermal systems reduce energy currently used by air conditioners and electric heating. This lowers carbon emissions as well as reduces the load on existing infrastructure and diminishes the immediate need for any new power plants. Thirdly, Canada's Gross Domestic Product (GDP) could rise. Geothermal heating replaces traditional furnaces and hot water tanks that run on natural gas. Hence, with more geothermal heating, more of Canada's natural gas could be exported. Higher export rates, combined with the possibility that much of the money saved on heating costs by households would be spent on other goods and services, could result in a rise in Canada's GDP. Canada currently exports approximately half of the natural gas extracted, mostly to the United States (Gormley 2014).

4.4 CONCLUSION

In order to adapt houses built in the 1960s, 1970s, and 1980s for affordability and sustainability it may be necessary, through education, to alter the mindset regarding who lives in the suburbs and how suburban houses look and function. As to whether the houses built for the baby boomer generation are still a viable housing option for today's families, in terms of owner satisfaction, the answer is yes. However, in terms of affordability and sustainability, the answer is no. Most young couples and families today cannot afford to buy the houses built for the boomer generation (see **Section 3.4.5**). Is boomer suburban housing a bust? Maybe not. Modifications can be made to those houses and neighbourhoods to provide more affordable housing options. Straightforward modifications also can be made to the existing houses to increase energy efficiency and sustainability. The first step in the adaptation of these houses for contemporary and future families is encouragement in the right direction … and likely some substantial government incentives.

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APPENDICES

APPENDIX 1 – QUESTIONNAIRE

HOUSING QUESTIONNAIRE

The questionnaire is strictly anonymous.

Please do not include any names, your address, or any other identifying information.

Please mail the completed questionnaire in the pre-addressed, stamped envelope included (do not write any identifying information on the envelope).

1 – DEMOGRAPHICS

These demographic questions are based on the data published by Statistics Canada from the 2006 Census. The intent behind asking these questions is to determine the accuracy of the demographic information for Orléans Ward 1 (see **figure 1**) in relation to the main study area in Convent Glen North. Only aggregate data will be used in the research report when referring to the answers given in this section in order to prevent data from being linked to individuals in any way.

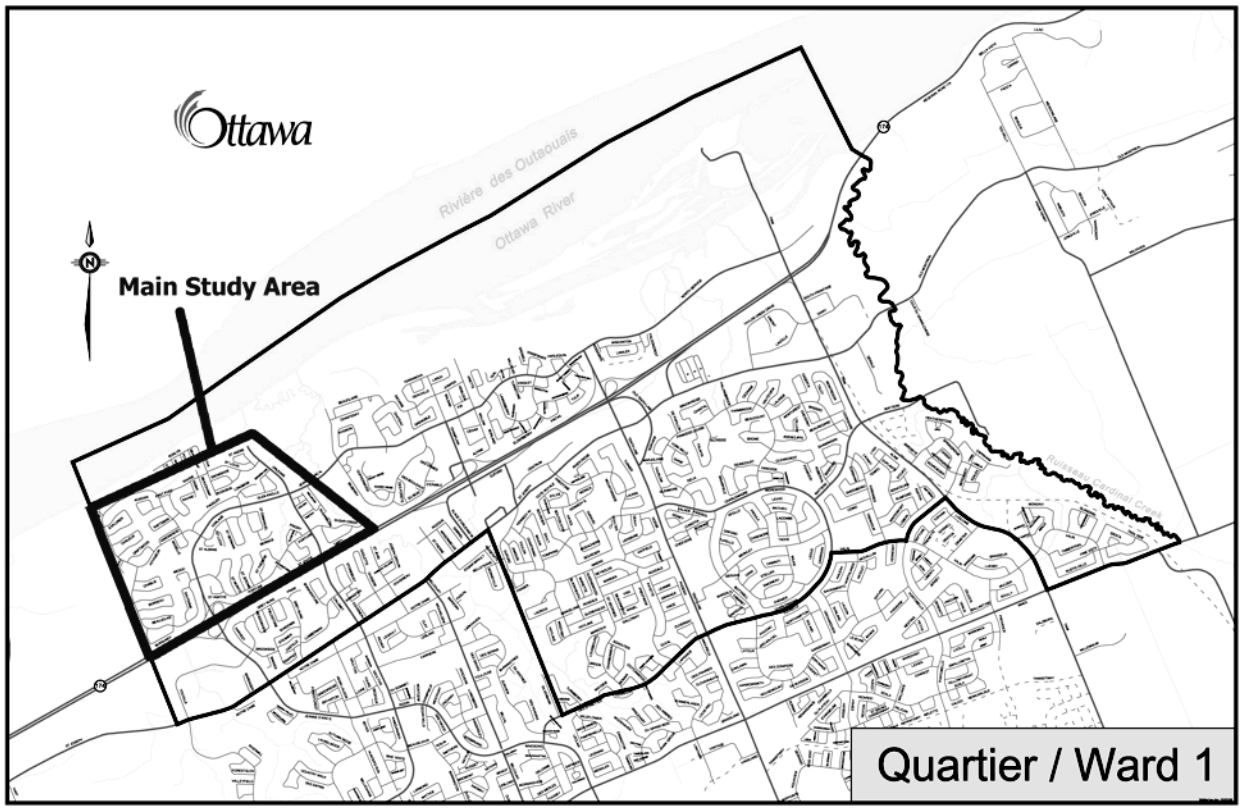

Figure 1 *http://ottawa.ca/*

1. Household size *(please check applicable box)*

☐ 1 person
☐ 2 persons
☐ 3 persons
☐ 4 to 5 persons
☐ 6 or more persons

2. Household age groups *(please check all applicable boxes)*

0 - 4 years	5 - 9 years	10 - 14 years	15 - 19 years	20 - 24 years	25 - 29 years	30 - 39 years	40 - 54 years	55 - 64 years	65 - 75 years	75 years +
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

3. Total number of children at home *(indicate number of children in each applicable category)*

< 6 years	6 to 14 years	15 to 17 years	18 to 24 years	25 years +

2 – ROOM USES

4. Do you use the following rooms for the use they are named for?

While the room may be furnished according to its name, how often is it used for that purpose?

Example 1: A dining room may be furnished with a dining table and chairs, but may usually used as a homework room or craft table – this could be marked as often, sometimes, rarely, or never.

Example 2: An upstairs bedroom may have been used as a bedroom until the child went away to university, and although it is still contains a bed, the room is used for storage – this upstairs bedroom should be marked as rarely or never.

	Always	Often	Sometimes	Rarely	Never	N/A	If often, sometimes, rarely, or never, how (else) do you use the room and/or what (else) do you use it for?
Formal Living Room							
Informal Family Room							

	Always	Often	Sometimes	Rarely	Never	N/A	Other uses for room
Dining Room							
Kitchen (cooking)							
Kitchen (eating)						(Too small for table)	
Back Hall (storage)							
Back Hall (laundry)							
Basement (storage)							
Basement (laundry)							
Basement (other: _____)							

	Always	Often	Sometimes	Rarely	Never	N/A	Other uses for room
Basement (other: _____)							
Master Bedroom							
Upstairs Bedroom 1							
Upstairs Bedroom 2							
Upstairs Bedroom 3							
Other: _____							
Other: _____							

3 – MODIFICATIONS

5. Do you know what year your house was built? If so, please specify.

☐ Yes _____ ☐ No

6. How long have you lived in this house? _____ years

7. Are you the original homeowner? (If yes, skip to question 9)

☐ Yes ☐ No

8.a) Were modifications made to the house before you moved there?

☐ I don't know ☐ No ☐ Yes (specify below)

8.b) For what reasons were the modifications made? *(Please check applicable box(es))*

☐ N/A
☐ Unknown
☐ Increasing the value of the house
☐ Updating (such as modernising fixtures)
☐ Aesthetics
☐ Improved circulation
☐ Improved insulation
☐ Energy efficiency (such as double-glazed windows, low-flow toilets, etc.)
☐ Increased storage
☐ Maintenance (for large upkeep projects, such as replacing the roof shingles)
☐ Change room use (for example a basement room into a guestroom, or a bedroom into a study)
☐ Major structural change (such as knocking out a wall to create a larger room, or adding walls in the basement to create a room)
☐ Addition to house
☐ Other: _____
☐ Other: _____

9.a) Have you made modifications to the house?

☐ No

☐ Yes (specify below)

9.b) If yes, why? *(Please check applicable box(es))*

☐ N/A

☐ Increasing the value of the house

☐ Updating (such as modernising fixtures)

☐ Aesthetics

☐ Improved circulation

☐ Improved insulation

☐ Energy efficiency (such as double-glazed windows, low-flow toilets, etc.)

☐ Increased storage

☐ Maintenance (for large upkeep projects, such as replacing the roof shingles)

☐ Change room use (for example a basement room into a guestroom, or a bedroom into a study)

☐ Major structural change (such as knocking out a wall to create a larger room, or adding walls in the basement to create a room)

☐ Addition to house

☐ Other: _____

☐ Other: _____

10.a) Are you planning to make any modifications/renovations to your house in the future?

☐ Yes ☐ No

10.b) If yes, when? *(Please check applicable box)*

☐ Within the next twelve (12) months

☐ Within the next two (2) years

☐ Within the next five (5) years

☐ Other: _____

10.c) If so, what modifications are you planning to make? And what is your estimated or intended budget for these modifications?

☐ N/A

Estimated / intended budget: $_____

11. How much are you able to spend on home modifications, renovations, updates, etc. over the next five years? *(Please check applicable box)*

☐ < $5,000
☐ $5,000 – $10,000
☐ $10,000 – $15,000
☐ $15,000 – $20,000
☐ $20,000 – $25,000
☐ $25,000 – $30,000
☐ $30,000 – $40,000
☐ $40,000 – $50,000
☐ $50,000+

12. Does your house satisfy your space needs at the moment?

☐ Yes ☐ No

13. Do you feel that your house is missing a particular space – something that you are always thinking that you need? Is there something you wish you could add in the future? *(Please check applicable box(es))*

☐ Nothing
☐ Unsure
☐ Storage
☐ Rec room
☐ Study/den
☐ Eat-in kitchen
☐ Sunroom
☐ Tower / belvedere
☐ Greenhouse / conservatory
☐ Guestroom / guest suite (bedroom and full bath)
☐ Hobby room
☐ Workshop
☐ Deck / patio
☐ Pool
☐ Secret passageways
☐ Other: _____

14. If you had an unlimited budget, what modifications or improvements (e.g. convert basement to hobby room, add sunroom, etc.) would you make to the house? Please include the reason for each modification.

Modification	Reason
e.g. New kitchen cabinetry	*e.g. More storage space*

15.a) Are there problems with the original overall layout of the house?

☐ Yes ☐ No

15.b) What would you change? (e.g. front hall closet next to front door instead of around a corner)

16. When considering home modifications, please rate each of the following in terms of importance, 1 being not important / not a consideration, and 5 being more important / main purpose for the modification. *(Please check applicable box for each option)*

		1	2	3	4	5
a)	Using eco-friendly products (construction materials)	☐	☐	☐	☐	☐
b)	Increasing energy efficiency	☐	☐	☐	☐	☐
c)	Adding value/equity to the home	☐	☐	☐	☐	☐
d)	Adding a sense of personal style	☐	☐	☐	☐	☐
e)	Preventative maintenance	☐	☐	☐	☐	☐
f)	Improving usability of a space/area	☐	☐	☐	☐	☐
g)	Budgetary constraints	☐	☐	☐	☐	☐
h)	Do-it-yourself	☐	☐	☐	☐	☐
i)	Accommodating future needs (working from home, kids moving out, retirement, etc.)	☐	☐	☐	☐	☐
j)	Making use of existing structure (no major structural changes, use of existing plumbing and electrical wiring)	☐	☐	☐	☐	☐
k)	Other: _____	☐	☐	☐	☐	☐

17. Do you have future plans for your house based on anticipated lifestyle changes or changing family needs? (e.g. starting a family; starting a home-based business; retiring, children leaving for university, etc.)

☐ Yes ☐ No

18.a) Would your family be comfortable in a smaller house at the present time if it meant lowering expenses?

☐ Yes ☐ No

18.b) Would your family be comfortable in a smaller house in the future if it meant lowering expenses?

☐ Yes ☐ No

4 – ADAPTABILITY

The following are proposals for modifying the existing neighbourhood in order to create more affordable housing options.

19.a) Option 1:
If it were financially feasible, would you want to make modifications to your house to allow for a conversion to create a basement apartment (see **figure 2** as an example floor plan) for university students or young adults, either your own children or as a rental unit?

☐ Yes ☐ No

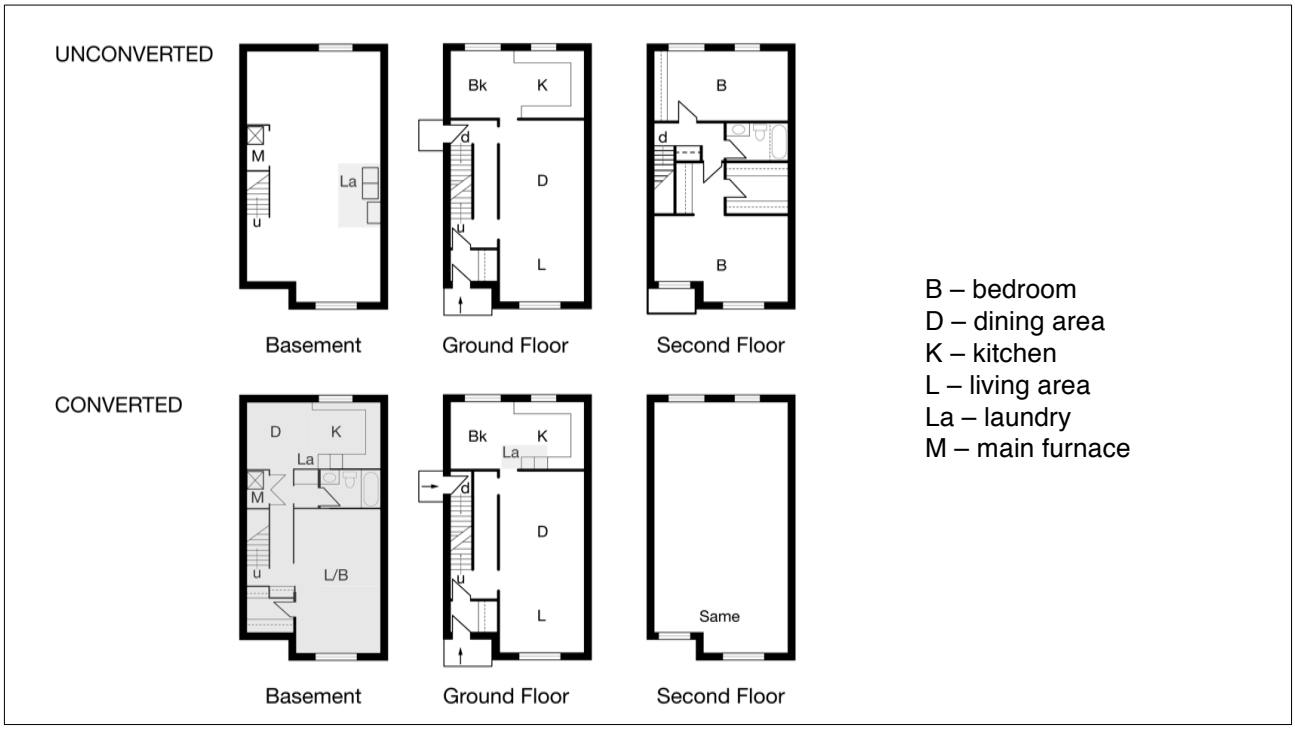

Figure 2 *CMHC's Made to Convert Housing, 1989*

19.b) How would modifying the layout and the tenancy of your house affect your quality of life? (Sharing yard with tenants and loss of basement, additional income from renting the basement unit, etc.)

☐ Positively ☐ Negatively

Please explain:

19.c) How would modifying the layout and the tenancy of your house (and if several of your neighbours did the same) affect the sense of community on your street? (More cars on the street, more community members, etc.)

☐ Positively ☐ Negatively

Please explain:

20.a) Option 2:

If it were financially feasible, would you want to make modifications to your house to allow for a conversion to create an addition on the back of the house (see **figure 3**) for an autonomous apartment for elderly parents or for your own young-adult children or as a rental unit (sometimes called a secondary suite, a garden suite, or a granny flat)?

☐ Yes ☐ No

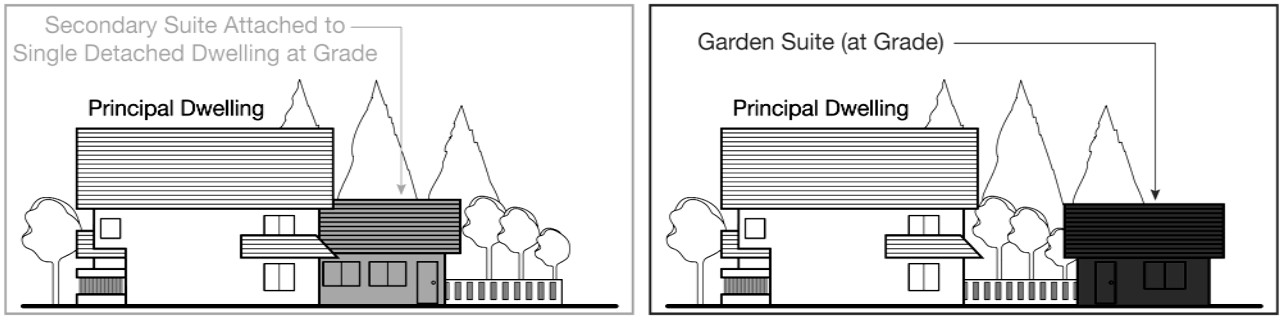

Figure 3 Modified from *Regional District of Nanaimo, 2012*

20.b) How would the addition of a granny flat to your house/yard affect your quality of life? (Sharing yard with tenants, loss of some yard space, additional income from renting the granny flat, close proximity to family, live-in help, peace of mind, etc.)

☐ Positively ☐ Negatively

Please explain:

20.c) How would the addition of a granny flat to your house/yard (and if several of your neighbours did the same) affect the sense of community on your street? (More cars on the street, new community members, etc)

☐ Positively ☐ Negatively

Please explain:

21.a) Option 3:

If it were financially feasible and allowed by zoning regulations and bylaws, would you want to sell your side yards for a substantial sum of money (minimum of $50,000) in order to build a row-house infill between your house and your current neighbour's (see **figure 4** for an example)? These small houses would be marketed as affordable starter houses for young couples/families (for example your own children when they move out).

☐ Yes ☐ No

Figure 4 *http://inhabitat.com/*

21.b) How would an infill row-house between your house and your neighbour's affect your quality of life? (Sharing yard with neighbours, loss of some yard space, additional income from sale of side yards, potential close proximity to family, etc.)

☐ Positively ☐ Negatively

Please explain: *continues on next page*

21.c) How would an infill row-house between your house and your neighbour's (and if several of these units were built on your street) affect the sense of community on your street? (More cars on street, more families, children have more playmates, etc.)

☐ Positively ☐ Negatively

Please explain:

5 – FINAL QUESTIONS

Only aggregate data will be used in the research report when referring to the answers given in this section in order to prevent data from being linked to individuals in any way.

22. Who filled out this questionnaire? *(Please check applicable box)*

☐ I filled it out alone

☐ I filled it out with my partner / family

23. What is your gender? *(Please check applicable box)*

☐ Male

☐ Female

☐ Prefer not to answer

24. Who do you live with? *(Please check applicable box(es))*

☐ I live alone

☐ I live with my partner

☐ I live with my partner and children

☐ I live with my children

☐ My parents live with me

☐ Other: _____

25. Household income *(please check applicable box)*

☐ < $11,000

☐ $11,000 – $21,000

☐ $21,000 – $41,000

☐ $41,000 – $61,000

☐ $61,000 – $81,000

☐ $81,000 +

26. ADDITIONAL COMMENTS

Thank you for your participation

APPENDIX 2 – SUBZONE CONDITIONS

Subzone	Minimum lot width (m)	Minimum lot area (m^2)	Maximum building height (m)	Minimum front yard setback (m)	Minimum corner side yard setback (m)	Minimum rear yard setback (m)	Minimum interior side yard setback (m)	Maximum lot coverage
W	9	240	11	4.5	4.5	6	1	n/a
WW	9	450	11	5	5	7	1	n/a

Table A.1 – R1 subzone conditions source: City of Ottawa n.d.(c)

Subzone	Prohibited uses	Principal dwelling type	Min. lot width (m)	Min. lot area (m^2)	Max. building height (m)	Min. front yard setback (m)	Min. corner side yard setback (m)	Min. rear yard setback (m)	Min. interior side yard setback (m)
C	duplex	Detached, Linked-detached	15	450	11	4.5	4.5	7.5	1
		Semi-detached	9	270	11	4.5	4.5	7.5	1.2
N	none	Detached, Linked-detached	9	270	11	5	5	7	1
		Semi-detached	9	270	11	5	5	7	1
		Duplex	9	270	11	5	5	7	1

Table A.2 – R2 subzone conditions source: City of Ottawa n.d.(d)