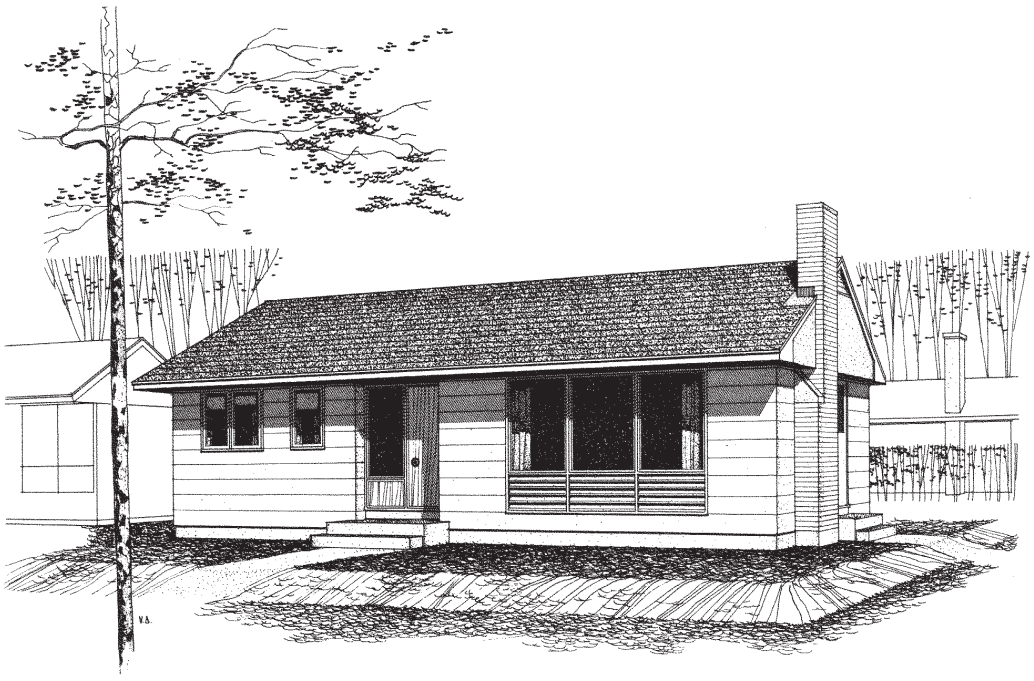
# RENOVATING DISTINCTIVE HOMES

## One-Storey Houses of the ’60s and ’70s



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# RENOVATING DISTINCTIVE HOMES: ONE-STOREY HOUSES OF THE '60S AND '70S

# *Renovating Distinctive Homes*
# *One-storey houses of the ’60s and ’70s*

***Prepared by***

***Canada Mortgage and Housing Corporation***

The information contained in this publication represents current research results available to CMHC, and has been reviewed by a wide spectrum of experts in the housing industry. Readers are advised to evaluate the information, materials and techniques cautiously for themselves and to consult appropriate professional resources to determine whether information, materials and techniques are suitable in their case. The drawings and text are intended as general practice guides only. Project and site-specific factors of climate, cost, aesthetics, and so on must be taken into consideration. Any photographs in this book are for illustration purposes only and may not necessarily represent currently accepted standards.

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# INTRODUCTION

A glance at a streetscape of homes over 20 years old shows that renovating is a constant preoccupation of Canadian homeowners. Within 20 years, houses that were virtually identical in size and style have experienced facelifts, and even full additions, that substantially change them. Even more extensive changes may have taken place indoors.

**Streetscape**
***Photo: Brent Applegate***

The one-storey house of the ’60s and ’70s is an ideal candidate for renovation. The large footprint of the house means that there is a large basement area which, when finished, can almost double the size of the house. The typical large suburban lots on which the one-storey homes were built allow for ground floor additions. As well, the one-storey design makes it easier for do-it-yourselfers to tackle projects such as painting, re-siding or even a full addition.

Still, each housing type poses special renovation challenges. For example, with one-storey homes, there is often the opportunity to expand into an attached garage. However, it is sometimes difficult to connect the new addition to the living area in the rest of the house. Also, construction technology went through a period of major change during the ’60s and ’70s. Some innovations did not prove out; others may not have been applied correctly when they were first introduced. These circumstances may require special attention when renovating a house built during that period.

This book focuses exclusively on the one-storey house from the ’60s and ’70s. It combines space planning and design tips as well as technical information.

This book provides you, the homeowner, with the basic information you need to plan and carry out a successful renovation on your one-storey house. It provides information on technical requirements, so that you will know what to ask your contractor; information about specific renovation problems you are likely to encounter with a one-storey house, and information about new trends in housing, such as Healthy Housing™ and FlexHousing™ , that you may want to incorporate into your plans.

Turn to Chapter 1 for background information on why your house is built the way it is and to Chapter 2 for information on typical problems that occur in older houses and that need attention as part of any renovation.

For an overview of what is involved in a renovation project and for help planning your renovation project, see Chapter 3, “The Renovation Process.” For tools to help you plan and carry out your renovation, Chapter 4 provides worksheets, checklists and a sample renovation contract. For renovation ideas and tips on proper construction details, see the descriptions of typical renovation projects in Chapters 5 and 6.

Finally, if you would like more detailed information on any aspect of renovation, turn to Chapter 7 for a directory of information sources.

# CHAPTER 1: THE HOUSE DESIGN

## Introduction

From the pioneer cabin to the suburban bungalow, the one-storey house has been an enduring part of Canada's housing stock—its virtues rediscovered every generation or two.

With its simple, square or rectangular shape and single floor, the one-storey house is relatively simple to build, thus affordable. Ease of construction makes the one-storey house ideal for owner-builders who can contract out the foundation, electrical, or plumbing work and handle the rest of the project themselves. The house is well suited to later additions at the front or rear, creating an attractive L-shape dwelling. For these reasons, one-storey houses are perennial favourites as "starter" homes. With their smaller size and ease of accessibility, they are also popular as an option for retirement living.

Although one-storey houses are relatively simple in shape, they can be readily interpreted in many different styles. A tour through an older community will disclose one-storey homes in Regency, Craftsman, Suburban Ranch, International, or the current Postmodern style. (See the photos in this chapter for some examples.)

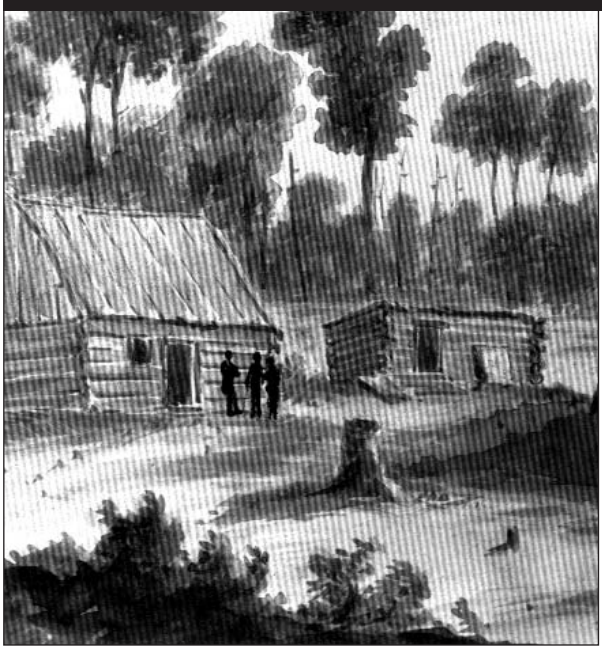
Note: Bungalow is an Hindustani word used to describe a one-storey house surrounded by a wide verandah. It has come to be applied to any one-storeyed house or—particularly in Cape Breton—cottage. Bungalow Style is a North American term describing housing built from the early part of the century through the '30s and embodying the Craftsman style of architecture. Some 1 1/2- and even 2 1/2-storey homes were built in the Bungalow Style.

This chapter looks more closely at the design and construction of the one-storey home of the '60s and '70s, from its roots in pioneer days to its modern descendants.

## Roots

The one-storey home was typically the first dwelling built on a homesteading site in pioneer Canada. Whether a log cabin in the East and British Columbia or a sod house on the Prairies, the first pioneer homes echoed the one-room rural English cottage or the Scottish croft. All family activities were typically carried out in one room, although sometimes a separate bedroom was added to one side.

**Pioneer Log Home**



Oxford University Press, 1994

Second generation rural dwellings often went up as well as out, adding a 1 1/2- or two-storey addition to the original one-storey cabin. However, the one-storey house remained popular as a small house in the emerging towns and cities, reinterpreted according to the popular styles of the day.

**Regency home with hip roof**

Ontario Architecture, John Blumenson, Fitzhenry & Whiteside, 1990

Regency one-storey homes were typically square with a hip roof. (For a description of different roof types see CMHC’s Glossary of Housing Terms.)

The Craftsman-style bungalow was popular from the turn of the century through the ’30s. It was rectangular with the gable end facing the street and a large verandah across the front. As well, throughout the 20th century, one-storey homes retained their rustic roots in the form of summer camps or cottages—often owner-built.

**Craftsman-style bungalow**

Ontario Architecture, John Blumenson, Fitzhenry & Whiteside, 1990

By the early ’60s, wider suburban lots were the predominant form for new development. The ranch-style home turned the one-storey house 90 degrees so that the wider eave side faced the street. It abandoned the front verandah in favour of a patio at the rear of the house.

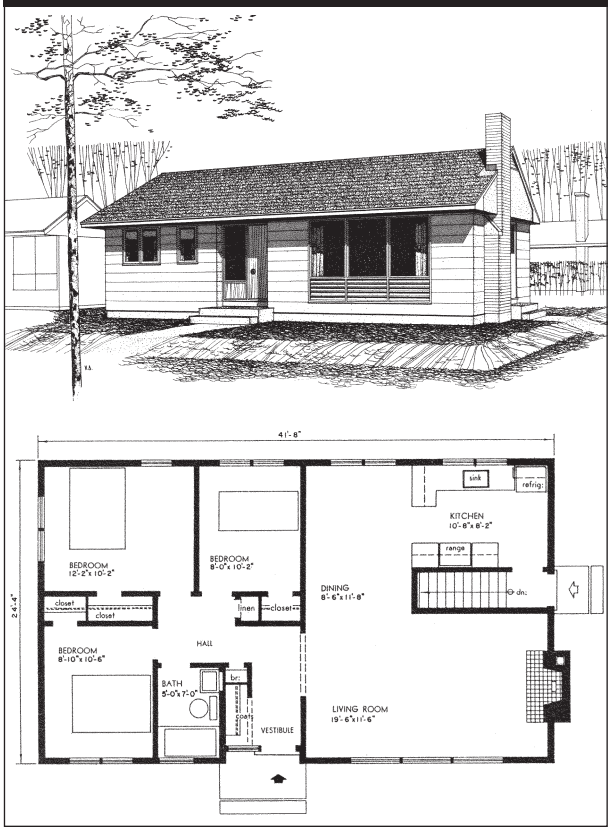
This housing form was very popular in large developments around major cities and also in single-street developments or highway strip development adjacent to smaller towns throughout Canada.

## The one-storey house of the ’60s and ’70s

### Basic design

A typical one-storey home of the ’60s and ’70s included three bedrooms, one bathroom, a kitchen and a combined living and dining area on the main floor. There was a full, but unfinished, basement. The entrance was roughly in the centre

**Typical Plan**



of the long eave wall that faced the street, with kitchen and living area on one side of the entrance and the bedrooms on the other. These three-bedroom houses ranged in size from 84 to 111 m² (900 to 1,200 sq. ft), although some custom-built versions were larger.

## Evolution of the design

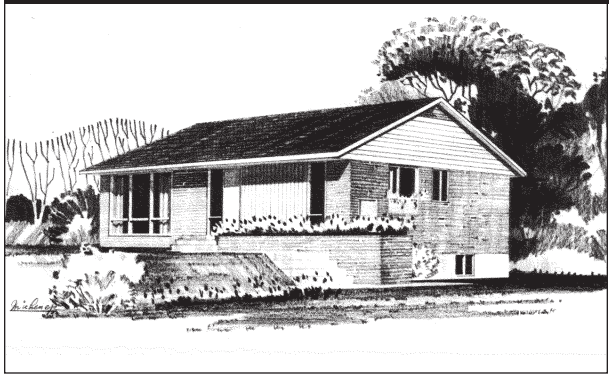
The one-storey house followed the general Canadian trend towards larger homes. Smaller versions of the design were more numerous in the early ’60s, with larger models evolving by the late ’70s. Once the house size exceeded 111 m² (1,200 sq. ft.), there was room in the layout for an ensuite bath in the master bedroom (sometimes just a two-piece with sink and toilet) or a separate main floor family room.

In earlier versions of the one-storey house, the living area was divided into distinct rooms. Kitchens generally allowed space for a table and chairs. If space permitted, a separate dining room was also included. Later models feature a dining area that is open to the living room. An eating space is only provided in the kitchen of larger models.

Variations in window type, exterior trim and detailing mark the transition from traditional ranch styling to a very modern, minimalist look.

Both models shown are three-bedroom homes. In the earlier version, the eat-in kitchen is quite separate from the living room. This design is approximately 91 square metres (980 square feet). The second home is larger and features an open-plan dining room/living room combination as well as an eat-in kitchen and slightly larger bedrooms.

**Design 242, Small House Designs: Bungalows and Split-Level Houses, CMHC, 1954.**



**Design 264, Small House Designs, CMHC, 1963.**

## Variations on a theme

For a simple house, the one-storey design lends itself to a surprising number of variations. As well as the standard rectangular shape, some layouts incorporated a slight bump-out on one half of the floor plan to increase the size of the bedroom or living area wing. Most homes of this type were divided from front to back with bedrooms and bathroom on one side and living area on the other. Some designs placed all the bedrooms along the back of the house.

Key variations in layout stemmed from the placement of the stairs to the basement and the location of the kitchen. Basement stairs could be placed on the gable or eave wall; they could be in a straight run or U-shape. Kitchens were often placed at the rear of the house, next to the service entrance. But some designs located the kitchen next to the front entrance, facing the street, with the living room facing the rear garden.

In municipalities where lots were narrower and deeper, some standard designs were turned ninety degrees with the main entrance at one side of the house. Other designs adapted to the narrow lots

by moving the front entrance to the narrow gable end facing the street.

**Gable front home**
***Photo: Jeff Clarke***

A split-entry model was popular in many parts of the country. Sometimes called a cathedral entrance, bi-level, or a raised bungalow, the front entrance of this model was at grade. The stairs were located at the front entrance, with the main floor living area up half a flight and the basement down half a flight.

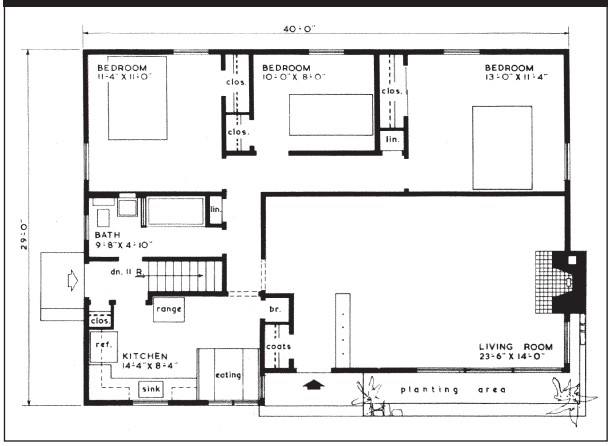
**Raised bungalow**
***Photo: Brent Applegate***

In the Maritimes, few one-storey homes of this period had attached garages. Attached garages were more common from Quebec westward. More versions with the gable end facing the street are found in Ontario while the raised bungalow is more popular in the Prairies and B.C. A higher proportion of larger models is likely to be found in the West than in other parts of the country.

**One-storey with attached garage**
***Photo: Jeff Clarke***

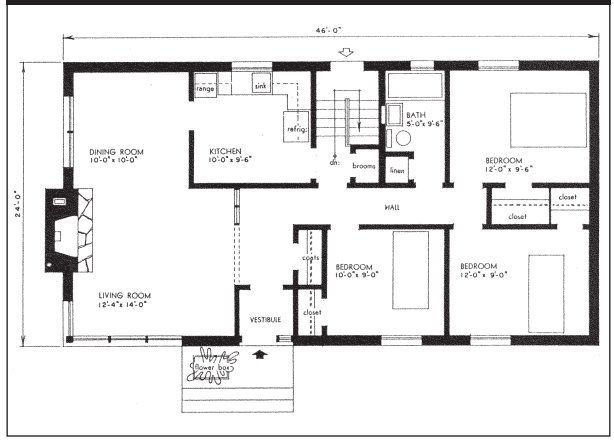
## Variations in ground floor designs

**Kitchen and living room are at the front of the house, with the bedrooms across the back.**



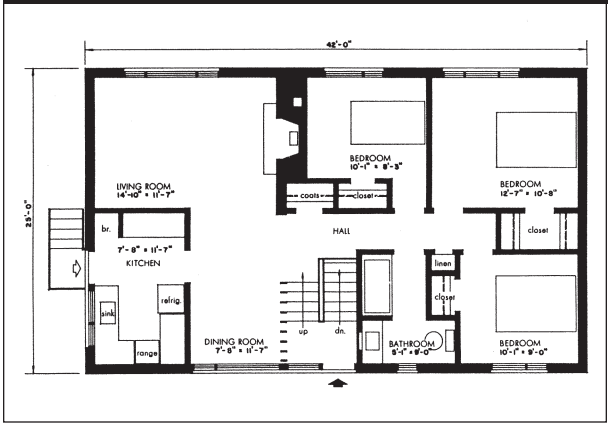

Design 248, Small House Designs, CMHC, 1963

**U-shaped stair provides a grade-level entrance at the rear of the house. The kitchen is located at the rear.**




Design 264, Small House Designs, CMHC 1963

**An example of the split-entry plan, this model has the kitchen at the front corner of the house with an open stairway leading from the entrance to the dining and living area.**

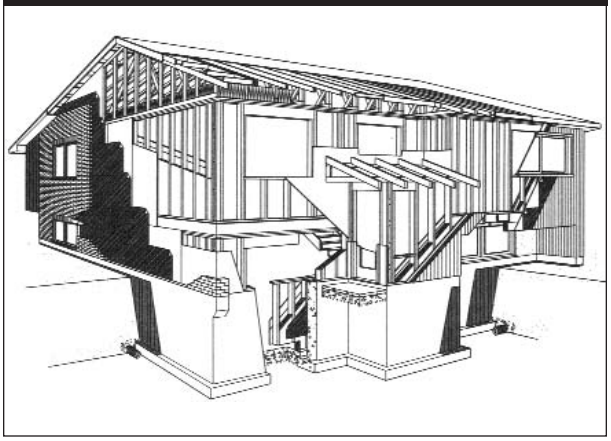



Design 2304, Small House Designs, CMHC, 1963

## Anatomy of the one-storey house of the ’60s and ’70s

This section describes how the one-storey house of the ’60s and ’70s was constructed. While the outward appearance of houses changed during this period, so did the components under the building skin. Construction methods also varied from builder to builder and from region to region. Keep these factors in mind as you compare your house to the following descriptions.

**Construction details**



## Changing construction methods

The ’60s and ’70s were a tumultuous period in the Canadian housing industry. The ’70s saw the beginning of unprecedented housing growth as the industry struggled to meet the housing needs of the baby boom generation.

In materials and construction, there is little difference between a house of the late ’50s and one from the ’30s or ’40s. In 1960 some composite materials, such as plywood, were available but they were still not widely used in all parts of the country. Factory-made windows had become the norm, but many components, such as kitchen cabinets, were still built on-site.

In just 20 years construction technology changed completely. By 1980, the engineered house, with extensive use of manufactured components and composite materials, was the standard form of construction. Roofs were supported by manufactured trusses instead of rafters. Plywood and waferboard had replaced dimensioned lumber for subflooring, wall and roof sheathing. Carpet, vinyl and parquet were used instead of strip hardwood and linoleum flooring. Drywall was the preferred finish, not plaster. Plastic PVC and ABS pipe substituted for cast-iron drainpipe and clay perimeter drain tile. Thermal pane windows had replaced window-storm combination units. Pre-finished aluminum and vinyl siding took over the market from wood and hardboard siding. The list could go on.

In other developments, the energy crisis spurred interest in the thermal performance of houses. Homes of the late ‘70s were generally built with higher levels of attic insulation. Many owners of homes built earlier in the period took advantage of government programs that offered assistance to retrofit attic or basement insulation.

Regional variations in construction practices and availability of materials meant that some of these changes occurred sooner in some parts of the country. But, even considering regional variations, by the end of the ’70s the standard Canadian frame house had made the transition from a site-built, crafted product to a site-assembled, engineered product.

## Construction details

### Foundation

The foundation allows the house to rest solidly, without shifting or cracking, on the ground. It must resist the effects of both water vapour and liquid water in the soil. The foundation must also be strong enough to resist pressures from the surrounding soil, particularly if the soil expands when wet or frozen.

Houses of the ’60s and ’70s are typically situated higher on the lot with a good portion of the basement wall exposed. Most are built on a poured concrete foundation, although in some parts of the country block walls were common until the late ’60s—particularly in areas that were too remote for delivery of poured concrete. The foundation walls rest on poured concrete footings that spread the load of the house to the ground. Some one-storey homes, particularly in British Columbia, are built with a slab-on-grade or over a crawl space instead of a full basement foundation. Some examples of preserved wood foundation (PWF) are also found from this period.

Most basements are not insulated. Moisture protection on the exterior was provided by perimeter drain tile (known as weeping tile) and dampproofing with bituminous coating below-grade. Clay tile was used in the ’60s. In the ’70s perforated plastic pipe became more common. The weeping tile collected any water near the foundation and directed it to a storm sewer. The exterior foundation walls of both poured concrete and block wall foundations are usually parged with a cement mixture or asphalt-cement mixture to reduce water movement.

The concrete basement floor was poured after the foundation walls were in place. It was not insulated either. Asphalt-coated roofing felt or rolled roofing paper was sometimes laid under the concrete to help prevent moisture in the soil from seeping through the concrete floor. Sump pumps evacuate perimeter drain water if there are no storm sewers.

### Structure

The wall structure holds up the roof and provides a framework to enclose the space. It must be strong enough to support the weight of the roof, the house itself, the occupants and their furnishings and withstand the force of wind pressures and snow loads.

In most one-storey homes of this period, the wall structure is built of lumber using the platform frame method. In Ontario and Quebec, some solid masonry homes continued to be built until the National Building Code of 1969 mandated wall insulation.

Platform-frame construction rests the walls of each storey on a platform formed by the floor. To build the first floor, a thick board (sill plate), the width of the foundation, is bolted to the top of the foundation wall. (In some locations, a metal termite shield is installed between the foundation and the sill plate.) Another board (the rim joist) is fastened on edge on top of the sill plate all around the foundation. The supporting framework for the first floor (floor joists) is nailed to the sill plate and the rim joist.

An earlier method, the poured-ladder system, embeds the floor joists directly in the poured concrete foundation wall. Use of this system continues in the Prairies into the ‘60s. It was discontinued east of the Prairies because the damper conditions rotted the joists.

Floor joists are 38x235 mm or 38x184 mm (2x10 or 2x8 in.) dimensional lumber spaced 400 mm (16 in.) apart. The joists are reinforced at intervals with wooden pieces (cross bridging or strapping) to prevent them from twisting. For longer spans, the joists are supported in the middle by a beam of dimensional lumber, a built-up beam or a steel beam that runs the length of the basement. The posts supporting the beam are made of concrete block, timber or steel tubing (jack posts). In some cases, a 38x89-mm or 38x140-mm (2x4 or 2x6-in.) stud wall supports the beam.

The subflooring, which is nailed to the floor joists, completes the structural part of the floor. Earlier models used 89-or 140-mm (4-or 6-in.)

wide boards, laid diagonal to the joists, for the subfloor. Plywood subflooring gained wide popularity in the late ’60s.

Walls are constructed of 38x89-mm (2x4 in.) studs. They were assembled on the floor or platform and then tilted into place and anchored to the platform. Short ends are used for bridging to prevent the frame from twisting. Additional boards (19x89 mm—1x4 in.) are fastened diagonally to the frame at the corners to provide lateral restraint and prevent the whole structure from shifting.

Once the stud walls were in place, they were covered on the exterior surface with sheathing. The sheathing stiffens the structure and provides a nailing base for the siding. Wall sheathing from the ’60s is most often boards nailed diagonally onto the studs. Some fibreboard was also used. Lumber sheathing continued to dominate in Atlantic Canada into the ’70s, although by then, plywood was the preferred material in other parts of the country.

Board sheathing was generally applied after the frame walls were erected. Plywood sheathing was applied when the stud wall lay square on the floor, then the whole assembly was tilted into place. Tar-impregnated building paper installed over the sheathing forms a weather barrier underneath the siding.

Although roof trusses and plywood sheathing had been available since the ’50s, many homes of the ’60s were still constructed with rafters and board sheathing. The roof is typically framed with 38x140-mm (2x6-in.) rafters fastened to the top of the walls. Near the peak of the roof, 19x89-mm (1x4-in.) boards (collar ties) connect and reinforce each pair of opposing rafters. With its simple roof form, the one-storey house is especially suited to the use of manufactured roof trusses; which first gained popularity in Western Canada.

Sheathing also covered the roof structure and provided a nailing base for the shingles. At the start of this period, builders used 19x140-mm (1x6-in.) boards. Later, plywood sheathing was sometimes used on roofs framed with rafters. It was always used on roofs framed with trusses.

With the use of plywood and a tighter roof, soffit and roof vents were introduced to allow moisture in the attic to escape. Typically, the soffit overhang was quite generous—406 to 610 mm (16 to 24 in.).

**Exterior wall and roof assembly**

The exterior wall assembly encloses the space and protects the structure from damage. It must resist the entry of water, snow, wind and vermin.

In most instances, siding is installed directly over the building paper without strapping. Choice of siding material varies from region to region. Hardboard siding is almost universal in the Maritimes; wood siding and brick veneer are popular in central Canada and aluminum siding in the western provinces. Stucco is also widely used on the Prairies and in British Columbia. Some vinyl siding was also used. Many houses from this period have been retrofitted with vinyl siding. Often a combination of siding materials was used to create visual interest.

Roofs are finished with asphalt shingles. On roofs sheathed with lumber, building paper is installed over the whole roof surface underneath the shingles. With the introduction of plywood sheathing, the building paper was sometimes omitted. However, a strip of roll roofing material or 6-mil polyethylene was installed along the eaves to protect the roof from water damage caused by ice damming.

**Interior wall and floor assembly**

The interior wall assembly protects the structure on the inside of the home. It must provide attractive, durable surfaces and protect the structure from water vapour originating inside the house.

By the 1960s, gypsum lath and plaster finishes for walls and ceiling were giving way to drywall. Gypsum lath is a 406x813-mm (16 x 32-in.) wide sheet material that is nailed onto the studs to form a base for a scratch coat of lightweight cement and a final skim coat of plaster. In solid masonry

homes, the interior surface of the brick is covered with tarpaper. Strapping fastened to the brick provides a nailing surface for the gypsum lath or drywall. The tub enclosure in the bathroom is sometimes finished with waterproof cement board and steel mesh to provide a base for ceramic tile.

Baseboards and trim were cut to size on-site from specially milled dimensioned lumber. One-piece trim was often used instead of built-up mouldings, particularly for baseboards. Finger-jointed, paint-grade trim became common in the ’70s. Interior closet and room doors are generally hollow core plywood, although some panelled doors were still used.

Flooring in earlier versions of the one-storey house was strip hardwood nailed to the subfloor. When plywood subflooring was introduced, some builders installed parquet hardwood flooring, which was glued to the subfloor. In kitchens and bathrooms, vinyl or linoleum (tile or sheet material) was installed on plywood (6 mm—1/4 in., good one side) or particleboard was laid over the plywood subfloor. Ceramic tile is the flooring material of choice for some bathrooms. Toward the ’70s, wall-to-wall carpet became popular for living areas. In some homes this is laid over the finish hardwood, but the common practice was to install the underlay and carpet directly over the plywood subflooring.

Some kitchen cabinets continued to be site-built from plywood and dimensioned lumber. However, manufactured cabinets of composite materials gained wider acceptance during the ’60s and ’70s. Counters were generally finished with plastic laminate, which was cut and installed on-site.

Many owners of one-storey homes from this period finished the basement within a few years of purchasing their house, often as a do-it-yourself project. Walls were typically finished with drywall, although wood panelling was also popular in the ’60s. To finish the floor, some owners installed parquet wood flooring, or vinyl tile directly over the concrete floor slab, but most used wall-to-wall carpeting. Some homeowners installed the finished basement flooring over a frame subfloor.

**Thermal protection**

Thermal protection is added to the foundation, walls and attic floor to protect the structure from extreme variations in temperature and to provide greater comfort for the occupants. It must form an even blanket around the building, without gaps or paths through which heat can escape.

It is now understood that there are three components needed for the thermal protection of a house:

1. Insulation to keep the heat in.

2. A continuous air barrier to prevent both heat and moisture from being carried out of the house through gaps and cracks in the building envelope, and to prevent moisture condensing inside the walls, causing water damage to the structure.

3. A vapour barrier to prevent water vapour in the house from penetrating through the building envelope.

Houses of the 1960s are built with very little insulation (typically RSI 2.1 in the attic and RSI 1.4 in the walls—R 12 and R 8). Basements are not insulated. Insulation batts faced with waxed kraft paper are installed in the stud spaces of the frame walls with the paper stapled to the studs to form a vapour barrier. In the attic, loose insulation or batts are placed between the ceiling joists on top of a waxed paper vapour barrier material. Mineral wool or loose vermiculite is often used as attic insulation; treated wood chips were still used in some parts of the country.

By the end of the 1970s, higher levels of insulation were used in the attic (RSI 3.5–R20) and polyethylene largely replaced kraft paper as the vapour barrier. The two-mil poly was stapled to the wall studs on top of the friction-fit mineral wool or fibreglass insulation. In the attic, the poly sheets were laid underneath the loose insulation. In some cases, the poly was installed before the roof trusses. As well, by the 1970s houses had become “tighter” because composite materials,

such as plywood for wall and roof sheathing, became more widely used.

Throughout the period, no air barrier was provided in the walls and ceiling, although doors were usually equipped with weatherstripping to prevent drafts.

Note: UFFI (urea formaldehyde foam insulation) was installed in many homes in the 1970s, until it was banned in 1980. UFFI is no longer considered a formaldehyde emission problem. Houses with UFFI show no higher formaldehyde levels than those without it. However, it can cause problems if it gets wet and begins to break down. In those circumstances, a specialist should remove the UFFI and the source of the moisture problem repaired. For further information see CMHC’s About Your House, “Urea Formaldehyde Foam Insulation (UFFI),” order number CE6.

Although traditional wooden-sash windows were also popular, sashless, horizontal-sliding windows were introduced and became widely used. They consisted of a combination storm and interior window set within an aluminum frame. Compared to traditional wood-frame windows, these windows are inexpensive and maintenance-free. However, since there is no thermal break in the frame or weatherstripping, they are subject to severe condensation and air leakage. Many of these original sliding windows have since been replaced.

During the mid-‘60s, the sealed thermopane unit was introduced. These are mostly wood-framed and were initially used in fixed sashes, sometimes with a small horizontal sliding sash at the bottom of the window.

**Mechanical systems**

Mechanical systems provide occupants with heat, electric power, light, ventilation, and water and wastewater services.

Throughout the ’60s and ’70s, copper piping was still used for water supply. However, in the ’70s, plastic PVC pipe began replacing cast iron for drainpipes and vent stacks.

By the ’60s, 100-amp electrical service was standard in some parts of the country, although 60-amp service continued to be the norm in some areas. Ground-fault protection for bathroom outlets (and kitchen outlets in some jurisdictions) was not introduced until later. Ground-fault protection became a requirement as local electrical codes changed during the ’80s. The way ground-fault protection was provided varied depending on the local electrical code.

Aluminum wiring was widely used from the late ’60s to mid-’70s, but is no longer in use because of the high maintenance factor. Aluminum systems require a smaller gauge wire than copper systems. Therefore, the aluminum systems required special receptacles, switches and fixtures, as well as special connectors between the aluminum wiring and any copper elements in the system. In some areas, copper wire was used for electric baseboard heating and aluminum wire was used for lights and outlets.

Most one-storey homes from the ’60s and ’70s were equipped with a forced-air furnace. Heat is distributed through a perimeter branch system that delivers warm air to registers on the perimeter of the house, usually located underneath windows. The warm air washing over the window keeps the glass warm and helps to prevent condensation. Some custom or owner-builder homes use radiant hot water heating, and option that was especially popular in Quebec. Again, the radiators are often located underneath windows. Oil was commonly used for space heating and gas was a popular choice where it was available. Electric baseboard heating was also a popular option. Homes with oil space heat usually used electricity for water heating.

There was no separate ventilation system. In a few cases, homes are equipped with a range hood that exhausts to the outside or with a fan in the bathroom that exhausts to the outside. Otherwise, the house depends on open windows, or air leakage and open windows to exchange fresh air for stale air.

# CHAPTER 2: 40 YEARS OLD

## Introduction

We think of buildings as permanent, when in fact they are constantly changing—some faster than others. Office interiors are reshuffled every few years, or even more often, to reflect changing business and organizational structures. Homeowners make major space planning changes less frequently, yet they are constantly maintaining, rearranging, replacing, refining, and updating their space. In short, they renovate.

Why do people renovate? The simple answer is to make the house into a better place to live. Families change, affecting the amount and kind of space they need in the home. Styles and standards change, prompting the desire to upgrade and modernize.

People renovate to satisfy their wants and needs but after 40 years, the house needs some attention for its own sake. This chapter explores changing expectations about housing and also takes a closer look at problems that arise in older houses and which should be addressed as part of any renovation.

Since the post-war years, research and experience have broadened understanding about many aspects of housing. This chapter introduces new considerations, such as House as a System, FlexHousing™ and Healthy Housing™ , which should be considered as part of any renovation plan.

## Changing expectations about housing

One-storey houses of the ’60s and ’70s were built primarily to serve the influx of young families entering the housing market. Today, family structure is more diverse. There are many single parent households. Families with an elderly parent or an adult child are becoming more common. Increasing numbers of households have one member working from home. These changes affect the design and use of space in the home.

Even as late as the ’70s, Canadians’ desires for housing were relatively modest. Today, more amenities and a higher level of comfort and convenience are expected—even in smaller homes.

### Space considerations

A typical three-bedroom, one-storey house from the ’60s or ’70s provides 84 to 111 m$^2$ (900 to 1,200 sq. ft.) of living space. There were more children per family in the ’60s than in the ’80s and ’90s and they often shared a bedroom. The basement was initially unfinished and was generally used for storage and a home workshop.

Today’s homes are definitely larger. A three-bedroom starter home is 167 to 185 m$^2$ (1,800 to 2,000 sq. ft.). Typically, the additional space is for a larger master bedroom with ensuite bath and a family room on the main floor. The one-storey home of the ‘60s and ‘70s was designed for a two-parent family with children. There was no space set aside for a larger private suite for other adults to live with the family.

**Simple older bungalow**
***Photo: Charles Wood***

**Nineties suburban home**

Storage space is another consideration. Today’s homes have more and larger closets than the ’60s and ’70s houses. As well, basements in today’s homes are often completely finished—allowing for a fourth bedroom or home office as well as a games room and workroom.

## Upgrading and modernizing the home

### Services

In 1960, 100-amp service was standard in many parts of the country, although 60-amp service was still found in homes with gas water heating. The norm is now 100-amp service—200 amps for electrically heated homes.

Most homes of this period had only one bathroom. A second, two-piece washroom is standard in today’s new homes. Larger homes have two, or even three, full bathrooms.

Today’s furnaces are more fuel-efficient. As well, programmable thermostats offer better control—allowing the temperature to be set back at night and during the day when the house is unoccupied.

### Convenience

Houses require regular maintenance. Many homes from the ’60s and ’70s used exterior wood trim and siding, which had to be painted regularly—usually every three to four years. Homeowners have welcomed the new maintenance-free materials that result in less ladder time and more leisure time. These include vinyl or aluminum siding, soffit and fascia and permanent aluminum storms and screens.

### Comfort and air quality

Older frame houses were built with little or no insulation and with no attention to an air barrier to keep drafts out. In winter, basements were often cold and rooms on the main floor could be drafty with cold spots near the windows and outside walls. Today’s houses are well insulated and sealed to prevent air leakage. Windows are more energy efficient. Today’s houses are easier to heat and more comfortable. There are very few drafts or cold spots—even near windows. Basements are insulated and can be comfortably used as living space.

The insulation in many pre-1970 houses has been substantially upgraded, particularly in areas of the country with high energy costs.

Houses built in the ’60s and ’70s depended on air leakage and open windows for ventilation. Often this was not enough to dispel cooking odours or excess humidity from laundry or showers. Today’s houses offer more control over air quality through a mechanical ventilation system. Kitchen and bathroom exhaust fans can minimize odours and moisture. Whole-house ventilation systems provide fresh air to the house and remove indoor pollutants. Some ventilation systems are tied into the furnace distribution system. Some whole-house systems use a heat recovery ventilator (HRV) to capture waste heat from the exhaust air stream and to pre-heat cold incoming air. To avoid high electricity costs, an efficient furnace fan motor is essential with whole-house systems.

# THE ONE-STOREY HOUSE OF THE ’60S AND ’70S

***Photo: Brent Applegate***

Besides the problems common to all older houses, there are other conditions in one-storey houses built in the ’60s and ’70s that require special attention during renovations.

## Basement and foundation

Many owners finished their basements within a few years of purchase—often without correcting moisture problems. As a result, moisture is trapped behind finished walls or under the flooring where it can cause damage and mold growth, leading to health problems.

Also, some early basement renovations created bedrooms with no windows or furnace rooms with little access to house or outside air.

Since basements were not designed as a living area, there was little or no provision for heating. The location of older, large heating systems often makes inefficient use of basement space.

Some problems were created when homeowners switched to gas or electric heating from oil heating. Some homes built in the ’60s and ’70s had underground oil tanks. When the owner switched to gas, electric heating or an above-ground tank, the line to the tank was capped inside the basement and the tank abandoned. An underground tank can be an obstacle if building an addition to the house. Also, some jurisdictions now require removal of the tank and any contaminated soil around the tank.

In some homes the tank was removed but the filler pipe on the basement wall exterior was left in place. This creates a potentially disastrous situation if the oil delivery person has the wrong address.

In some areas of the country, houses built over a crawl space often did not incorporate a moisture barrier over the earth floor of the crawl space. The resulting moisture in the crawl space can lead to structural damage or to poor air quality in the living area.

## Structure

Some homes from later in the ’60s and ’70s were built with floor joists at their maximum span and inadequate cross-bridging. This causes “spongy” floors that should be reinforced before the basement ceiling is finished.

In parts of the country with a humid climate, the lack of bathroom ventilation and an air barrier has led to accumulation of moisture in the walls, with resulting mold and health issues as well as deterioration of the wall finish and the wall structure.

Many owners later added more insulation to the attic in the form of loose cellulose or mineral fibre. Since there is no air barrier, moist air from the house can enter the attic through gaps around light fixtures, the attic hatch and so on. Excessive moisture trapped in the attic can cause damage. Sealing the air leaks is the best solution. Attic ventilation can help.

Some owners of houses with attached outdoor decks enclosed the deck or balcony to expand the living space. In some cases this was done without reinforcing the structure to accept the additional weight of walls and roof.

### Main floor layout

In smaller versions of the one-storey house, the eating area in the kitchen is cramped and the living room is too small to include a dining table. The placement of the basement stairs sometimes blocks off the kitchen, making it difficult to open up the space as a kitchen-family room combination.

Storage space is limited in the one-storey house. Since the bedrooms are already small, it is difficult to expand the closet space without cutting into valuable living area. If there is any dampness in the basement, it is not advisable to store books, papers or clothing as they could be affected by mold and moisture damage.

### Mechanicals

Aluminum wiring was widely used in homes from the late ’60s to mid-’70s. While quite safe, some inspectors recommend that an electrician check aluminum wiring every few years to ensure that the connections to receptacles and appliances are secure. This is especially important with any 240-volt connection, such as baseboard heaters or electric hot water heaters. As well, fuses must never exceed 15-amp rating for branch circuits. When renovating, special receptacles that are compatible with aluminum wiring must be used. Another solution is to have an electrician add special connectors to join the aluminum wire to copper wire before the receptacle, which allows the use of copper wire in the receptacle. For these reasons, homeowners often choose to replace aluminum wiring when renovating.

### Thermal protection

The aluminum-frame, sashless, sliding windows in homes of this period did not perform well. They were drafty and subject to extreme condensation that could cause rotting of the trim and wall beneath the window. Wood-framed sliding units performed somewhat better but are still not comparable to today’s energy-efficient windows.

### Exterior and interior finish

Lead paint was still in common use well into the ’70s for both exterior and interior surfaces and particularly for trim work. Special precautions should be taken if the paint is to be removed during renovations. (See CMHC’s *Healthy Housing™ renovation planner* and the booklet *Lead in your home* for suggestions about safe ways to deal with lead paint.)

# WHEN HOUSES AGE

A house built in the ’60s is now (2001) 40 years old. As any homeowner will tell you, maintenance is never-ending. But there are special problems that can develop with an older house. Problems such as excessive moisture may not be obvious at first, but they can cause serious damage to the house over time. It is especially important with older houses to approach renovation from a practical point of view. Underlying problems must be dealt with before any other renovation work is undertaken. Preventive maintenance should be part of any renovation project.

The following are some of the conditions which commonly occur as houses age and which should be considered as part of any renovation planning.

### Components reach the end of their service life

Some building components were never designed to last the lifetime of the house. Asphalt shingles are rated for 15 or 20 years, after which time they begin to curl and crack. Forced-air furnaces have a service life of about 25 years and should be replaced to meet new standards and energy-efficiency requirements. Electrical panels can become outdated or rust. Even plaster walls were not designed to last forever. After 50 years, bulges may appear in walls or ceilings where the plaster has pulled away from the supporting lath. The bulging walls could also be a symptom of a moisture problem. Drywall fares somewhat better as it is fastened mechanically to the wall structure.

### Some components wear out

Some components, particularly finishes such as exterior paint, putty and caulking, simply wear out after a few years. If they are not renewed regularly, there can be serious deterioration to the underlying material. Another component, eavestroughs, can become corroded.

Interior components such as tile, sheet flooring or carpeting can wear out in less than 20 years, depending on material and traffic volume. Even very durable hardwood flooring eventually wears out and needs to be refurbished or renewed.

Other interior finishes, such as paint and wallpaper, need refreshing every few years. Panelling and cabinetry also need attention, although less frequently.

### Foundation and structural problems become more evident

In the first few months after construction, houses settle slightly and minor cracks may appear. This is not a concern. However, real problems can arise if the structure is later weakened by moisture or water damage, by damage from insects (termites or carpenter ants) or by improper alterations to the building.

Structural problems can show up as twisted or rotted beams and posts, sagging floor joists and moldy or rotting timbers. Over time these underlying structural problems can cause plaster to crack, doors and windows to stick and floors to sag or heave.

### New, improved products and systems become available

Housing technology has been evolving rapidly in the second half of the 20th century. Furnaces, lighting and appliances are far more efficient. Wiring is safer, many materials are maintenance-free and some are more durable. Also, indoor air quality is becoming more important to Canadians and new building materials and ventilation products have been developed to meet the need.

### Some components are damaged by exposure

Sunlight can rapidly weather materials. It causes paint to deteriorate in just a few years. Air pollution causes pitting and corrosion of metal siding. Over a longer period, air pollution also

damages the mortar in brickwork. At the age of 40 a house may be ready to have some of the mortar repointed and the chimney upgraded.

### Moisture damage is likely

After the occupants, moisture is the single biggest cause of damage to buildings. Over time, unwanted moisture can weaken the foundation, damage the structure and ruin interior and exterior finish materials.

In houses from the ’60s and ’70s, the foundation walls may be made of a lower-quality poured concrete, which tends to be porous, or of porous concrete block. Groundwater can seep through the basement walls, causing the concrete or block to eventually crumble. Even good quality concrete will admit moisture if not dampproofed correctly. Additional dampness in the basement creates ideal conditions for wood rot to develop in structural members. Signs of moisture damage in basements include water stains, damp spots on foundation walls or floor, cracked and crumbling mortar or a white, powdery deposit (efflorescence) on walls.

Damp basements create ideal conditions for mold growth. Mold is becoming more recognized as a health hazard, especially to young children and the elderly. If mold is present, major corrective measures could be required.

Above-grade, moisture damage can occur when exterior building elements are not sufficiently protected from the weather. For example, holes in corroded eavestroughs can allow the siding to be soaked from rain. Paint failure, decay and buckling of wood siding can all occur when edges of the siding are unprotected or if there are open joints or gaps in the material. A missing or damaged roof shingle or a loose flashing can allow water to penetrate the roof, causing damage to the attic and the ceiling finishes below. Over time, grading of soil around the foundation may be changed, directing runoff toward the basement wall.

Moisture damage from ice damming is visible as stains on exterior siding and on interior walls and ceilings.

Moisture damage can also occur when the building envelope is not protected from moist indoor air leaking into the walls or attic and condensing, causing wetting and damage to the building structure. Other signs of excess humidity and potential problems include wet insulation in the attic, stains on the ceiling, visible condensation on windows, water stains, blistering, peeling paint and soft or rotten plaster or drywall.

As well, localized water damage can occur to countertops, flooring, tub enclosures and cabinets when fixtures such as sinks and tubs are not properly sealed.

## New considerations in housing

### House as a System

The *House as a System* approach recognizes that all components of the house—the building shell, the heating and ventilation systems—interact as part of one system.

Understanding that the house acts as a system is especially important in renovation work since changes to one component can bring unexpected results. For example, upgrading the building envelope can lead to higher indoor humidity and condensation on windows unless the ventilation system is upgraded at the same time.

House as a System best practices are incorporated in the construction details for the sample projects in Chapters 5 and 6.

### Adaptability

Housing is a very durable commodity. Most houses in Canada last 80 to 100 years—some even longer. In this century we have seen family needs, population and communities change

**The Grow House**
***Photo: CMHC***

rapidly. It only makes sense that housing should be adaptable to our changing requirements.

For example, by planning ahead to include the required wiring, a nursery can be used later as a home office. Similarly, an open plan may be nice when children are small, but the simple addition of pocket doors will allow more flexible use of space for a house full of teenagers. Or, in bathroom renovations the simple addition of grab bars and easy access door and faucet handles will make the house more usable for an elderly or disabled person.

This approach to home building and renovation is called FlexHousing™ . Tips on how to incorporate FlexHousing™ principles are included in the detailed coverage of each sample renovation project.

## Health and environmental considerations

Healthy Housing™ is a new approach to building and renovating houses. It recognizes that the houses we live in can affect our health and that they have a major impact on the environment around us as well. Consider these facts.

## Occupant health

Canadians spend 90 per cent of their time indoors. The indoor environment can be three-to-four-times more polluted than outdoor air. More and more households report someone with allergies or breathing problems.

There are three approaches to improving indoor air quality:

1. Eliminate the source of contaminants.
2. Separate contaminant sources from the indoor air.
3. Provide adequate ventilation.

Healthy Housing™ supports occupant health by selecting materials, products and systems that maintain good indoor air quality.

**CMHC's Toronto Healthy House**
***Photo: CMHC***

### Natural resources

In Canada demand for water is increasing much faster than the population, straining water infrastructure and, in some communities, water resources. Between 1972 and 1981, population increased by five per cent but water use rose by 50 per cent. Residential water use now averages 350 L (92.5 gal.) per person per day compared to 140 L (37 gal.) in Europe. Many communities now experience water shortages. Healthy Housing™ uses low-flow showerheads and toilets to reduce water use by up to 50 per cent. This approach carries through to the efficient use of all natural resources.

### Environmental responsibility

Single detached dwelling units make up more than 60 per cent of Canada’s housing stock. This housing option consumes the most land, energy and water. Healthy Housing™ encourages better use of existing developed land through renovations, additions and options such as basement rental units. Healthy Housing™ puts a lighter burden on municipal waste disposal and the environment by generating less construction waste and by properly managing hazardous construction materials. Healthy Housing™ features also reduce energy and water use, resulting in fewer emissions and less wastewater.

### Energy efficiency

Canada is one of the highest per capita energy consumers in the world, partly as a consequence of climate, geography and industrial base. Housing accounts for 20 per cent of the country’s energy use. Almost half of Canada’s houses were built before 1980, when houses were poorly insulated. The energy efficiency of existing housing will have to be improved if Canada is to meet commitments to greenhouse gas reductions. Healthy Housing™ achieves energy savings of up to 50 per cent by improving the building envelope and by using alternate heating and energy sources such as wood heating or solar energy.

### Affordability

In 1991, 10 per cent of homeowners spent more than 30 per cent of their household income on shelter. At the same time, 30 per cent of these owners who spent over the norm on shelter lived in housing that was overcrowded or that needed major repairs.

Healthy Housing™ is for everyone. Many of the improvements can save renovation costs and substantially reduce home operating costs.

See the descriptions of renovation projects for tips on how to incorporate Healthy Housing™ principles into your next renovation.

## Conclusion

The one-storey house is modest in size but attractive and adaptable. It is essentially easy to build, yet suited to a wide variety of styles and finishes. With these qualities, it’s not surprising that large numbers of one-storey homes were built during the ’60s and ’70s and are still being built today.

Still, after 40 years of occupancy, there are many reasons why a house from this period requires more than just maintenance. Over 40 years, families and society have changed and these changes are reflected in the way we use our homes. Standards for building components and services have risen over the years. The ’60s or ’70s house may need upgrading. New knowledge has shown that houses can be more efficient and have less impact on the environment and on the pocketbook. Over the years, problems may have developed through simple wear and tear or through failure of building components.

Changing expectations, new considerations, and problems that need attention—all should be addressed as part of any renovation plan.

# CHAPTER 3: THE RENOVATION PROCESS

## Introduction

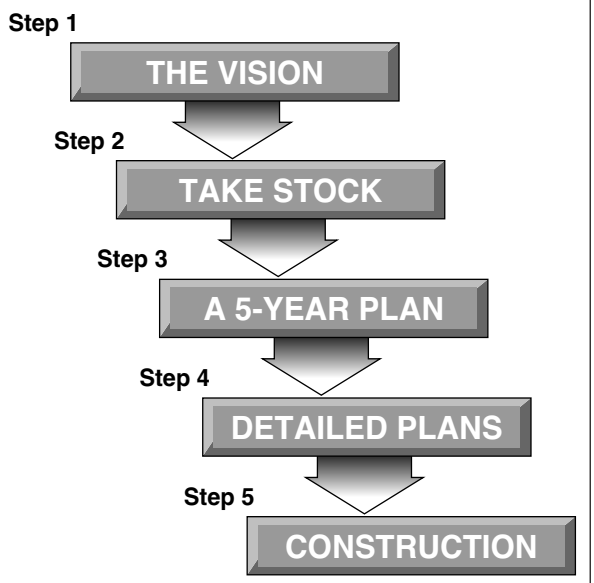
Most owners of older homes are constantly renewing their house, doing a large job every few years—a new roof this year, a year or two later the furnace. Many will undertake some jobs, for example, repainting or building a deck, themselves. Once in a while, a major project, such as redoing the kitchen or putting on an addition, will require work from several trades. Yet, despite this constant attention, effort and expense, all too often the results are unsatisfactory.

- The quality of the finished work didn't measure up to expectations.
- The desired look or feel of the space was not achieved.
- The project cost far more than anticipated.
- Work had to be redone because a necessary permit had not been obtained.
- The job dragged on far too long.
- Some existing problems were ignored and had to be dealt with later at greater expense.
- The renovation changed the house in unexpected ways.
- Unexpected problems were discovered, requiring more work and expense.
- The work had to be ripped out three or four years later to accommodate a subsequent renovation.

Many of these common pitfalls can be avoided with a better understanding of the renovation process and proper attention to planning and preparation. This chapter provides an overview of the renovation process from vision to construction. It offers a step-by-step description of what is involved and what tasks you, the homeowner, need to accomplish in order to achieve a successful renovation.

## The Renovation Process

**Step by Step**




Remember why people renovate? To make the house into a better place to live. The renovation process starts with your vision of what you would like the house to be and moves through several steps to the completion of individual projects.

Along the way, you will need to **take stock.** Develop a solid understanding of the house—what needs attention, its good features and limitations, problems and opportunities.

With a vision in mind, and a thorough knowledge of what you have to work with, you can develop **the big picture**—a rough plan of what you aim to accomplish over the next three to five years.

Then, you can get down to the pleasant task of making your dream a reality by tackling individual projects. Depending on circumstances, your plan may spread projects over several years or group them into one major renovation effort. Whether the project is big or small, you will need to develop **detailed plans and preparations** and manage the actual construction work.

## Step 1: The Vision

*If you don't know where you're going, how will you know when you get there?*

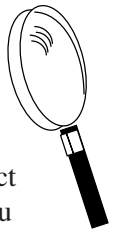
You may already have some very specific ideas about your house—improvements you would like to make or problems you would like to fix. But step back for a moment and look at the house as a whole. What kind of house would you like to have in three to five years?

How do you and other family members picture your ideal home? A large family room with a glowing fire? A fully equipped hobby room or a state-of-the-art kitchen? Has your family changed or do you anticipate changes? Do you need more space or would you like to use the space for different activities?

Dreaming doesn't cost anything, and it can help to identify those features that would give you the most satisfaction. Besides, drawing a vision of your future home will help you to get a picture of how the various ideas and projects you have in mind fit together.

Use the checklist in Chapter 4 to help develop the vision of your ideal home.

## Step 2: Take Stock



Even if you do not plan to do any of the work yourself, you need to understand enough about your house so you can direct the renovation process. To begin with, you should know what it will take to bring the house up to current codes and standards of construction.

While some things, such as the need for a paint job, are obvious, other potential problems are only noticeable when you look in out-of-the-way places such as the basement or attic.

Besides identifying hidden problems, getting to know your house better will help you to identify opportunities for combining jobs efficiently, for example, dampproofing and insulating while finishing the basement.

The separate parts of a house form one complete system. Understanding how the parts interact can help you anticipate how a planned renovation to one component will affect others. For example, a planned addition may put too great a load on the existing heating system and a new furnace may be required. Similarly, removing an interior wall may require additional structural reinforcement or rerouting of the plumbing and wiring enclosed in the wall cavity.

Finally, a thorough understanding of the house and all its possibilities will help you to stage the improvements in a logical order and avoid unnecessary work and expense.

The best way to gain an understanding of your house is to have a thorough inspection done by a renovator or experienced home inspector. If you are already knowledgeable about house construction, you may do the inspection yourself.

The inspection is similar to a general physical check-up. It should cover all aspects of the house—basement, mechanical systems, the exterior and the main floors—not just the areas you are presently interested in renovating, or the areas where you know there are problems.

For each component, the inspection should give you answers to the following questions.

- How is the house built? What is it is made of and how was it assembled?
- Is it safe? Are there any hazards that need immediate attention such as unsafe heating system, broken handrails or stair treads?

- Is it built to current standards? What should be upgraded while renovating?
- Does it need repair or replacement? If so, how soon?
- Are there less obvious problems that could become serious later?
- What are the opportunities for making the house more energy efficient?
- What are the opportunities for improving indoor air quality?

A sample inspection checklist is included in Chapter 4.

## Step 3: A Five-Year Plan

This is where you begin to put your dreams on paper. When complete, your plan will identify what you want to accomplish over the next three to five years, roughly how much each project will cost and when it will be done.

Even if your renovation work is limited to one major job every year or so, having an overall plan to guide the process will:

- help to clarify the direction you are taking with the house;
- ensure that essential jobs are given top priority and that components of the house are renewed before they break down, preventing unpleasant surprises;
- ensure that projects are undertaken in a logical sequence, saving you time and money;
- allow you to space out major jobs so they don't have to be done all in the same year; and
- allow you to plan and budget for home maintenance and renovation in a realistic manner.

### List the projects

To begin developing your plan, list and prioritize all the projects and tasks that need to be done to fulfill your vision and to address problems identified in the inspection. The planning worksheet in Chapter 4 is a useful aid for this step.

### Describe the work

Change may be due but, before starting any renovation, it is important to have a clear idea of what you want to accomplish. Otherwise, you may get more (or less) than you bargained for.

Develop a simple description for each job including a ballpark estimate of the costs and comments on when it should be done. For smaller jobs, such as replacing the furnace, a few notes will suffice. You can usually obtain ballpark estimates from the trades involved.

For larger projects, it is important at this stage to try to visualize how your finished project will look. Start a clipping file to collect ideas and design illustrations you like. If you are rearranging space or adding new space, develop a floor plan to scale so you can try out different furniture arrangements and traffic patterns. (Templates of typical furniture and recommended space allowances are included in Chapter 4 p. 35, Layout Tools in.)

Keep an open mind. There is usually more than one solution to a problem and the best one may not be the most obvious. Mentally walk through the space imagining traffic flows and the view from room to room. Do a sketch of any addition to help you visualize how it will look from the outside.

Don't ignore the essentials. Finishings can be easily upgraded or added later but it's very costly to redo structural work, add more space or upgrade services after the fact.

At this point you may have more questions than answers. What's involved in removing this wall?

How much will it add to the cost of the renovation? Are there other possible ways to add more space? It is often wise to seek the advice of a qualified home inspector, contractor or designer. For an hourly consultation fee, they will walk through your home with you and answer questions about your proposed plans. Sometimes, they will even provide a sketch showing an alternate concept. For large projects, this is money well spent. The hourly fee is often paid back through money saved and mistakes avoided during the renovation.

Contractors, magazine articles and friends are all good sources for ballpark costs. But remember, costs for renovation work can vary significantly depending on:

- the quality of workmanship;
- the quality of materials, especially finish materials used;
- unforeseen problems discovered during the course of the work, for example, rotten floor joists; and
- prevalent rates in various parts of the country.

### Reality check

Once you have put your dreams on paper, it's time for a reality check. You will need to ask yourself if your plans are permitted under current zoning by-laws, and whether they're practical and financially feasible.

- Check to see that your dream addition conforms to the local zoning by-laws. If not, you may need to apply for a variance. It is not usually difficult to obtain a variance for a minor change in setback or lot coverage, especially if your renovation is in keeping with the other houses on the street. However, it is best to obtain permission before committing to the work.

- With ballpark costs in hand you can begin to look at some practical issues. For any improvements beyond preventive maintenance, you should consider these questions.

- How long do you plan to stay in the house?

- How much of the renovation cost will you likely get back on resale?

- Will your planned renovation put your house sale price out of line with other houses in the neighbourhood?

- If the project is practical from an equity point of view, what are the implications for operating costs?

- Will the renovation increase costs for heat, hydro and water?

- How will it affect the assessed value of your home? Will your property taxes and home insurance go up as a result?

Finally, is the project financially feasible? Can you carry the additional costs of the renovation work and any increase in operating costs? How will you finance the work? For major projects, a personal loan is one possibility, whereas increasing the size of the mortgage allows you to pay for the work over a longer period of time. Keep in mind that lenders prefer to see a minimum of 15 per cent equity in the home and costs for principal, interest and taxes at no more than 30 per cent of income. If you are considering a major project, before proceeding further, it's best to check with your banker to make sure you will qualify for any needed financing.

### Finalize your five-year plan

After the reality check, you may need to revisit your priorities or scale back your plans somewhat. Then, as you finalize your five-year plan, you will need to organize projects into a logical sequence. When complete, your plan will:

- give priority to essential maintenance and repair work which must be done;
- take advantage of opportunities to save money by combining jobs; and
- schedule projects to suit your financial resources.

## Step 4: Detailed Plans

Your completed plan may consist of a series of individual projects spread over several years or you may decide to carry out all the work in a few months as one major renovation. Whichever you decide, it's a good idea to review all the tasks which need to be done before construction starts, from preparing detailed plans to last minute preparations of the work site.

### Detailed plan

On major projects, detailed plans will be needed for building permit approvals, but even small jobs go much smoother with a proper set of plans and specifications. A detailed plan will:

- provide the information you need to obtain quotes from contractors; and
- help you to visualize what is involved and what the finished appearance of the job will look like.

For smaller jobs, for example, reroofing, you will only need a short description of the work that includes the following items.

- What is the scope of the job? What is included and what is not? For example, on a roofing job, is the sunroom roof to be included as well?

- What are the specifications for the quality of materials and workmanship? For example, will the shingles be 15-year or 20-year type? Does the job include installing a membrane or metal flashing along the eaves to prevent water entry in the winter?

- Sketch any particular detail that is out of the ordinary, for example, how the new flashing should be installed at the chimney.

- Determine the types of guarantees.

- Who is responsible for debris removal?

- What are the payment terms?

For this type of project, you could write up the detailed specifications yourself. However, you may want to seek the advice of a contractor or designer. They will often be aware of a wider choice of materials other than what is available through your local building supply depot.

Large projects, such as an addition, will require more information including a site plan, floor plans, elevations, drawings of construction details and written specifications.

There are several options to obtain detailed plans for larger projects. You could hire an architect or architectural technologist. The usual fee for an architectural service is 10 per cent of the value of the work. You could ask a contractor. Most contractors are prepared to develop detailed drawings and usually include this cost in their quote for the work. However, it is not fair to take the drawings of one contractor and use them to obtain quotes from others. A better practice is to pay the contractor directly for the drawings. They are then your property and you can use them as you like. Alternately, if you are skilled in this area and have some time, you could prepare the drawings yourself.

### Who will do the work?

The size and complexity of the job will be your guide in deciding who will actually do the work. Some small jobs, such as painting or installing a fence or deck, can be done by a neighbourhood handyman/woman or yourself. You will want to hire a skilled tradesperson for other tasks such as roofing, wiring or plumbing.

Larger jobs will involve several trades. For example, a kitchen renovation could involve a cabinetmaker, general carpenter, electrician, plumber, drywall installer, flooring installer and painter. These larger jobs require the services of a general contractor to coordinate the work, hire the trades and handle scheduling.

**Should You Act as Your Own General Contractor?**

Yes, if you:

- have the time to spend organizing and supervising the work;
- have a great deal of patience;
- are a competent handyman/woman;
- understand construction practices thoroughly;
- can find the right subtrades and get competitive bids;
- are assertive enough to provide the supervision and scheduling;
- work well under stress; and
- have the support and agreement of your family.

There are other, easier ways to save money on your renovation than acting as your own general contractor. You (and a few friends) could handle some of the demolition. You could negotiate with the contractor to provide site clean-up or you could arrange to do some of the finishing work yourself, for example, painting.

## Hiring a contractor

Whether the job is a single task such as building a deck or a full addition involving several trades, the process of hiring a contractor is the same. Canada Mortgage and Housing Corporation gives some sound advice in the booklet "How to Hire a Contractor." The following information is summarized from that booklet.

First, you will need to contact a minimum of three candidates to ask for quotes. You can get referrals from your designer, friends and neighbours, or local homebuilders' association.

Provide all the candidates with the same information: your detailed plans and specifications. Ask them for three references of previous clients. Follow up these references. Visit sites of previous work and work in progress, if possible, and ask the owners about the contractor's performance.

When evaluating the bids, use the contractor checklist in Chapter 4 and keep these points in mind.

- Suitable experience: Does the contractor have experience with the scale of job you have in mind?

- References: How do previous customers view the contractor's performance?

- Working relationship: Will you be able to form a good working relationship?

- Licences and insurance: Do they carry the appropriate licences and insurance to cover public liability and property damage?

- Price: The lowest bid isn't necessarily the best. If it's much lower than the others, the contractor may have misunderstood the scope of the work, made a mistake or be trying to get a foot in the door and counting on charging for extras later.

## The contract

Whether your project is large or small, a contract is essential. It records the agreement and understanding between you and your contractor. The contract can vary from a simple letter to a document of many pages but the essential features are the same. All contracts should include:

- address of the property where the work will be done;
- the client's name and address;
- the contractor's name, address and phone number and the name of the person who will be in charge on site;
- a detailed description of the work to be performed under the contract (for larger

projects this is done by attaching the drawings and specifications as part of the contract);
- dates for starting and completing the work;
- an itemized price for the contracted work and the terms of payment;
- a statement of any warranties or guarantees on the work; and
- the signature of both parties, with each retaining an original signed copy of the contract.

For larger projects or additions the contract will also need to include:

- agreement on who is responsible for obtaining any necessary permits, licences and certificates;
- agreement on who is responsible for removing all construction debris;
- a statement of the contractor's public liability and property damage insurance coverage;
- a statement on who is responsible for increased fire and theft coverage for the new work under construction (usually the homeowner);
- a statement that the contractor is responsible for any applicable workers' compensation coverage; and
- a statement naming the person (usually the homeowner) who is responsible for providing the contractor and his subtrades with access to the property, electrical power, water, washrooms, etc.

See Chapter 4 for a sample contract.

**Follow These Rules**

- Always get it in writing.
- Don't sign anything the first time it's presented. Take the time to think about it.
- Don't sign anything without getting other quotes.
- Compare any contracts against what's needed. Don't be shy about making changes or additions to any contract presented by the contractor.

## Getting permits

While the contractor or tradesperson may arrange to get the required permits, the homeowner is ultimately responsible to ensure they are in place. If you are not sure whether you need a permit, call your municipal building department. It's always less costly in the end to spend time on permits and inspections up front than to have to redo work later.

- Building permits make sure the work is inspected and verified to be in accordance with building codes. A building permit is generally not required if the project is replacing a worn building component such as roofing. Permits are required for any structural changes or additions to a building, to excavate or build a foundation and to install new plumbing, heating or air conditioning.

- Permits are required for any changes to plumbing, heating and electrical systems. Generally the respective tradesperson arranges for the permit.

- Some municipalities require a permit to remove all or part of a building, for example, to remove a back porch and replace it with a deck.

- Planning approvals are only required when the renovation plans will not conform to the local by-law regarding setbacks from the property line or coverage of the lot by the building. In these circumstances, the owner must apply to the municipality for an exception or variance to the by-law.

## Last-minute preparation

As the homeowner, you are responsible for providing space, access and utilities that the workers need. Whether the job is big or small, you will need to make these arrangements.

- Remove or protect anything that could be damaged by construction activity. Outdoors, this could include brickwork, prize shrubs

and plants. Indoors, be sure to protect carpets, cabinetry and panelling, furniture and artwork.

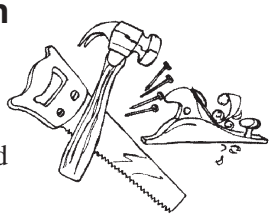
- Provide an area for workers to store materials, tools and refuse. If a dumpster is required, choose a location that will minimize damage to your lawn.

- Provide workers with access to water, washrooms and a telephone.

- Seal off areas where major interior work is occurring to protect the rest of the house from dust and disruption or, if this is not possible, arrange to move out for a while.

- Talk to the contractor to get an idea of the sequence of the work so you can make appropriate plans for periods of greatest noise or disruption, including times when water and hydro may be turned off.

## Step 5: Construction



Once the work is under way, it’s important, as the homeowner, to stay involved to make sure the project is going according to plan and to correct any problems before they get out of hand. During construction you are responsible for:

- informing the renovator about deficiencies or mistakes as soon as possible;
- paying for the job; and
- deciding whether the job has been done to your satisfaction.

### Communication

Difficulties are bound to arise in the course of any job but, with a good working relationship, the homeowner and contractor can quickly sort things out. The key is communication.

Keep in touch. Don’t hesitate to call the contractor if you have a question or if there is some change on the job site that you weren’t prepared for. For larger jobs, it’s a good practice to set up a regular meeting time, once or twice a week, with the contractor and your designer if you have one. This arrangement saves time for both you and the contractor. It provides a relaxed forum to review the work to date, resolve any questions about materials or methods, and deal with change orders and any complaints you may have.

Keep lines of communication clear. You may ask questions to the workers on site but always deal directly with the contractor to settle any issues.

Hear the other side. When difficulties do arise, try to see it from the contractor’s point of view and clarify the issue amicably, before positions harden.

### Inspections

If your renovation project involved a permit, then the work will be inspected, in some cases, several times. Major additions are generally inspected three or four times:

- after the footings and foundation wall are constructed and before the foundation is backfilled;
- when any new framing is complete;
- after the insulation is installed; and
- when the job is complete.

Plumbing inspections are generally done just once, after the pipes are installed, but before the fixtures are in. Heating and electrical systems are usually inspected twice. Although it is the responsibility of the contractor to arrange the inspections, it’s good practice to be on hand when the inspector is there. With their wealth of experience, inspectors can be a good source of information and suggestions.

### Mid-course changes

Very few renovation jobs go completely as planned. You may decide to add more features part way through the project, or material costs may be higher than expected, prompting some

cutbacks in other areas. In some cases, problems are discovered in the course of the work. For example, opening a wall may reveal rotten structural members that need to be replaced before the work can go forward. At times like these, the time spent building a good working relationship with the contractor will really pay off. You will need to agree on an approach to be taken and record it as a written change order, signed by both parties.

### Final inspection

When the job is complete, you will want to walk through it with the contractor to do your own final inspection. At this point, you should identify any deficiencies or incompleteness in the work and come to an agreement with the contractor on how they will be resolved.

# CHAPTER 4: TOOLS

## Introduction

This chapter is your tool kit for planning and managing successful renovation in your home. The tools presented here cover the steps in the renovation process from developing a vision of your ideal home to preparing a contract for the work. They include:

- a vision worksheet to note your ideas and to identify just what you want to accomplish in your home;
- a sample house inspection checklist to take stock;
- a renovation planning worksheet to help you grasp the big picture as you prepare your five-year plan;
- a set of scaled templates for planning room layouts;
- a contractor checklist to use when hiring a contractor; and
- a sample contract.

# Vision Worksheet

## 1. We need to correct an obvious problem:

| | |
|---|---|
| Fuel bills are too high. | The electrical system is overloaded/not enough outlets. |
| The house is hard to heat/uncomfortable. | The roof leaks. |
| Components of the house have reached their lifespan. | The basement leaks. |
| The house affects family members who have allergies, asthma or other health sensitivities. | The house is too damp and moldy. |
| Other | |

Our vision includes: _____

_____

_____

## 2. We basically like the house as it is but would like to make some improvements:

| | |
|---|---|
| To make the layout more convenient. | To make the house more appealing/attractive. |
| To cut down on maintenance. | To make it more comfortable. |
| To modernize the wiring and plumbing. | To update the kitchen. |
| To modernize the bathroom. | To open up the floor plan. |
| Other | |

Our vision includes: _____

_____

_____

## 3. Our interests/family have changed. We need to change the space to accommodate:

| | |
|---|---|
| More children. | A nanny. |
| Growing children or teenagers. | A parent coming to stay. |
| A rental suite. | Grown children returning. |
| A home office. | An entertainment centre. |
| A home daycare. | A growing hobby or craft interest. |
| Other home business. | Other |

Our vision includes: _____

_____

_____

# House Inspection Checklist

This checklist is designed to assist you in making a quick but broad examination of your home. It should indicate areas that need attention or further investigation. It will also serve to familiarize yourself with your home, in preparation for discussions with contractors.

| | |
|---|---|
| • Number of occupants | Daytime: _____ Nightime: _____ |
| • Usual indoor temperature | Daytime: _____ Nightime: _____ |
| • Humidity levels | acceptable ___ high ___ low ___ |
| • Humidity sources | _____ |
| • Odours | acceptable___ complaints: _____ |
| • Drafts | acceptable___ complaints: _____ |
| • Thermal comfort | acceptable___ complaints: _____ |
| • Special uses | _____ |

## Basement/Crawlspace

| | |
|---|---|
| Foundation Walls | |
| • Construction | poured concrete___ concrete block___ |
| | preserved wood___ concealed___ other_____ |
| • Cracks, movement | concealed___ none___ minor___ notes_____ |
| • Signs of moisture | water leakage: none___ location and notes_____ |
| | moisture pass-through: none___ effluorescence___ dampness___ |
| | condensation: none___ location and notes_____ |
| • Insulation | none___ interior___ exterior___ fibre___ foam___ |
| | thickness___ R___ condition_____ |
| • Vapour barrier | concealed___ none___ good___ poor___ |
| • Moisture barrier | concealed___ none___ exterior___ interior___ good___ poor___ |
| Floor | |
| • Construction | poured concrete___ dirt___ raised___ finished___ |
| • Cracks, movement | concealed___ none___ minor___ other_____ |
| • Signs of moisture | water leaks: none___ location and notes_____ |
| | moisture pass-through: effluorescence___ spalling___ dampness___ |
| • Floor drainage | none___ drain___ sump pump and location_____ |
| Floor Support | |
| • Header | concealed___ signs of moisture/rot___ good___ |
| • Joists | concealed___ size___ spacing_____ span_____ |
| | signs of moisture/rot___ good___ cut outs___ notching___ |
| • Posts | concealed___ none___ adequate___ poor___ |
| • Beams | concealed___ none___ wood___ steel___ good___ poor___ |

NOTES

## Mechanical Systems

| | |
|---|---|
| Heating System | |
| • Fuel | oil___ gas___ electric___ wood___ |
| • Type | forced air___ hydronic___ baseboard___ |
| • Capacity | _____ kW or BTU/hr |
| • Condition | good___ questionable___ poor___ |
| • Combustion air | supplied from exterior___ interior___ signs of spillage/backdrafting_____ |
| • Accessory operation | humidifier___ air cleaner___ air conditioner___ heat pump___ |
| • Furnace air filter | good___ needs replacement___ |
| Fireplace: | |
| • Type | none___ open face___ doors___ recirculating___ stove___ |
| • Chimney condition | clean___ dirty___ |
| • Combustion air | supplied___ not supplied___ |
| • Evidence of spillage | none___ stains___ |
| Hot Water System | |
| • Fuel | oil___ gas___ electric___ wood___ solar___ combination___ |
| • Type | central hot water tank___ instantaneous___ |
| • Ownership | rental___ owned___ |
| Plumbing System | |
| Supply: | |
| • Type | copper___ iron___ plastic___ mixed___ galvanized___ |
| • Shut-off valve | location_____ concealed___ operational___ not operational___ |
| • Condition, leaks | good___ questionable___ poor___ notes:_____ |
| • Potential for freezing | safe___ possible___ |
| • Flow rates | good___ low pressure___ restricted flow___ |
| Drainage: | |
| • Type | cast iron___ plastic___ copper___ |
| • Stack location | _____ |
| Electrical System | |
| Service: | |
| • Capacity | 60 amps___ 100 amps___ 200 amps___ other___ |
| • Distribution | fuse___ breaker___ spare circuits___ |
| Wiring: | |
| • Type | copper___ aluminum___ grounded (3 prong)___ ungrounded (2 prong)___ |
| • Age/condition | good___ old___ unsafe___ |
| • Outlets | distribution: good___ need additional plug outlets_____ |
| • Fans | none___ kitchens___ bathrooms___ |
| • Ground fault breaker | bathrooms____ outdoors___ garage___ whirlpool bath___ |
| NOTES | |

## Main Floors

| | |
|---|---|
| Exterior Walls | |
| • Construction | single stud: 38 mm x 89 mm___, 38 mm x 114 mm___ insulated sheathing (R_____) |
| • Insulation | none___ cellulose___ fibre___ foam___ R_____ |
| • Finish | drywall___ plaster___ panelling___ |
| • Cracks | none___ minor___ notable_____ |
| • Signs of moisture | none___ stains___ mold___ dampness___ peeling paint___ |
| | soft plaster/drywall___, location_____ |
| Interior Walls | |
| • Finish | drywall___ plaster___ panelling___ |
| • Cracks | none___ minor___ notable_____ |
| • Signs of moisture | none___ stains___ mold___ dampness___ peeling paint___ |
| | soft plaster/drywall___, location_____ |
| Ceilings | |
| • Finish | drywall___ plaster___ panelling___ |
| • Cracks | none___ minor___ noteable_____ |
| • Signs of moisture | none___ stains___ mold___ dampness___ peeling paint___ |
| | soft plaster/drywall___, location_____ |
| Floors | pre-finished tile or sheet material___ |
| • Finish | carpet___ tile___ linoleum___ hardwood___ ceramic___ other___ |
| • Level | good___ foundation movement___ interior support___ sag___ |
| • Squeak | none___ acceptable___ requires correcting___ |

## Windows and Doors

| | |
|---|---|
| Windows | |
| • Type | fixed___ awning___ casement___ sliders___ |
| • Glazing | single___ single and storm___ double___ triple___ other_____ |
| • Frame | wood___ moisture damage___ rot___ |
| | aluminum___ vinyl___ other___ |
| • Condition | good___ poor___ notes:_____ |
| • Seal/weatherstripping | good___ poor___ notes:_____ |
| • Sill condition | good___ moisture damage___ rot___ |
| Doors | |
| • Type | wood___ metal___ insulated___ |
| • Storm | none___ aluminum___ wood___ |
| • Weatherstripping | none___ good___ loose fitting___ |

NOTES

## Attic Ceiling Space

| | |
|---|---|
| • Type | flat roof___ cathedral ceiling___ peaked___ other_____ |
| • Structure and | concealed___ joist___ rafter___ truss___ |
| Condition | concealed___ good___ damaged___ rot___ |
| • Sheathing and | plank___ plywood___ composite___ other_____ |
| Condition | concealed___ good___ damaged___ rot___ |
| • Insulation | none___ blown___ batts__ |
| | mica___ cellulose___ fibreglass___ other_____ R value_____ |
| • Vapour barrier | none___ poly___ other_____ |
| • Air barrier | none___ well sealed___ evidence of air leakage___ |
| • Evidence of roof leakage | none___ description/location_____ |
| • Evidence of | none___ general staining___ condensation on sheathing___ |
| condensation | wet or packed insulation___ |
| • Evidence of air leakage | attic hatch___ plumbing stack___ |
| • Ventilation | soffits___ peak___ gable___ mushroom___ |
| | adequate___ inadequate___ |

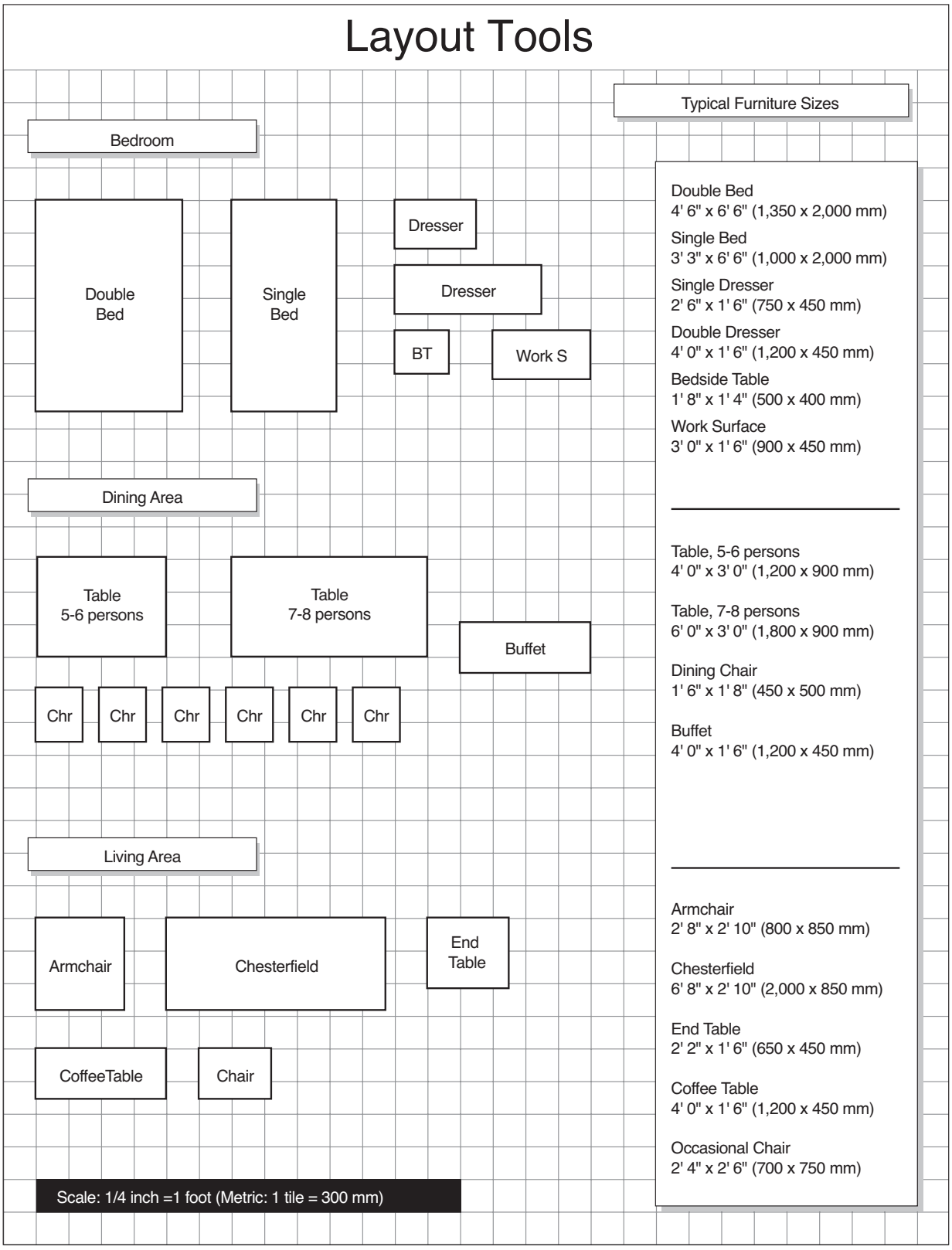
## House Exterior

| | |
|---|---|
| Foundation | |
| • Signs of moisture | none___ exterior source___ interior source_____ |
| • General condition | good___ poor___ description_____ |
| • Cracks | none___ minor___ noteable_____ |
| • Grading | positive slope away from house___ slope toward house at___ |
| Chimney | |
| • Condition | good___ repoint___ rebuild___ |
| Exterior Walls | |
| • Finish | brick___ stucco___ wood___ aluminum___ vinyl___ |
| | stone___ other_____ |
| | good condition___ needs attention___ |
| • Cracks, bows, sags | none___ minor___ notable_____ |
| • Signs of moisture | none___ exterior source___ interior source___ |
| Windows | |
| • Type | fixed___ awning___ sliders___ casement___ boarded up___ |
| • Signs of moisture | none___ stains___ rust___ rot___ |
| • Cracks, bows, sags | none___ notable_____ |
| • Flashing and caulking | good___ needs repair___ replacement___ |
| Roofing | |
| • Expected life | 1-3 yrs___ 5 yrs___ 10 yrs___ longer___ |
| • Type | asphalt shingle___ slate shingle___ wood shake/shingle___ tar/gravel___ other___ |
| • Condition | good___ minor repair___ major repair/replacement___ |
| • Heat loss | okay___ winter snow melt___ winter icicles___ |
| • Eavestrough/downspout | good___ needs repair___ |
| • Drainage | good___ pooling___ |

# Renovation Planning Worksheet

| PROJECTS AND TASKS | Priority | Trade Required OR Do-It-Yourself | Ballpark Cost |
|---|---|---|---|
| The Essentials . . . addressing immediate problems and preventive maintenance | | | |
| Reroofing | | | |
| Basement waterproofing | | | |
| Correct moisture problem | | | |
| Repaint exterior siding/trim | | | |
| Recaulk siding | | | |
| Correct electrical problems | | | |
| Correct plumbing problems/tub enclosures | | | |
| Service HVAC equipment | | | |
| Correct indoor air quality problems | | | |
| Home Improvements . . . improving the existing space | | | |
| Upgrade wiring | | | |
| Upgrade plumbing | | | |
| Upgrade HVAC system | | | |
| Modernize kitchen | | | |
| Modernize bathroom | | | |
| Change interior room layout/move walls | | | |
| Replace/upgrade flooring | | | |
| Replace interior finishes/stairs and railings | | | |
| Re-siding | | | |
| New windows | | | |
| Upgrade insulation and air sealing | | | |
| Space Related . . . adding new rooms | | | |
| Finishing the basement | | | |
| Second storey expansion | | | |
| Ground floor addition | | | |

# Layout Tools




**Typical Furniture Sizes**

Double Bed
4' 6" x 6' 6" (1,350 x 2,000 mm)

Single Bed
3' 3" x 6' 6" (1,000 x 2,000 mm)

Single Dresser
2' 6" x 1' 6" (750 x 450 mm)

Double Dresser
4' 0" x 1' 6" (1,200 x 450 mm)

Bedside Table
1' 8" x 1' 4" (500 x 400 mm)

Work Surface
3' 0" x 1' 6" (900 x 450 mm)

---

Table, 5-6 persons
4' 0" x 3' 0" (1,200 x 900 mm)

Table, 7-8 persons
6' 0" x 3' 0" (1,800 x 900 mm)

Dining Chair
1' 6" x 1' 8" (450 x 500 mm)

Buffet
4' 0" x 1' 6" (1,200 x 450 mm)

---

Armchair
2' 8" x 2' 10" (800 x 850 mm)

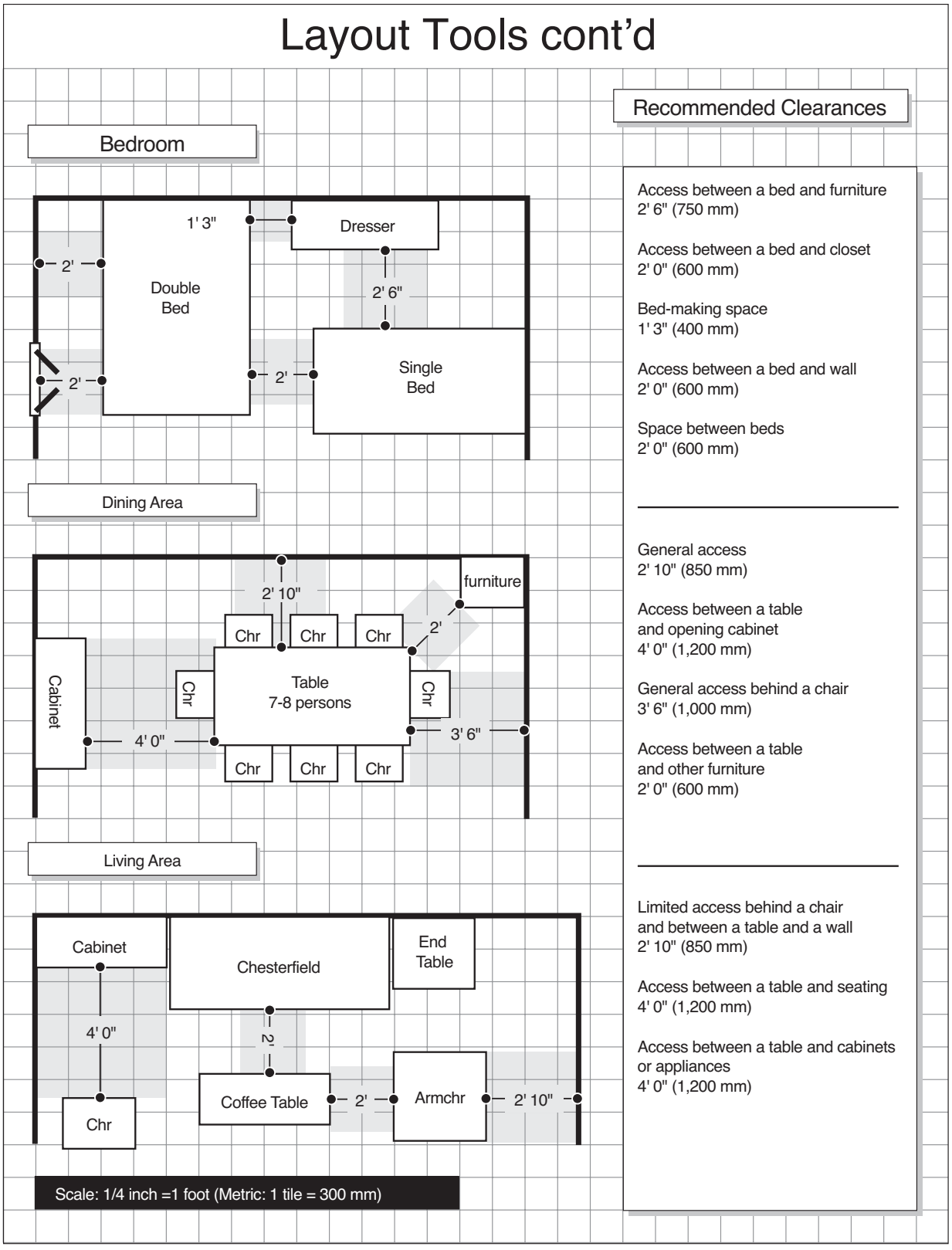
Chesterfield
6' 8" x 2' 10" (2,000 x 850 mm)

End Table
2' 2" x 1' 6" (650 x 450 mm)

Coffee Table
4' 0" x 1' 6" (1,200 x 450 mm)

Occasional Chair
2' 4" x 2' 6" (700 x 750 mm)

# Layout Tools cont’d




## Recommended Clearances

Access between a bed and furniture
2' 6" (750 mm)

Access between a bed and closet
2' 0" (600 mm)

Bed-making space
1' 3" (400 mm)

Access between a bed and wall
2' 0" (600 mm)

Space between beds
2' 0" (600 mm)

---

General access
2' 10" (850 mm)

Access between a table and opening cabinet
4' 0" (1,200 mm)

General access behind a chair
3' 6" (1,000 mm)

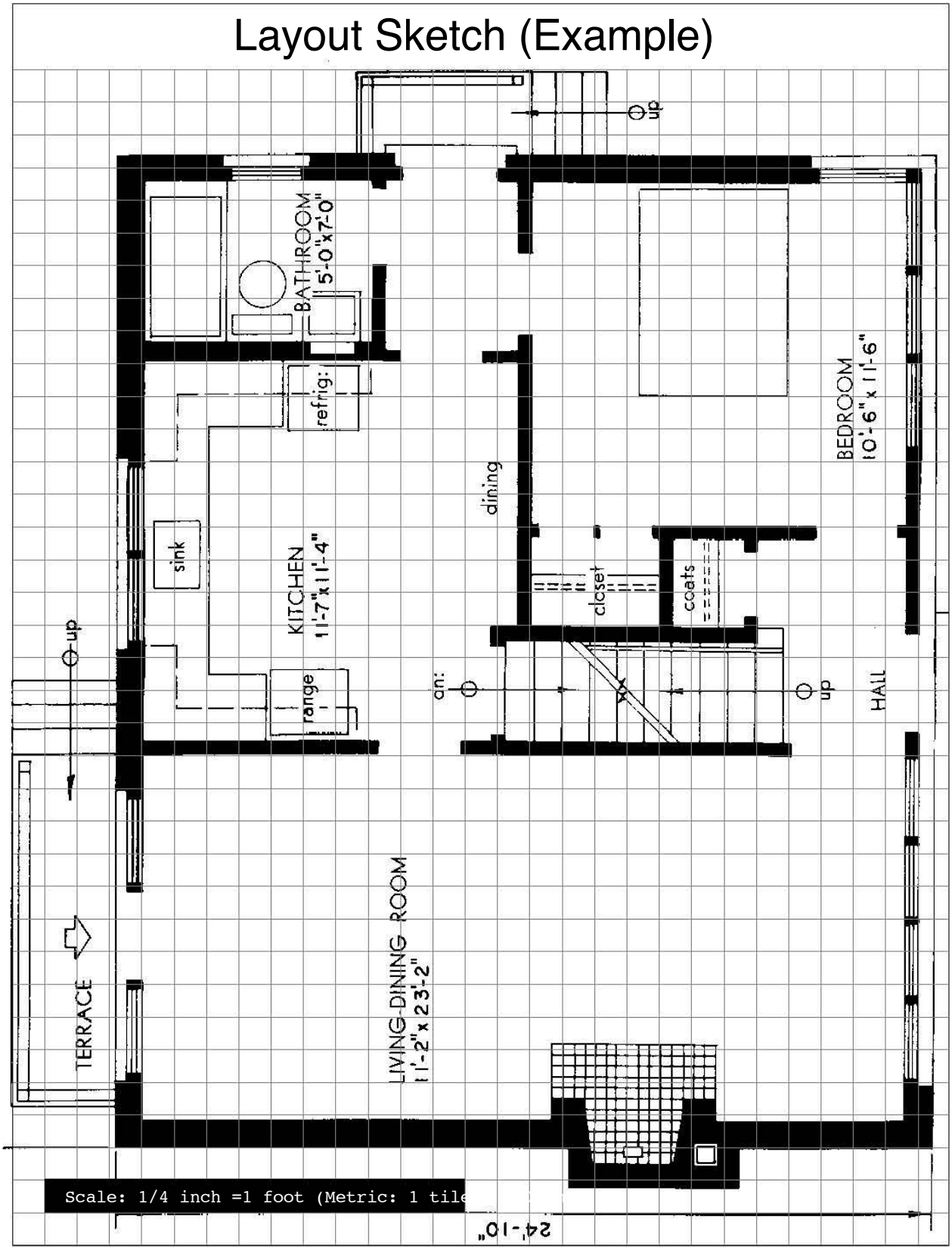
Access between a table and other furniture
2' 0" (600 mm)

---

Limited access behind a chair and between a table and a wall
2' 10" (850 mm)

Access between a table and seating
4' 0" (1,200 mm)

Access between a table and cabinets or appliances
4' 0" (1,200 mm)


Layout Sketch (Example)
up
BATHROOM
5'-0" x 7'-0"
refrig:
sink
KITCHEN
11'-7" x 11'-4"
range
dining
BEDROOM
10'-6" x 11'-6"
closet
coats
up
HALL
up
TERRACE
LIVING-DINING ROOM
11'-2" x 23'-2"
Scale: 1/4 inch =1 foot (Metric: 1 tile
24'-10"

# Contractor Checklist

## CONTRACTOR 1

1. Suitable experience for the job at hand

2. References

3. Working relationship

4. Licences, insurance, prof. affiliations

5. Price

## CONTRACTOR 2

1. Suitable experience for the job at hand

2. References

3. Working relationship

4. Licences, insurance, prof. affiliations

5. Price

## CONTRACTOR 3

1. Suitable experience for the job at hand

2. References

3. Working relationship

4. Licences, insurance, prof. affiliations

5. Price

**Sample Contract**

Between the Owner
And the Contractor
Subject Property

Contract Documents:

1) This agreement
2) Attached drawings and specifications signed by both parties
3) Additional documents and contract amendments (extras and deletions) signed by both parties during the course of this agreement.

The Contractor Shall:

1) Furnish all labour, materials, supervision and services to carry out the work detailed in the attached plans and specifications (to be initialled by the contractor and the owner) at the above address.
2) Be licensed and maintain full public-liability and property-damage insurance covering the above work.
3) Maintain workers' compensation coverage on all employees as required by provincial law, and ensure that all subcontractors maintain such coverage on their employees. Maintain site safety at all times.
4) Acknowledge the right of the owner to retain a mechanic's lien holdback as specified by provincial law.
5) Do all work to the requirements of the applicable building codes.
6) Be responsible for the work carried out under this contract by any subcontractors the contractor may employ.
7) Agree to start the work within 10 days of the signing of this contract, and to complete it not later than _____ days after the work has started.
8) Remove all construction debris from the property on completion of the work and, if damage occurs, restore the property to its original condition.
9) Warrant the work and materials for a period of one year from the date of completion, and, during this time, repair any defects immediately on receiving written notice from the owner. This warranty does not replace the following manufacturers' warranties on materials and equipment (details to be included or attached).

Permits:

1) The responsibility for obtaining any necessary permits is as designated below:

| | **Owner** | **Contractor** |
|---|---|---|
| a) Building permit | | |
| b) Heating permit | | |
| c) Hydro permit | | |
| d) Plumbing permit | | |
| e) Site-works permit | | |
| f) Other | | |

The Owner Shall:

1) Be responsible for assuring that the property meets municipal zoning by-laws and, if necessary, that special permission has been obtained from the appropriate authorities for the work covered in this contract.
2) Provide the space and freedom of movement on the property for the contractor's workers to do their jobs.
3) Pay the sum of $ ..... (including all applicable taxes) to the contractor as follows: $_____ on _____, $_____ on _____ and $_____ on _____ .

**Signed:** _____ _____
**Owner** **Contractor**

**Date:** _____

# CHAPTER 5: CHANGING THE SPACE

## Introduction

The one-storey house of the ’60s and ’70s is an ideal candidate for space-expanding renovation. The larger lots of the period (typically 15-or 18-m wide by 30-m deep—50-or 60-ft. wide by 100-ft. deep) usually allow the house to expand to the front or rear. The location of existing bedrooms on the main floor allows for home office space with ready access to the front door. The large footprint of the house provides the opportunity for additional living space or a rental unit in the basement.

As well, one-storey homes are often chosen as retirement homes because all the facilities are on one floor. With some modifications, the one-storey home can be adapted to the needs of people with limited mobility.

This chapter is an owner’s guide to the most popular space-expanding renovations for one-storey homes. The projects include:

- Adding a one-storey addition.
    - Creating a master bedroom.
    - Creating a main floor family room.
    - Creating a basement rental unit.

- Retrofitting for accessibility.

Each project is presented separately and discusses design considerations to keep in mind when drawing up plans, tips on construction techniques for successful results and opportunities to incorporate FlexHousing™ and Healthy Housing™ features. The section about one-storey additions highlights design considerations, construction techniques and Healthy Housing™ options that are common to master bedroom and family room additions. The sections on master bedrooms, family room additions and basement rental units include sample floor plans, showing how renovation design can suit various models of the one-storey house.

# ONE-STOREY ADDITIONS—GENERAL DESIGN AND CONSTRUCTION NOTES

## Design considerations

The following are general considerations to keep in mind when adding any extension to a one-storey house:

- Where will the new space be added? The most common approach is to extend the rear of the house, but if the lot is wide enough, the house may be extended into the side yard. A front extension may also be suitable.
- How large should the addition be? The width and depth will be dictated by the proposed use, lot size, local bylaws, design considerations and budgets.
- How will the addition affect the appearance of the house? The addition should complement the existing roofline, elevation and finish.
- How will the addition affect daylighting to existing rooms on that side of the house? Will they need new or enlarged windows?
- Will skylights be needed to provide natural light to the interior of the addition?
- Can plumbing and electrical services be easily integrated? Will the house electrical system require upgrading?
- How will the space be heated—by extending the current house heating system or by installing new equipment?
- Is additional basement space needed? If it is, should it be a full-height basement under the addition? Or would a crawl space or slab-on-grade foundation be adequate?
- How will the roofline of the addition meet the existing house? Will it affect windows, skylights, chimneys or other penetrations?
- What type of roofline will work best in the proposed addition—raised or cathedral ceilings or a more traditional flat ceiling?
- What type of windows, cladding and other exterior elements will best complement the existing house?
- How will the addition link the house to the garden?

## Construction

Design and construction practices are governed by the building code in each province. However, many aspects of working around existing structures are not dealt with in building codes. Several key construction considerations must be addressed to ensure the long-term durability and energy efficiency of the addition.

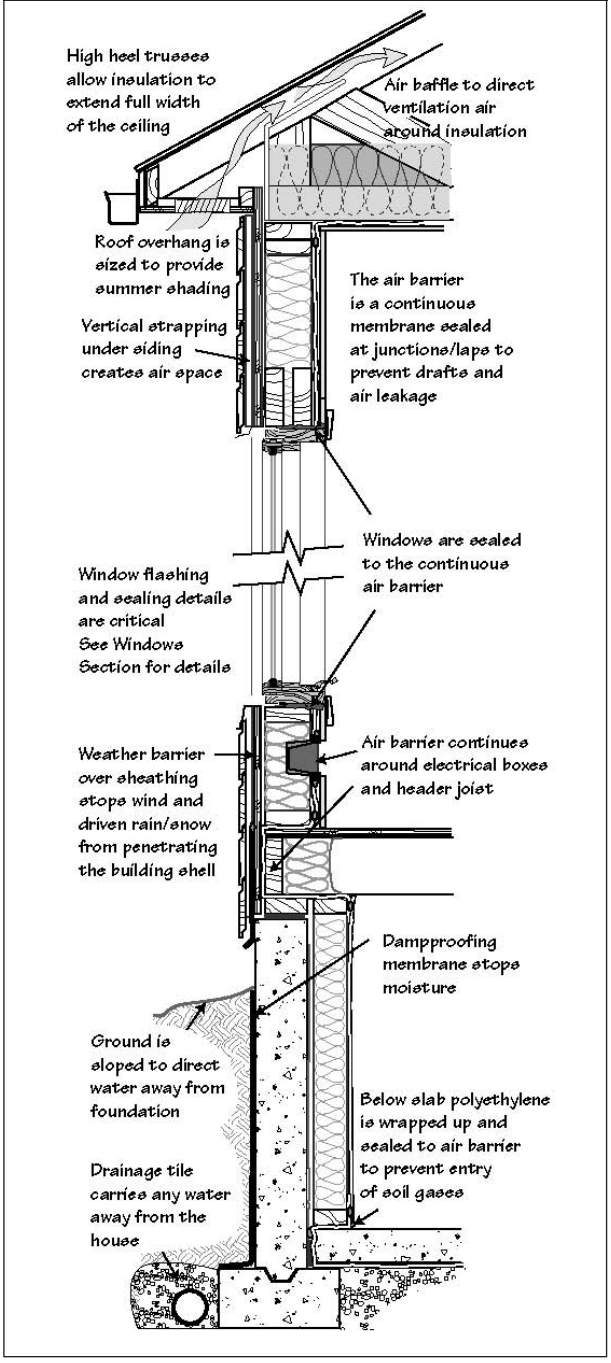
### Foundations

- Excavation and construction of the addition must not affect the structural integrity of the existing house. When the house is constructed on a foundation without a sound footing, underpinning may be required.
- A full basement or crawl space must be accessible from the existing house. Some structural alterations may be required unless there is a window or door in the existing foundation.
- Unheated crawl spaces are not recommended as they can lead to cold floors and frozen service lines.
- Heated crawl spaces must be connected well to the house ventilation system.
- Surface and soil moisture must be directed away from the foundation walls. Consider using drainage layer membranes or free-draining insulation materials.

- Dampproofing and ground cover must be provided to the crawl space floor to resist the entry of vapour from the soil. The more you plan to use the crawl space, the better construction quality required in your floor.

### Framing

**Construction details**




- The new floor system must be permanently tied into the existing house structure, using either threaded rods or lag bolts.
- Floors in the addition should be level, even if the floors in the house are not level.
- Additional structural support may be needed if window or door openings in existing walls are enlarged.

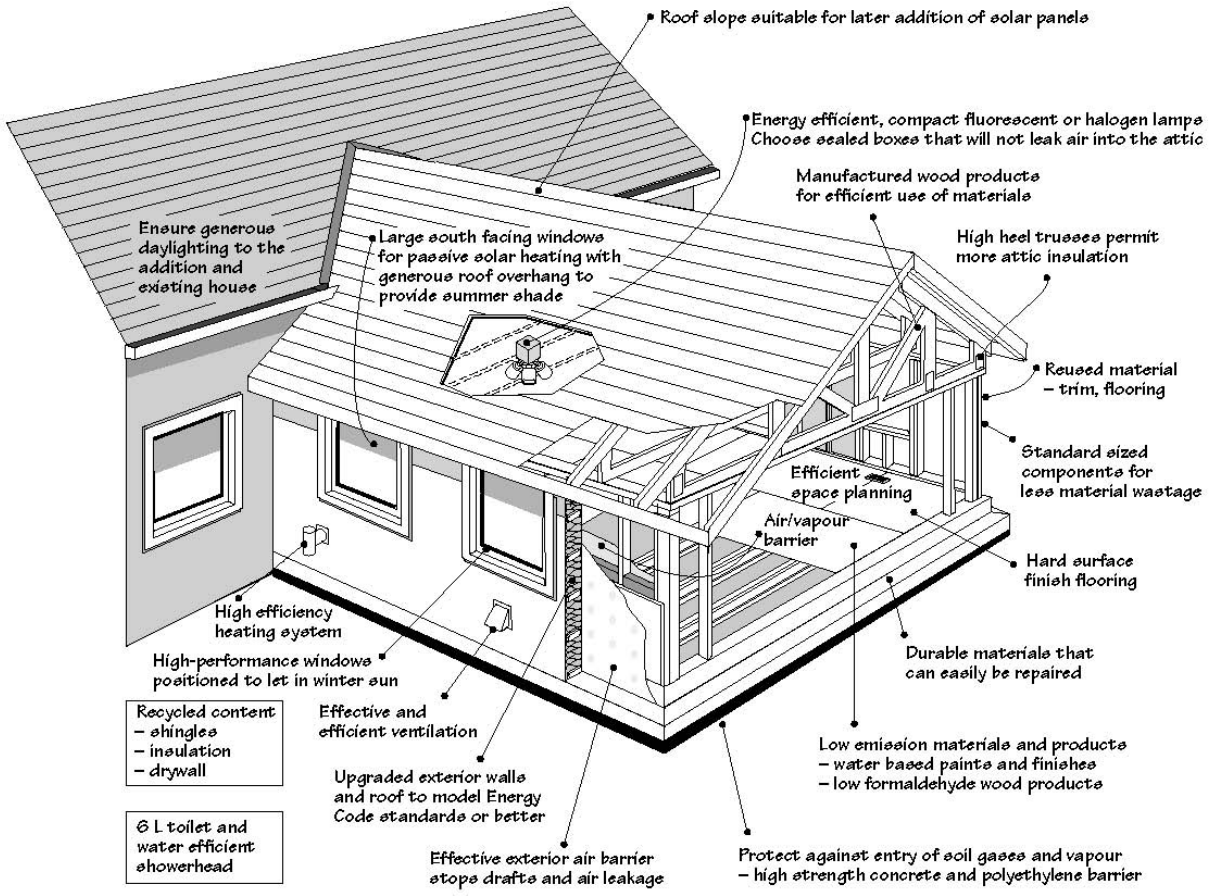
### Wall systems

- The join between the existing house cladding and the addition must be sealed to prevent rain and snow entry.
- An effective air seal must be provided to minimize air leakage at the junction of the addition and existing house.

### Roofing

- The new roof must be professionally joined to the existing roof to reduce the potential for leakage. Upgrading of the existing house roof may be justified at this time.
- Scissor trusses permit design of cathedral ceilings.
- Use raised-heel trusses to permit insulation over the full attic area.
- Make sure the attic and roof space are ventilated well to prevent snow buildup and ice damming at the eaves. Install required eave protection.
- Take care to provide adequate structural support and weather protection for the new roof. Where the new roof joins the existing roof, some doubling of rafters in the existing house will be required.
- Ensure that roof drainage (eavestrough and downspouts) directs water away from the house.

**Rear addition details**




## Other considerations

- Services can usually be run from the existing house through the floor assembly.
- Construction sites are messy. Resist the temptation to open the house into the addition before the very end of the project. This will reduce the amount of construction dirt and airborne particles entering the house.

# MASTER BEDROOM EXPANSION

## Overview

Since the ’60s and ’70s, houses have gradually increased in size, allowing for amenities such as master bedrooms with ensuite baths. Many owners of smaller, one-storey homes decide to enlarge or adapt their homes to add a master bedroom.

Some homeowners find space for a new master bedroom within the existing footprint of the house by converting three bedrooms to two. If additional bedrooms are required, they are added in a finished basement.

Another popular solution is to bump out the house at the front or rear, allowing for expansion of one of the existing bedrooms or the creation of a new bedroom.

**Rear addition**
***Photo: Brent Applegate***

## Design considerations

In developing the design, it is important to define where the new space should be located, how it will relate to the rest of the house and what features it should include.

- Locating the new master bedroom next to the existing bathroom or kitchen reduces the plumbing costs involved in installing an ensuite.
- Adding the master bedroom at the opposite end of the house from the other bedrooms creates a separate “adult realm.”
- If traffic noise is a concern, put the addition at the rear of the house.
- A master bedroom at the rear of the house also allows for a direct connection to the garden.
- Will the floor level be the same as the rest of the house or would a “sunken” space work better? Small changes in floor level add architectural interest and can make a small space seem larger, but changes in floor level limit accessibility.
- What features should the new master bedroom include? For example, one approach could include an enlarged bathroom with updated fixtures and a walk-in closet with dressing room. Another approach could include an exercise room off the master bedroom. An alcove in the master bedroom could be used as a sitting area or home office.

## FlexHousing™

A one-storey bedroom addition can be one of the most adaptable and useful spaces in the home, provided it has all the necessary facilities. It can serve as a master bedroom, a granny suite or home office. With separate heating and ventilation, the addition can provide a “clean” room for family members who are environmentally sensitive.

With some advance planning, many of these future options can be built in or “roughed in” during the initial renovation, saving money and disruption later.

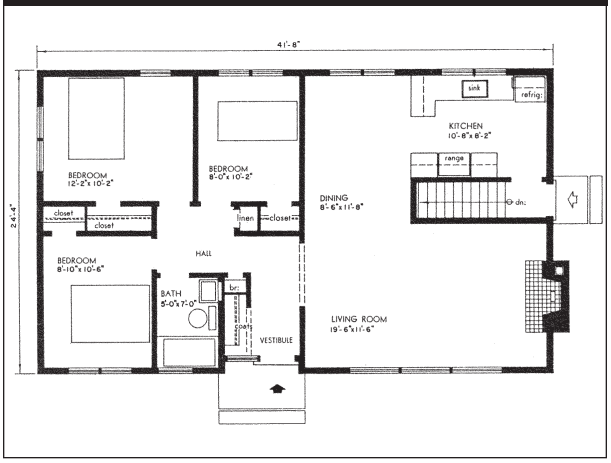
Some of the features to keep in mind include:

- Additional wiring for a home office.
- Accessibility features in the bathroom.
- Wider doorways to accommodate a wheelchair.

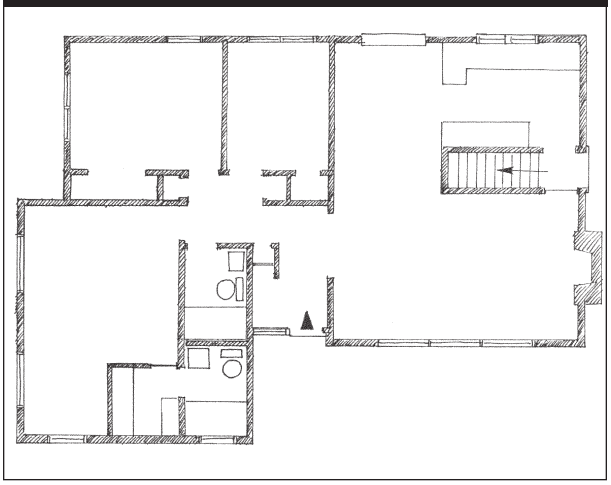
- Smooth transition in floor level between the addition and the main body of the house.
- Windows with low sills that allow viewing from a sitting position.
- Access to the outdoors by a wheelchair ramp.

### Master bedroom addition—Plan #1

**Original layout**




**Front addition**



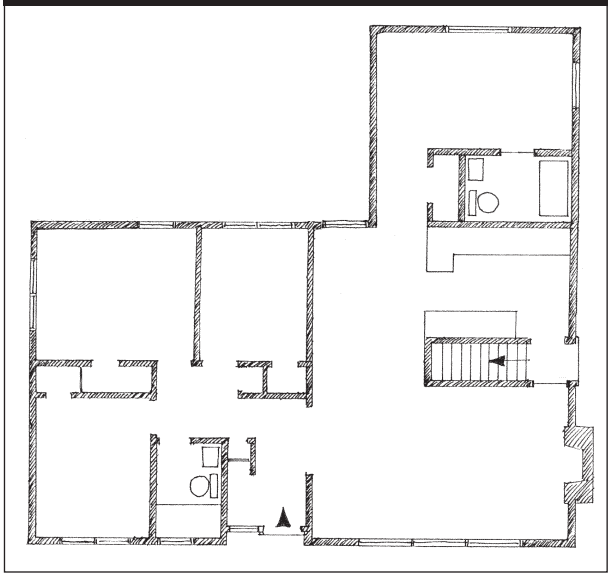
Enlarging the front bedroom next to the bathroom allows for an ensuite bathroom back-to-back with the original bathroom.

A dressing room may be provided adjacent to the ensuite bathroom.

Depending on the location of lot lines, windows at the side may not be permitted. In this case, the walk-in closet may be moved to allow for additional windows at the front of the house.

### Rear addition

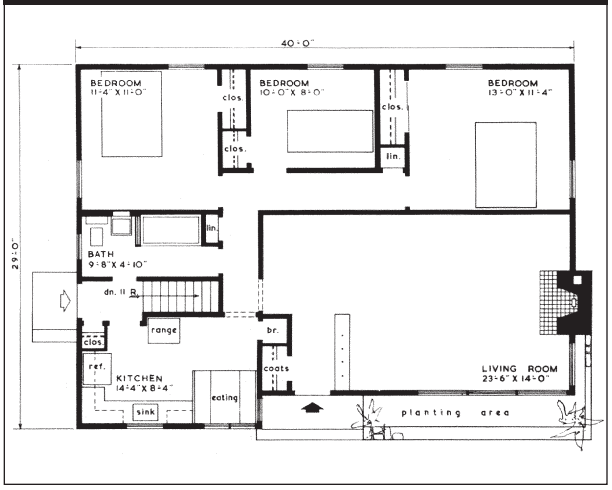
**Rear addition**



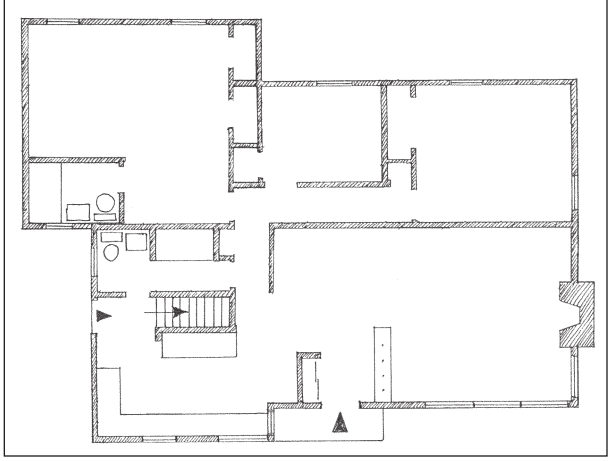
- An addition to the rear allows the ensuite bathroom to be located adjacent to the kitchen plumbing.
- In this location, the additional bedroom may be more suitable for a granny suite as it is separated from all the family living areas.
- The rear location allows for a walkout to a patio or garden.
- If desired, the dining area-family room could be expanded by removing the third bedroom adjacent to the kitchen-dining area. This

would also increase the daylighting into the dining area and allowing for a walkout from the dining area to the garden.

**Original layout - Plan #2**



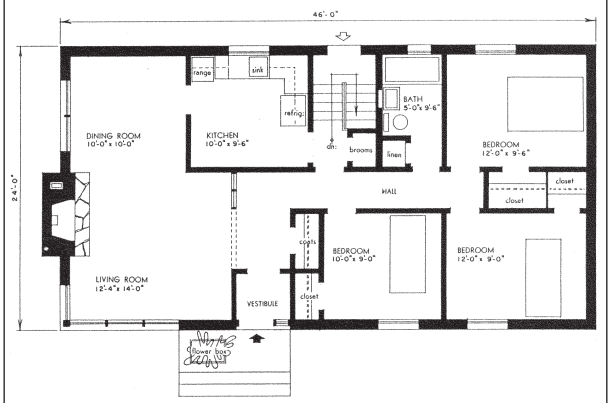

**Rear addition - Plan #2**



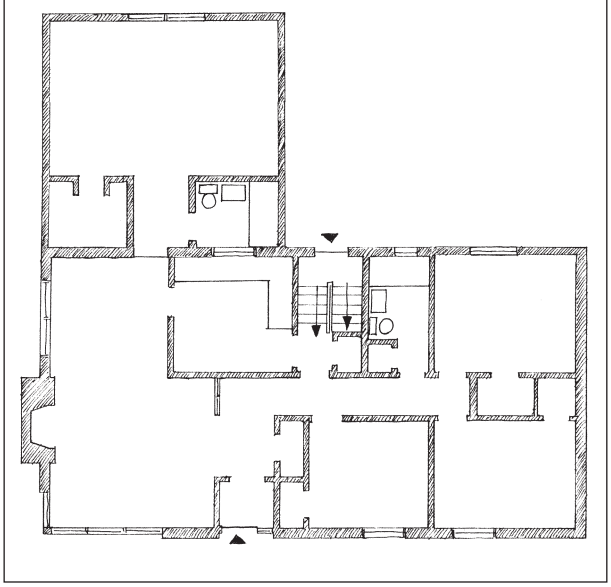
**Master bedroom addition—Plan #2**

- If lot line restrictions allow, a small bump-out to the side and rear will allow for an enlarged master bedroom with ensuite.
- The rear location allows for a walkout to patio or garden.
- Simply extending further into the yard can increase the size of the addition.

**Original layout - Plan #3**



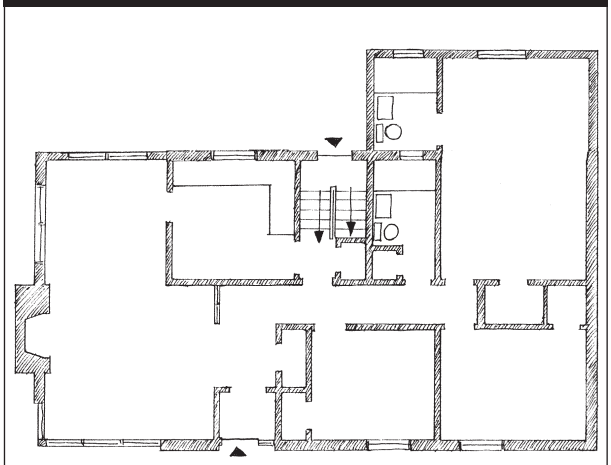

**New master bedroom**



## Master bedroom addition—Plan # 3

- The location of the kitchen at the rear of the house allows the option of adding a new master bedroom behind the kitchen.
- As in Plan #1, page 45, a bedroom with ensuite off the kitchen could also be used as a granny suite with a walkout to the garden.
- The disadvantage with this option is that it eliminates natural daylighting for the kitchen.
- Adding a new master bedroom to this layout would allow for the small bedroom next to the front entrance to be used as a home office.

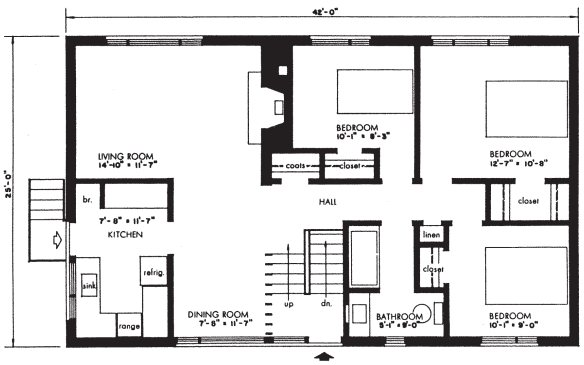
**Expanded master bedroom**



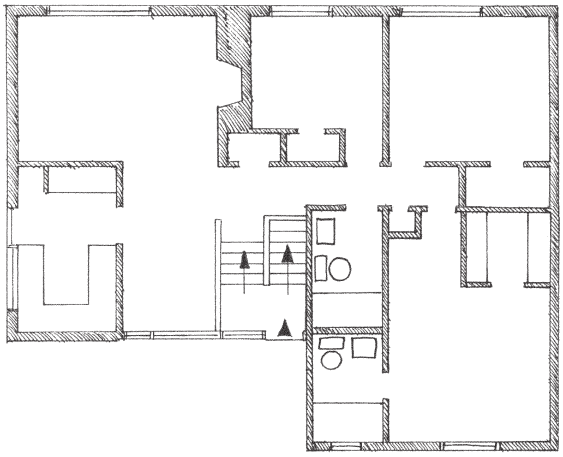
- Instead of adding a full new bedroom, a master suite could be created by expanding the rear bedroom adjacent to the original bathroom.
- This option retains the master bedroom in the private wing of the house, but still allows for a walkout from the bedroom to the rear patio.

## Master bedroom addition—Plan # 4

**Original layout**




**Front master bedroom**



- This layout is similar to "Master bedroom addition—Plan #1," page 45, but since the existing front bedroom is larger in this layout, it can be enlarged to a master bedroom simply by extending the house toward the front.
- Windows on the side would add more natural light to this master bedroom if lot lines and setbacks allow.

# FAMILY ROOM-SITTING ROOM ADDITION

## Overview

Adding a finished recreation room in the basement was one of the first do-it-yourself project in most one-storey homes of the ’60s and ’70s. However, the larger homes of the ’80s and ’90s include a main floor family room next to the kitchen and this is now the desirable feature to add to existing homes.

Most family rooms are added at the rear or front of the house. Depending on local bylaws and on the layout of the house, it is sometimes possible to convert an attached garage to a family room.

Family lifestyles vary. A key aspect in designing a family room addition is to consider how you will use the space.

- Will the addition be used mainly by family members or do you entertain frequently?
- Do you entertain at sit-down dinners or informal gatherings?
- Will the television be located in the family room?
- Do you often listen to or practise music? Where do you do it now? Will you do it in the new family room?
- What about other activities? Is a family member working from a corner of the living room? Perhaps what is needed is a home office.

**Garage conversion**
***Photo: Jeff Clarke***

## Design considerations

- When adding space to create a family room, consider that, in most one-storey homes of the ’60s and ’70s, the living room was open to the hall and dining room and often to the kitchen. This presents the opportunity to use the existing space as the family room and to use the addition as a separate sitting room.
- Once a family room is added, if the living room is also open to the rest of the house, it will rarely be used. However, if sound separation is provided between the family room and the living room, the living room can serve as a quiet sitting room, music room or library.
- How much additional space is actually needed to accommodate your family’s activities? In homes with family rooms there is often a small eating area in the family room and a small formal dining area next to the living room. Often, the formal dining room is seldom used. Would one larger eating area be a better solution?
- A solarium addition can also serve as an informal sitting room, removed from the rest of the house. The photos below show a house shortly after it was built and the same house, some years later after a solarium was added.
- If the new family room is located in a converted garage, the entrance to the family room will shut off what was the back door to the house. Where will the new service entrance be located?
- Consider how people will get to the family room from other parts of the house and from outside. Will people have to pass through the kitchen or dining area to reach the family room?

- A family room with good access to the backyard provides an excellent setting for informal entertaining.

**Before solarium addition**
***Photo: Brian Crewe***

**After solarium addition**
***Photo: Brian Crewe***

## FlexHousing™

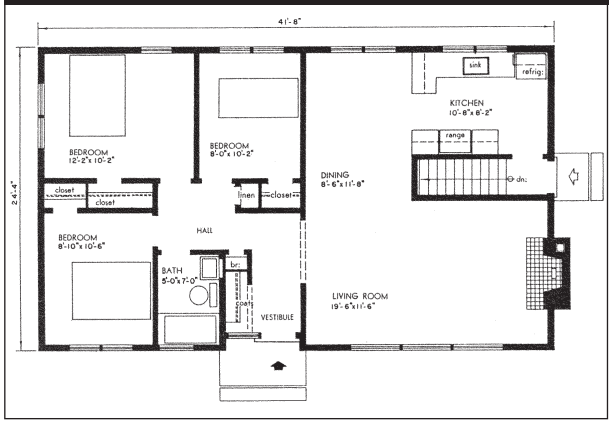
- The end result of a family room added to the main floor will be one large open space that includes the kitchen, dining and living areas and one enclosed room that is separated from the main family living area.

- The enclosed room adds a great deal of flexibility to the home. Depending on location, it may serve as a home office, a formal sitting room, a solarium sitting room, a music room or study.

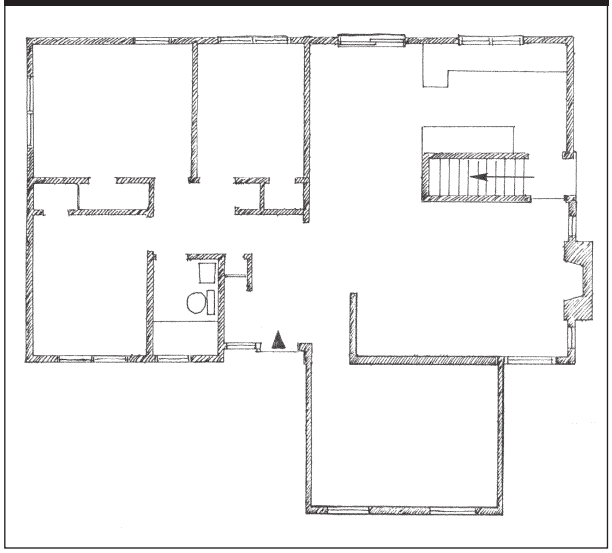
- Considering accessibility issues and FlexHousing™ principles as part of the renovation will enhance the future potential of the new space. Are doorways wide enough? Are changes in level easy to manage? Can the access to outdoors accommodate a ramp?

## Family room-sitting room addition—Plan # 1

**Original layout**




**Front sitting room**

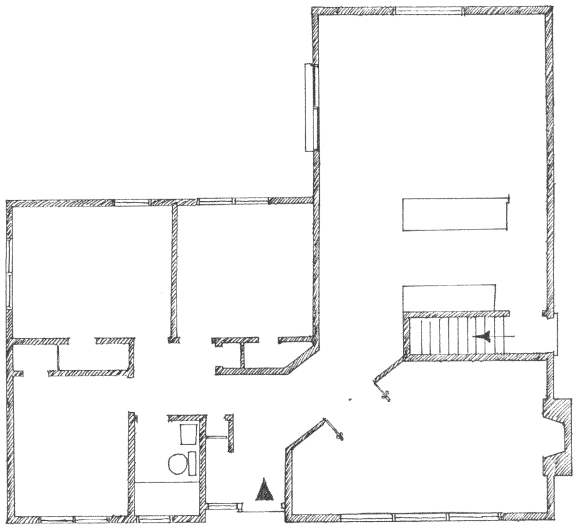


- This new room at the front of the house could serve as a quiet sitting room or, since it is next to the front door, as a home office.

- If used as a sitting room, the addition could be accessed through French doors from the family room.

## Rear family room

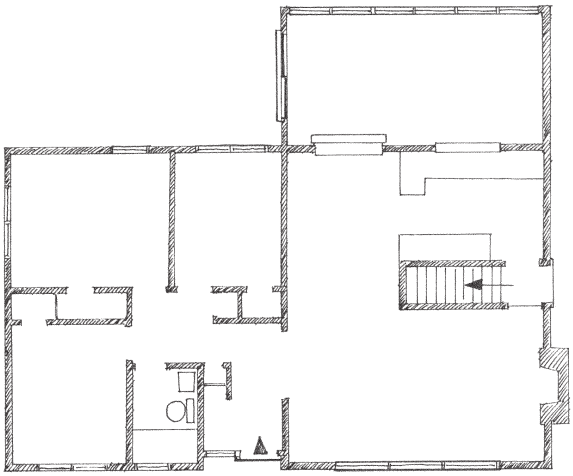
**Rear family room plan**



- This arrangement extends the family room to the rear of the house.
- With this layout, the problem of the basement stairs is resolved and the kitchen is connected directly to the dining room and family living area.
- The former living room can be separated from the hall to provide a sitting room that is isolated from the kitchen and family room.
- If setbacks allow, new windows in the side of the house could provide natural light to the kitchen.
- Structural reinforcement will be required to support the second floor walls above the expanded family room.

## Rear solarium

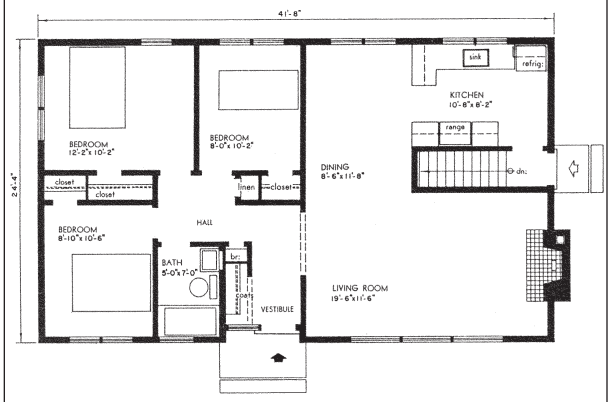
**Rear solarium plan**



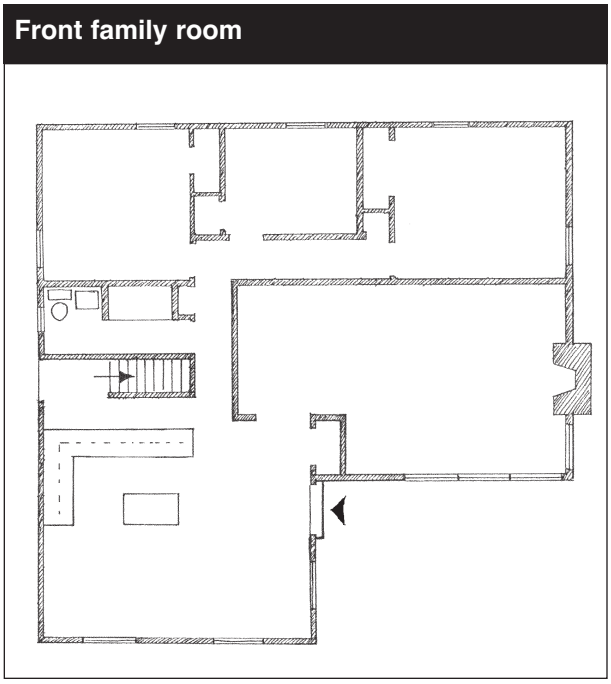
- A solarium at the rear of the house can also serve as a quiet sitting room.
- One disadvantage of this plan is that traffic to the solarium would have to pass through the dining area.

## Family room-sitting room addition—Plan # 2

**Original layout**



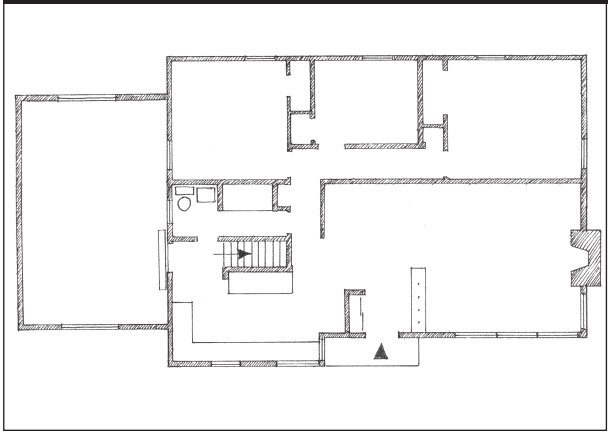

**Front family room**



- Since the formal living-dining area is already well separated from the kitchen, this layout lends itself to the addition of a family room off the kitchen.
- To make the best use of space and simplify traffic patterns, the front entrance is repositioned to open directly into the family room.
- To avoid traffic passing directly through the kitchen from the back door, the kitchen is positioned to face into the new family room.
- As in "Family room-sitting room addition—Plan # 1," page 49, structural reinforcement will be required to support the second floor walls above the expanded family room.

## Garage conversion

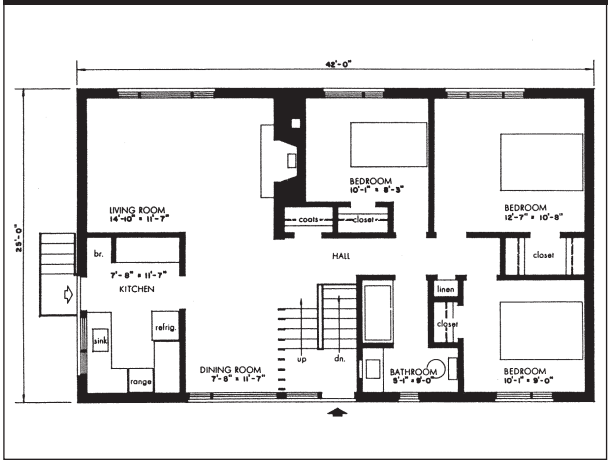
**Garage conversion**



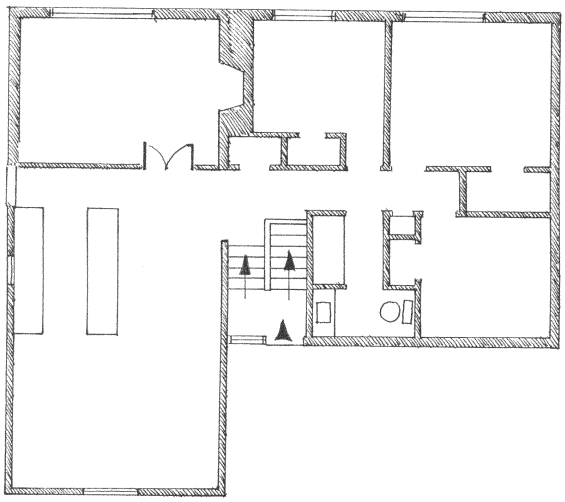
- With a side entrance, this layout allows for conversion of an attached garage to a family room.
- The kitchen is opened up to allow traffic to pass through the kitchen to the family room.
- The front hall arrangement may be altered to provide better separation of the formal dining and living room.

## Family room–sitting room addition—Plan #3

### Original layout

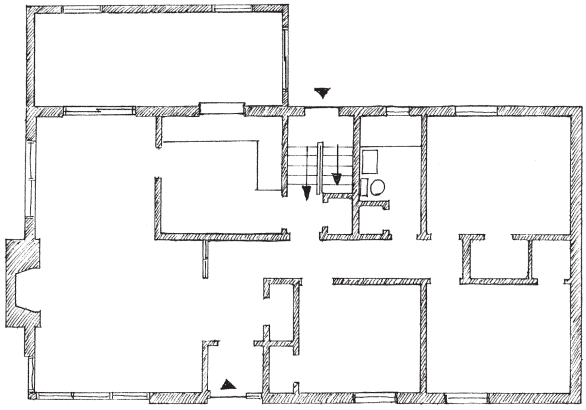



### Front sitting room–office



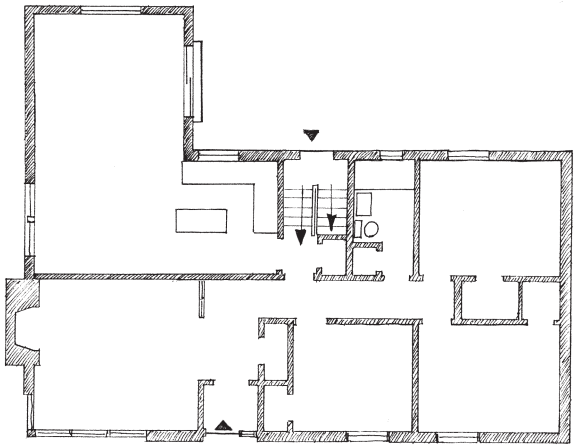
- This layout is similar to Family room–sitting room Plan #1, page 49. It allows for the addition of a separate room off the family living room and adjacent to the front door. The addition may be used as a formal sitting room or a home office.
- This scheme calls for removal of a full partition wall, to open the kitchen to the family room.

### Rear solarium



- A solarium may be added directly off the dining room.
- The original floor plan may be retained (as shown), or the kitchen partition wall may be removed to create a more open great room.

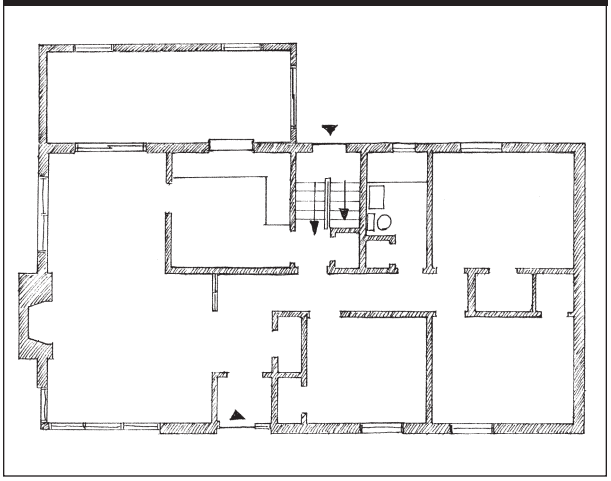
### Rear family room



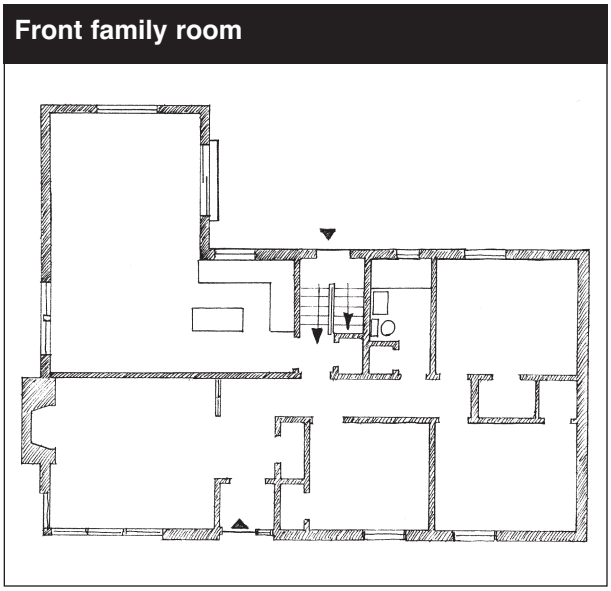
- In this arrangement, a family room may be added at the rear and the former living area enclosed to form a separate sitting room.
- This scheme allows for access from the family room to the patio—a useful arrangement for informal entertaining.

## Family room–sitting room addition—Plan #4

**Original layout**



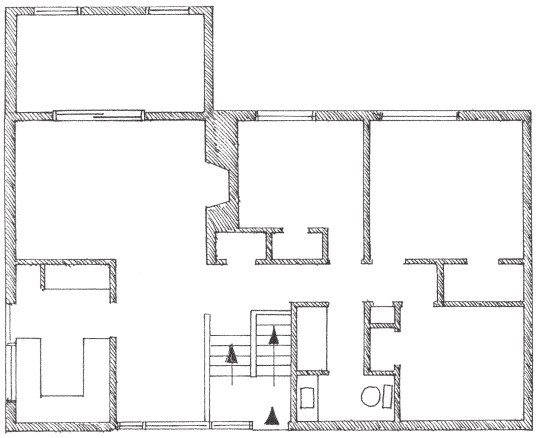
**Front family room**



- An extension to the front of the house allows for a main floor family room.
- The kitchen is reconfigured to allow better access to the family room.
- The side door is moved to allow for better traffic flow.
- The former living room is enclosed to form a separate sitting room.

## Rear sitting room–solarium

**Rear sitting room–solarium**



- A solarium or full-size, formal sitting room could be added at the rear of the house.
- Traffic would have to pass through the family room to reach the sitting room.
- The existing kitchen could be retained or reconfigured to allow better access to the family room.

# BASEMENT RENTAL UNIT AND UPGRADE

## Overview

For many owners of one-storey homes, the first space-expanding project was to finish at least part of the basement. The typical basement renovation added two bedrooms and a recreation room, with a small area left for laundry and utility room.

In some communities, housing is at a premium and bylaws permit basement rental units. The one-storey house of the ’60s and ’70s is a good candidate for basement rental conversions. The larger footprint of the house can accommodate a generous basement apartment as well as the necessary utility room. Many houses of this era were built with only four feet of the foundation underground. This allows for generous-sized basement windows, which can provide natural light for the rental unit. Most homes have generous ceiling height and don’t require major structural changes.

In many homes the second entrance was at-grade on the side, that is, at the level of the landing for the basement stairs, allowing for easy access from the street to the rental unit. One style that was popular in the West had an entrance at-grade with a garage occupying half of the lower level. Often the garage was later finished to expand the lower level living space.

*Photo: Bruce Riddick*

Even if there is no intention to rent a basement unit, and the basement is already finished, after 30 or more years it may be time to upgrade the living space. Most of the Design Considerations and Construction Techniques will apply, whether the renovation is for rental or for expanded family use.

Whatever the project, any basement renovation must address two key issues:

1. What is the space to be used for—recreation, a bedroom, a rental suite? The design will change accordingly, but it may be best to build so future options are kept open.

2. What do you have to work with? Is the foundation sound? What about dampness or water leakage? To protect the building structure, never finish a damp basement without first solving the water problems.

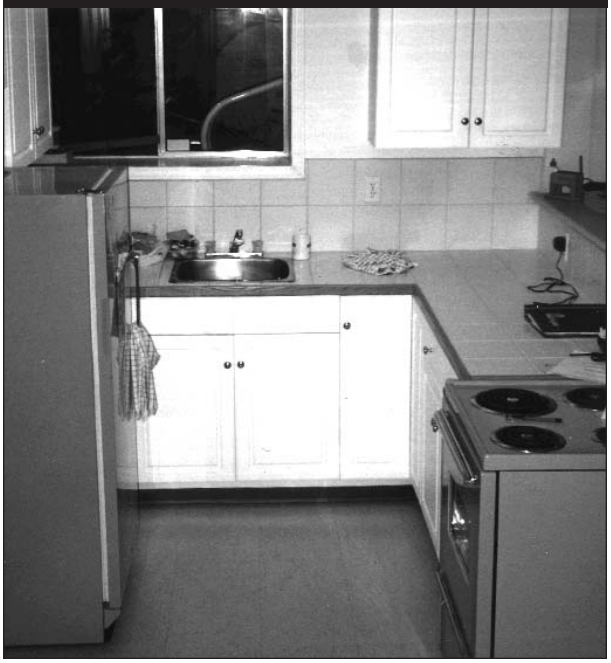
## Design Considerations

While the basement space in one-storey homes has great potential, it still may lack some essential requirements for living space: adequate daylight, safety and provision for plumbing, heating and ventilation, or even adequate ceiling height. A successful basement renovation will address these issues and also retain sufficient space for the original basement functions, such as utility room and storage. As well, creating a basement rental unit presents some special problems.

## Daylighting

Building codes require that habitable spaces have adequate windows for egress, light and ventilation. Yet basements have very small windows, which one can only see out of when standing. The simplest solution is to increase the window size in critical living areas, using

**Basement kitchen**
***Photo: Bruce Riddick***



window wells to bring the windowsill to table height. This is especially suitable where there is a generous portion of basement wall above grade. However, window wells are only advisable where good drainage is possible. A basement walkout with glass doors is another alternative. This option works well on a sloping site or where a second entrance to the space is needed. However, proper frost protection is still required.

## Safety

Safety is just as important in basement living areas as on the main floor. Ensure that fire separations conform to local code requirements. Include at least one smoke alarm in the finished basement space.

Forced-air systems that are shared between the main and secondary living unit do not allow for odour or fire separation. As well, they often fail to provide good comfort levels in the basement space. Consider a separate heating system for the basement unit. While not always required by code, a second exit is preferable if the space is to be used for sleeping or as a rental suite. Since this will expose the footings for the house, frost protection must be provided. In some jurisdictions, a window measuring one square metre (10.75 sq. ft.) is considered a sufficient exit.

## Plumbing, heating and ventilation

Adding a bathroom or kitchen, or both, requires additional plumbing in the basement. A sump pump may be required to lift waste to the level of the waste line that connects to the municipal sewer system or septic tank. As well, access to the municipal sewer system will require breaking through the concrete floor.

Unfinished basements are heated minimally or not at all. In houses with forced-air systems, simply tapping into the existing overhead ducts will not make the basement comfortable. A finished basement may require significant changes to the existing heating and ventilation systems in the house.

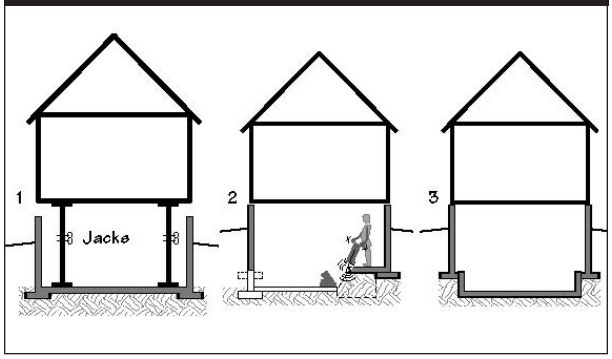
In addition to operating windows, a finished basement requires exhaust fans in kitchen and bathroom to remove excess moisture from the house. Care should be taken to ensure an adequate supply of air to the furnace room, especially if fuel-burning appliances are enclosed in a small room. Spillage-resistant heating appliances, such as direct vent furnaces, may be advisable.

A separate heating system for the rental unit is advisable. Air mixing from a single, forced-air furnace is not recommended, as living styles may not be compatible.

## Ceiling height

Ceiling heights should be at least 2.1 m (6 ft., 11 in.) from finished floor to finished ceiling. One-storey homes of the ’60s or ’70s may have a generous ceiling height of 2.3 to 2.4 m (7 ft., 6 in. to 8 ft.), allowing for installation of a subfloor. For homes with lower basement ceilings, there are three options for increasing the ceiling height.

**Three options for increasing basement ceiling height**




1. Temporarily raise the house on jacks and increase the height of the basement walls.

2. Underpin the old footings and dig out the full basement floor, thereby increasing the height of the basement wall.

3. Dig out the centre area of the basement floor, leaving the footings and walls intact and a “shelf” or “bench” around the perimeter. This is the least disruptive and least costly approach.

Both options 2 and 3 require careful relocation of sewer lines and drains located underneath the basement floor.

### The essentials

It is important not to over-finish the basement area. The basement is the nerve centre for the house’s mechanical systems. Accessible space is required for utilities such as the furnace, water heater and electrical panel. Floor drains should not be covered. Access is needed to plumbing shut-off valves, electrical and phone cable junctions and cleanouts at the base of vertical plumbing stacks. Since many of these services for the upstairs run through the basement ceiling, fire-rated metal access panels are recommended to allow access to critical areas.

### A separate rental unit

In addition to these general considerations in finishing a basement, creating a separate basement rental unit brings special challenges.

- Storage space for tools, sports equipment and so on is essential. Where will storage for the main floor household and the basement rental unit be provided? Options include a storage room in the basement, a storage shed in the yard or the garage.

- How will the owner obtain access to the utility room? In homes with fireplaces, the chimney and furnace are usually located underneath the living room, far from the entrance to the basement.

- Stacking the kitchen and bathrooms will save on plumbing expenses.

- Where will laundry facilities be located? Will there be one facility with common access or separate facilities in each unit?

- A sloping site offers the potential for a walkout to the backyard from the basement.

- How will soundproofing between the floors be provided?

- How will fire safety principles be implemented?

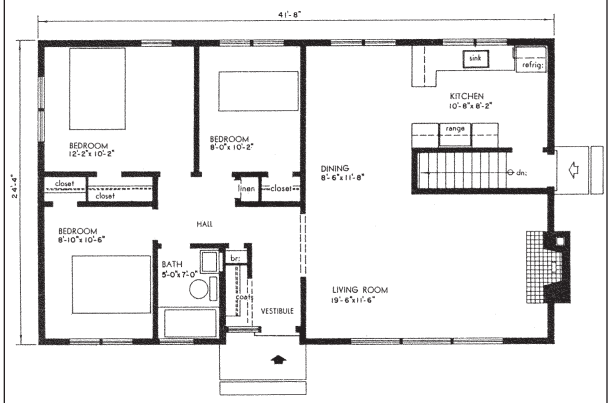
- How will power for an additional stove and dryer by provided—through an electrical upgrade or will gas appliances be used?

### FlexHousing™

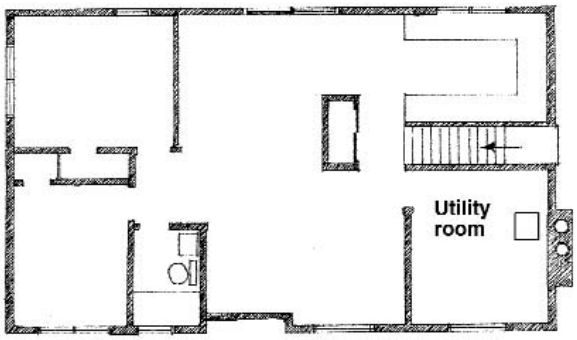
For maximum flexibility, consider the key potential uses of the finished space before deciding on a finished design. If a rental unit is desired now, might there be a need to reintegrate the finished basement with the rest of the house at a later date? Are there any rooms in the finished basement that could later be converted to a home office, a game room or hobby room? Will children of student age require a semi-separate living space in the future?

## Basement rental—Plan #1

### Original layout–main floor



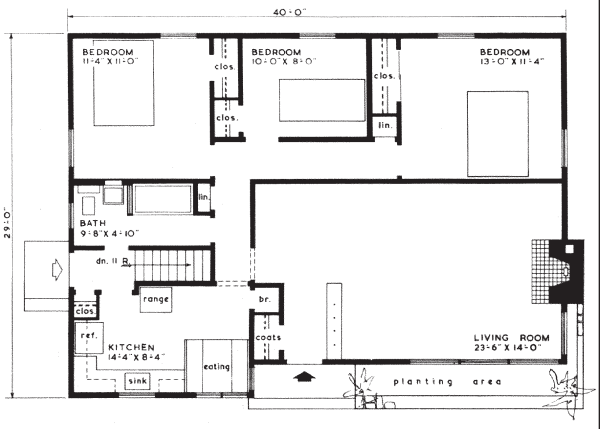

### New basement floor plan



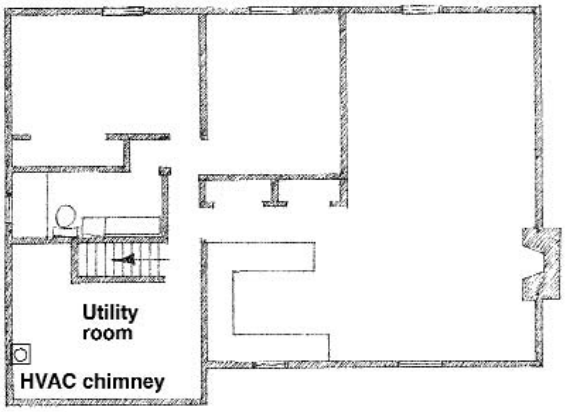

- This layout allows for a generous, two-bedroom rental unit.
- The utility-furnace room is next to the entrance stairs. If desired, the entrance could be configured to allow for independent access to the utility room.
- The kitchen and bathroom are stacked under the main floor facilities, making it easier to install plumbing.
- Depending on lot grade, it may be possible to have a walkout from the basement dining area.

## Basement rental—Plan #2

### Original layout–main floor



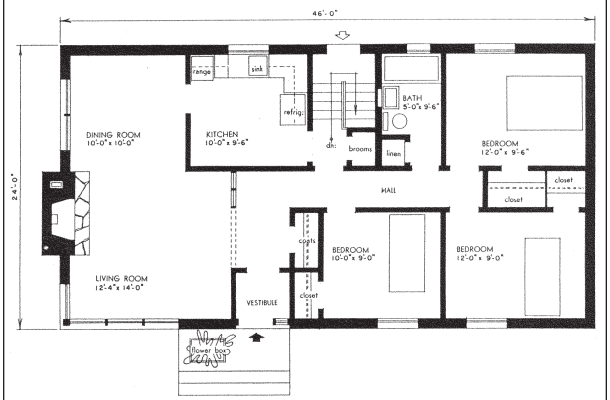

### New basement floor plan



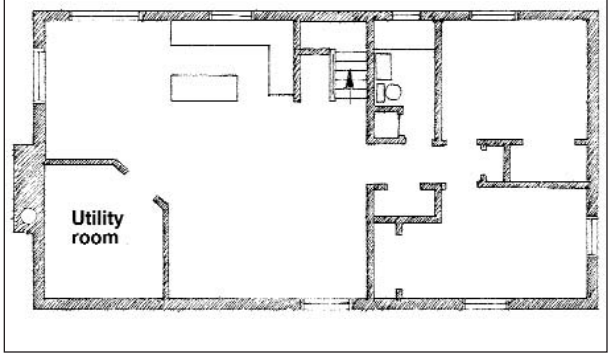

- Depending on the location of the furnace, it may be possible to locate the utility room next to the stairs.
- Since the utility room is underneath the kitchen, it would be possible to include laundry facilities to service both units.
- Since the main floor bedrooms are located at the back of the house, there will likely be no reason not to have a walkout from the basement living room.

## Basement rental—Plan #3

**Original layout–main floor**



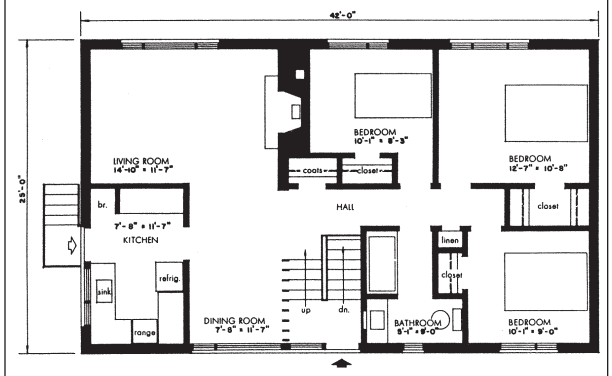

**New basement floor plan**



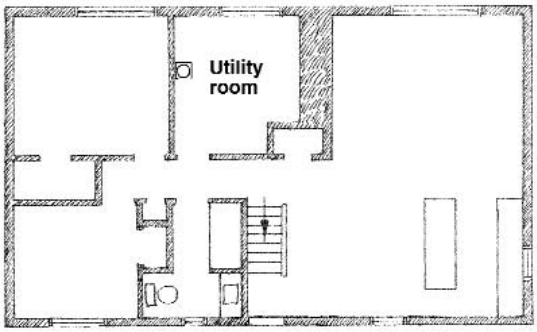

- A split entrance at the rear of the house allows for a pleasant entrance to this basement unit.
- The kitchen and bathroom are stacked underneath the main floor facilities, making it easier to install plumbing.
- The utility room location is somewhat awkward as it stands between the dining and living area, but an angled wall helps to ease the traffic flow between these two areas.
- It will be difficult to get natural light into the living area, since much of the living area wall is directly beneath the front entrance to the home.

## Basement rental—Plan #4

**Original layout–main floor**




**New basement floor plan**




- With a front split entrance, this home is a natural for conversion to two units.
- The utility room is opposite the stairs, adjacent to the living room.
- The kitchen and bathroom are stacked.
- Depending on the lot grading, it may be possible to have a walkout from the living room to the rear garden, perhaps underneath a deck off the main floor living room.

## Construction

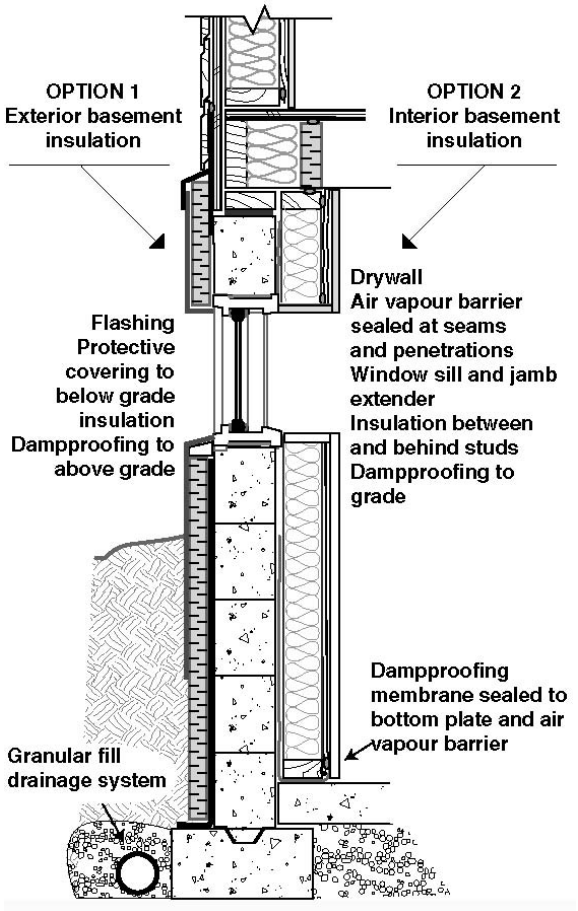
### Basements must be made dry

All basements must be dry before finishing. Finishing a damp basement will lead to mold growth and possible health problems.

It is preferable to stop excess moisture at its source—outside. For details, see CMHC’s *Investigating, Diagnosing and Treating Your Damp Basement*.

Exterior treatment (Option 1 in Exterior treatment–Options 1 and 2, below) involves installing a drainage membrane or dampproofing coating and insulation from the outside and the addition of free-draining backfill material and new drain tile.

**Exterior treatment–Options 1 and 2**




Alternatively, basements can be treated from the inside, as shown in Option 2 in Exterior treatment–Options 1 and 2). Leakage through cracks and holes in a poured concrete foundation can be reduced by injection of urethane or epoxy from the inside. Movement of soil moisture through the walls and floor can be prevented by using a liquid sealer or by installing a dampproofing sheet material against the foundation wall on the interior.

For basements with severe foundation problems, it is possible to build a new foundation within the old. Where the basement has experienced moisture problems, any structural damage to walls, floor or supporting timbers must be repaired and any mold removed before proceeding with the renovation.

### Basements must be warm

For comfort and heating efficiency, the basement walls and floor must be insulated and an effective air barrier system must be installed. It is preferable that all exterior walls be insulated to their full height, whether from the interior or the exterior. If possible, it is best to do both dampproofing and insulation from the exterior. This keeps the foundation wall warm and dry. Wall finish can then be added on the interior, or the concrete simply painted. However, exterior insulation is generally more expensive, unless exterior waterproofing work is required.

If access to the outside of the foundation is a problem, walls can be dampproofed and insulated from the interior. This requires construction of a stud wall with insulation and an air barrier and vapour barrier, or installation of rigid board insulation directly to the foundation wall. When insulating from the interior, it is important to stop air leakage at the floor header assemblies (where the floor joists meet the outside wall) and to insulate this space. This can be done by caulking all around the joint and filling the space with batt insulation or by fastening rigid insulation between the joists.

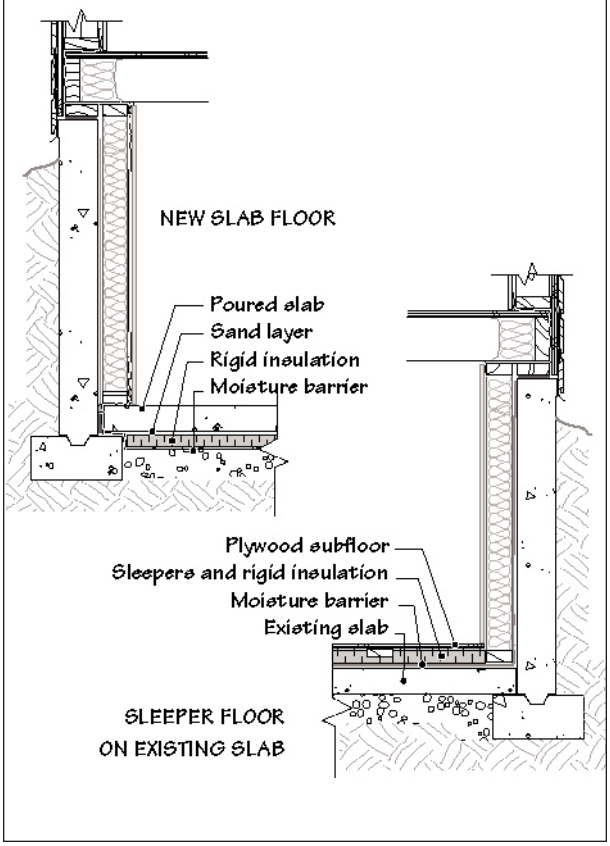
Insulating a basement floor can improve comfort and minimize the potential for condensation. There are two approaches to creating a warm floor.

1) If the basement has been dug out and a new floor slab is being poured, insulation is placed under the floor.

2) Alternately, insulation can be laid over the existing concrete floor and a new wood floor built on top. With this method it is essential to provide dampproofing between the wood and the original concrete floor.

Some basements with irregular stone foundations are very expensive to finish properly. For these foundations, it may be better for your house and your health to avoid finishing the basement walls and floor in any way.

**Floor options**




### Basements must be usable

A finished basement should be equipped to the same standard as the rest of the house. This means that electrical services must comply with code requirements for sufficient outlets and ground fault protection on outlets in kitchen and bathroom areas. It may be necessary to upgrade the electrical service to the house to provide sufficient service to the new living area.

Sound is also important. The finished basement space must be isolated from the noise of furnace fans, clothes dryers and washing machines. Control of noise from the floor above should also be addressed.

### Basements must be safe

If a basement is to be used for living space, care must be taken to ensure that it is built to the same standards of safety as the main floor of the house. The following issues deserve special attention:

- Interconnected, hard-wired smoke alarms are recommended to detect smoke spreading from one unit to another through heating ducts.

- Fire separation between the dwelling units should be provided through use of appropriate materials.

- Exits should be located to allow for easy ways out in an emergency.

- The electrical panel may require upgrading to more than 100-amp service to accommodate additional appliances.

### Don’t create new problems

Some alterations require special care. If a basement walkout is added, the footings will be exposed to frost and potential uplift damage. This requires extra excavation to insulate around the footings. Similarly, the addition of window wells in front of enlarged windows can expose the foundation to rainwater runoff unless proper

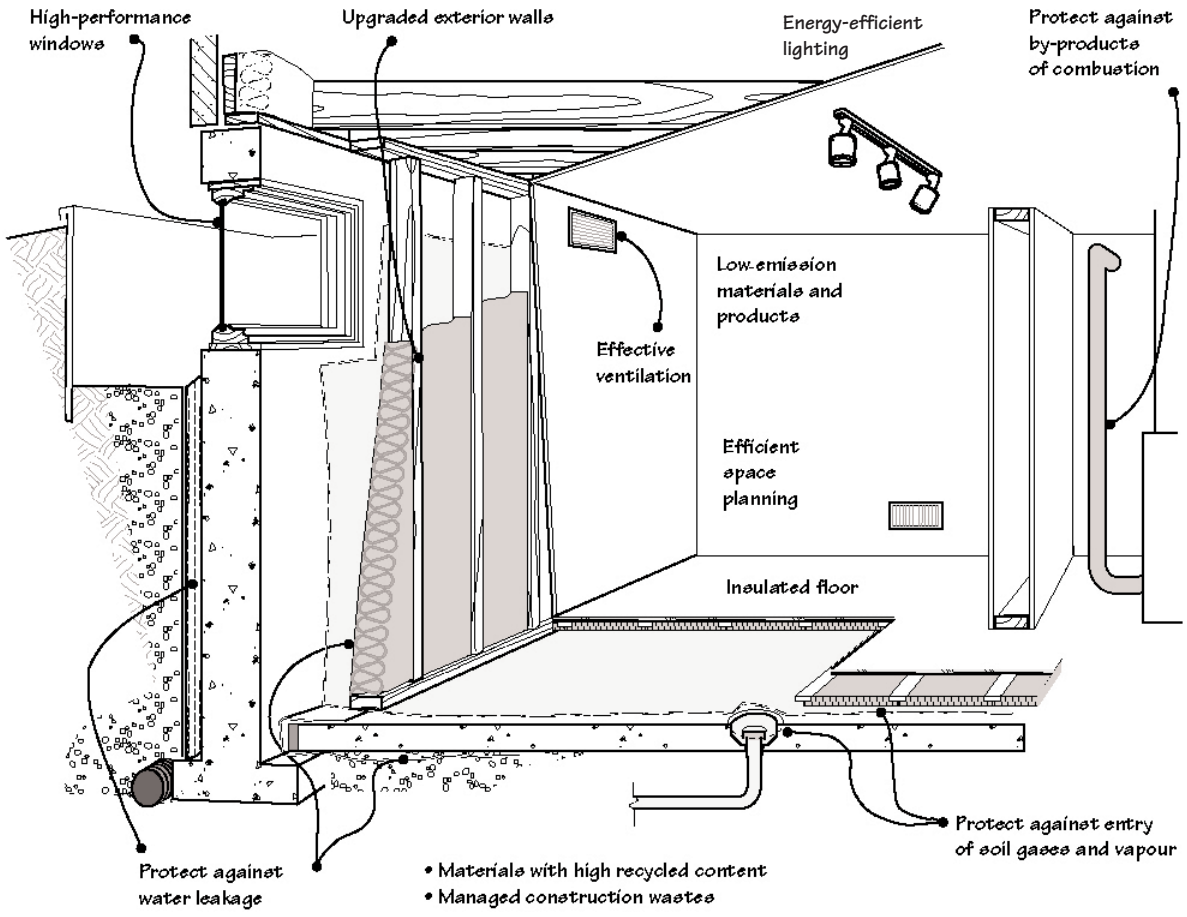
drainage is provided. Do not overload much-needed ventilation systems. New bathroom and kitchen facilities require exhaust fans to expel the additional moisture from bathing and cooking.

### Healthy Housing™

Attention to good design and construction practice will address key Healthy Housing™ issues such as adequate daylighting, energy efficiency, adequate ventilation and protection from dampness and mold.

Good indoor air quality can be achieved in a basement living space by providing an effective ventilation system and choosing low-emission materials. Pay extra attention to protection from combustion by-products. To avoid dangerous backdrafting, make sure that combustion appliances are not excessively depressurized by house fans, furnace fans or leaky drafts. Adequate air must be introduced to newly created rooms housing the furnace and gas hot water heaters. Sealed combustion or fan-forced appliances may be necessary to avoid backdrafting or combustion spillage.

**Healthy Housing™ features**



# ACCESSIBILITY RETROFIT

## Overview

Even more than other renovation projects, adapting the home to improve accessibility depends on the individual family’s needs and desires. The house can be made more adaptable in anticipation of future needs by incorporating such features as wider door openings, framing for bathroom grab bars, or lowered sink and cooktop, whenever renovation is taking place. But, when a specific situation arises, the family will need to take an inventory of the house to determine what features need to be changed.

The extent of the renovation will depend on the original design of the house, the nature of the person’s infirmity and whether the person has a caregiver or will be living totally independently.

## Design considerations

### Mobility

The most significant changes are required to accommodate people with limited mobility: people who can’t climb stairs, who use a walker for support or who use a wheelchair.

Access to the outdoors can be arranged by installing a ramp with firm handrails or by altering the front porch or rear deck to accommodate a motorized lift. For people who are housebound most of the time, it is important to provide a deck or sheltered porch where they can sit in fresh air—preferably where they can see the street.

One-storey homes are particularly suited for people with limited mobility, as the bedroom and bathroom are on the main floor. (However, split-entry homes require an interior elevator for access to the main floor.) With some modification, bedrooms and bathrooms could be suitable for someone who uses a wheelchair. Bathrooms from the ’60s and ’70s were often small and may need to be enlarged to accommodate turning and space for a caregiver to assist with bathing.

If the home is being altered to accommodate someone who uses a wheelchair and lives independently, the kitchen will need more extensive renovations. Alterations can include a lower cooktop and sink with knee space underneath. Pullout counters at table top height, pull-down cabinets, a side-opening wall oven and a side-by-side freezer–refrigerator all make the kitchen more accessible. Storage carts, which pull out from under the counters, are an alternative to lower cabinets.

Laundry facilities are another consideration as they are usually in the basement. The least expensive solution is to find space for the washer and dryer near to existing plumbing. This could be in a linen closet near the bathroom or in the kitchen. Alternatively, if the bathroom needs to be enlarged anyway, the new space could incorporate laundry facilities.

If the person is living alone, consideration should also be given to access to the electrical control panel and normal operating controls of major systems that are usually located in the basement. The ideal arrangement is a house without a basement that has an accessible main floor utility room. Alternatively, the system controls could be relocated to the main living level, a lift provided to the basement.

To improve access, doorways in all living areas need to be enlarged, swing-clear door hinges and doors equipped with lever-type handles need to be installed. All living areas will also benefit from windows with lower sill height so that people can see outdoors from a seated position.

### Visibility

Changes to improve accessibility for people with a visual impairment are less structural. The main consideration is to provide low-glare surfaces with high-colour contrast at the edge of all surfaces. High colour contrast finishes and paints can be used to define the edges of counters and

cabinets, baseboards and doorways. Low-gloss paints and floor finishes should be used and lighting should be even and diffuse. Glare from windows can be reduced by using adjustable blinds or screens. Visual and tactile warning strips make stair treads safer and easier to negotiate.

### Hearing

Adjustments for people who are deaf or hard or hearing require that communication and warning devices communicate visually. For example, smoke detectors can be equipped with a large strobe light, and telephones with a telecommunications device for the deaf (TDD). TDD devices allow people to communicate by telephone using typed messages. Video monitors can be installed so that the front door or a child's room is visible from the living area or kitchen.

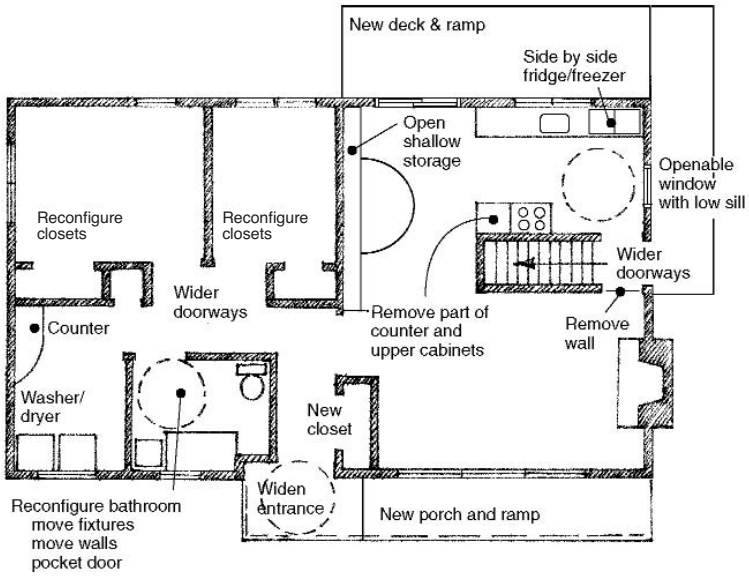
### Construction

All alterations should be soundly constructed. Bathroom grab bars require extra reinforcing. Widening doorways will require new framing and a wider lintel. Outside ramps must have a secure foundation.

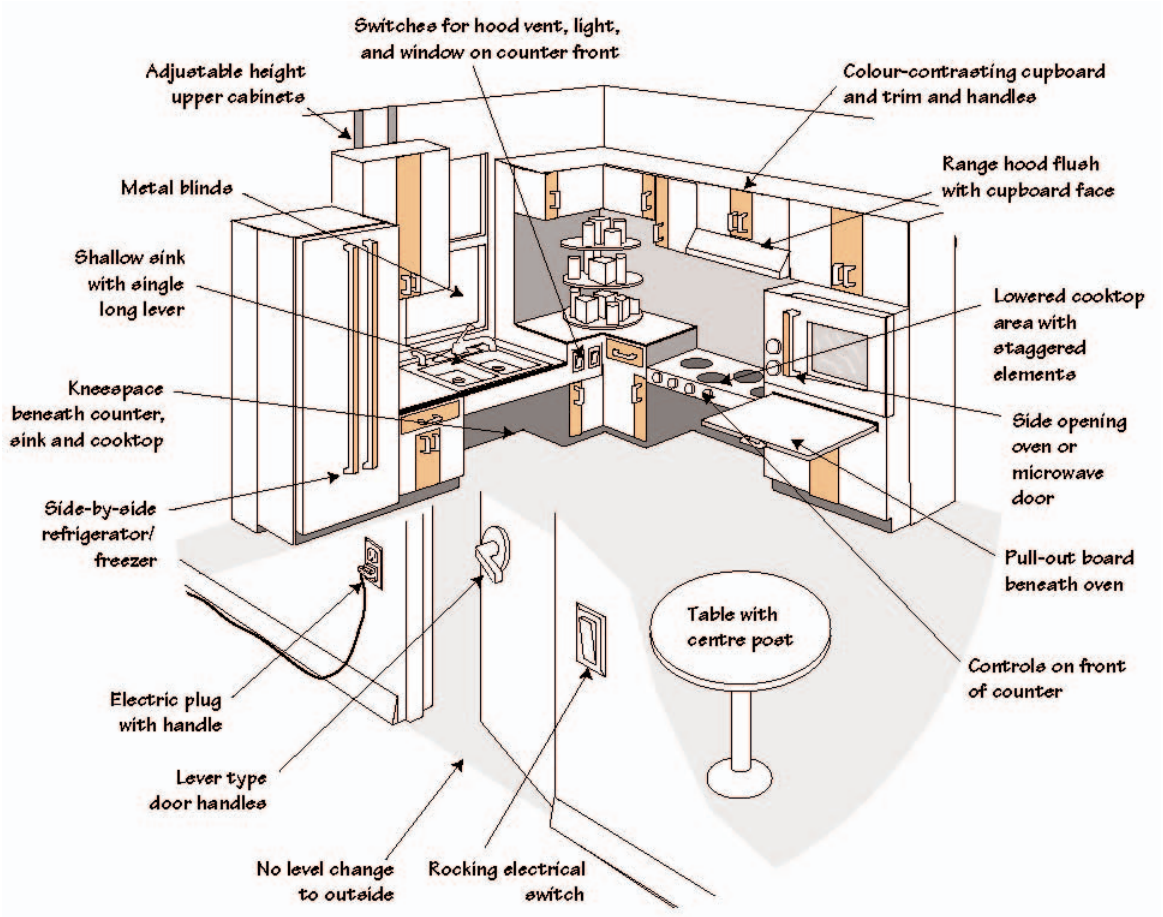
Doorways should be at least 91 cm (3 ft.) wide and have a clear area to one side of the handle or at least 46 cm (18 in.). Where space is at a premium, consider pocket doors. They are also easier for people who use wheelchairs. Door thresholds should be no higher than 1.25 cm (1/2 in.).

Replacing a stove with a separate cooktop and wall oven will require a change in the wiring. Also, relocate switches and outlets so that they are reachable.

**Accessibility features**



**Healthy Housing™ features**




Plumbing fixtures may also need to be changed to make it easier for people with a mobility impairment. This involves a higher tub and toilet and a lower vanity sink.

See CMHC’s *Housing Choices for Canadians with Disabilities* and *Housing for People with Disabilities*.

### Healthy Housing™

Daylighting and ventilation are especially important for people who spend more time indoors. Make sure that living areas have adequate window openings and that sills are low enough to permit people to see out when seated. For suggestions on ensuring adequate ventilation see the section on Upgrading heating, ventilation and air conditioning (HVAC) systems on page 78.

# KITCHEN REMODELLING

## Overview

In many smaller one-storey houses of the early ’60s, the living room and kitchen were very distinct rooms. The greatest change in kitchen design since then has been the reintegration of the kitchen with the family living areas of the house. This trend became evident in one-storey homes of the ’70s. Today, the farmhouse-style kitchen and family room concept are two expressions of this trend.

As the kitchen returned to its position as the focal point of family life, style and appearance became more important. At the same time, cooking methods changed and more and more small appliances came onto the market. As a result, homeowners found that their kitchens from the ’60s and ’70s lacked counter space, storage space and electrical outlets.

A kitchen renovation may be as simple as giving the room a new look with refaced kitchen cabinets, new paint and flooring. Many owners choose to completely renew the kitchen, installing new cabinets and appliances as well as finishes. A compete renovation can also include a new room layout to provide more counter space and better integrate the kitchen with the main living area of the house.

**Kitchen opened to family room**
***Photo: Brent Applegate***

## Design considerations

### Scope

Kitchens are one of the most costly areas in the house to remodel. Site-built cabinets are difficult to reface as they are usually not built to standard modular sizes. Changes to layout may require moving plumbing and wiring. A major renovation is also an opportunity to add or change windows and to insulate and air seal exterior walls. Before deciding on a complete renovation, consider how long you plan to be in the house. If the room layout is acceptable, a facelift and perhaps new appliances may be enough.

### Layout

Kitchens from the ’60s and ’70s usually included just a fridge and stove. You may want to add a dishwasher, a water purifier or a wall oven to the new kitchen.

- Will the existing layout accommodate additional major appliances?

The kitchen is one of the busiest rooms in the house. Consider traffic flow when you plan a new layout.

- Can traffic through the kitchen be routed around the food preparation area?
- Is there access to the service entrance and the garden from the kitchen?

### Size

Kitchens from the ’60s and ’70s were small, but even professional chefs don’t need a large preparation area. The way space is arranged can be as important as the size of the room. The ideal work triangle has a maximum of 2 m and a minimum of 1 m (roughly 6 ft. and 3 ft.) between the stove, the sink and the fridge. (See Chapter 4 for recommended lengths of counters and clearances around major appliances.)

Consider space savers such as pullout counters, roll-away work carts, overhead pot racks, a walk-in pantry cupboard, small-scale appliances for tight spaces and food storage elsewhere in the house. Space for the social side of the kitchen can often be found by opening the kitchen to the dining room or living room by, for example, turning a wall into a bar-counter. Alternatively, a large pass-through with folding doors allows more flexible use of the space.

### Style

At 40 years of age, the ’60s house is a period piece. While ’60s or ’70s style may not be to your taste, it is a good idea to reflect the period of the house in your renovation. For example, by using similar baseboards and trim to that found in the rest of the house, the new kitchen will fit right in. By avoiding the extremes of current trends your new kitchen will age more gracefully and won’t look out of date in five years. Similar considerations apply to the exterior. If your kitchen renovation involves moving or enlarging a window opening, use a window style appropriate to the age of the house. Starkly modern or fake colonial will look out of place and detract from the overall appearance.

### What works best for you

A kitchen is first and foremost a workshop for cooking. When designing your kitchen think about the extent and type of cooking you do at home. Consider too, how you might use the kitchen in the future. You may not want a microwave now but you may want to include space to add one later. Read books, clip pictures and visit showrooms to gather ideas. You might consider working with a kitchen company. They are experienced in kitchen layout and will do the design words missing–best guess: if you order their cabinets.

## Construction

### Cabinets and finishes

When installing cabinets in an older home that has settled, it may be difficult to find a point of reference that is level or plumb. Determine why floors are significantly out of alignment and level them before installing the cabinets and new flooring. Upper cabinets must be securely fastened to solid blocking in the walls.

### Thermal comfort

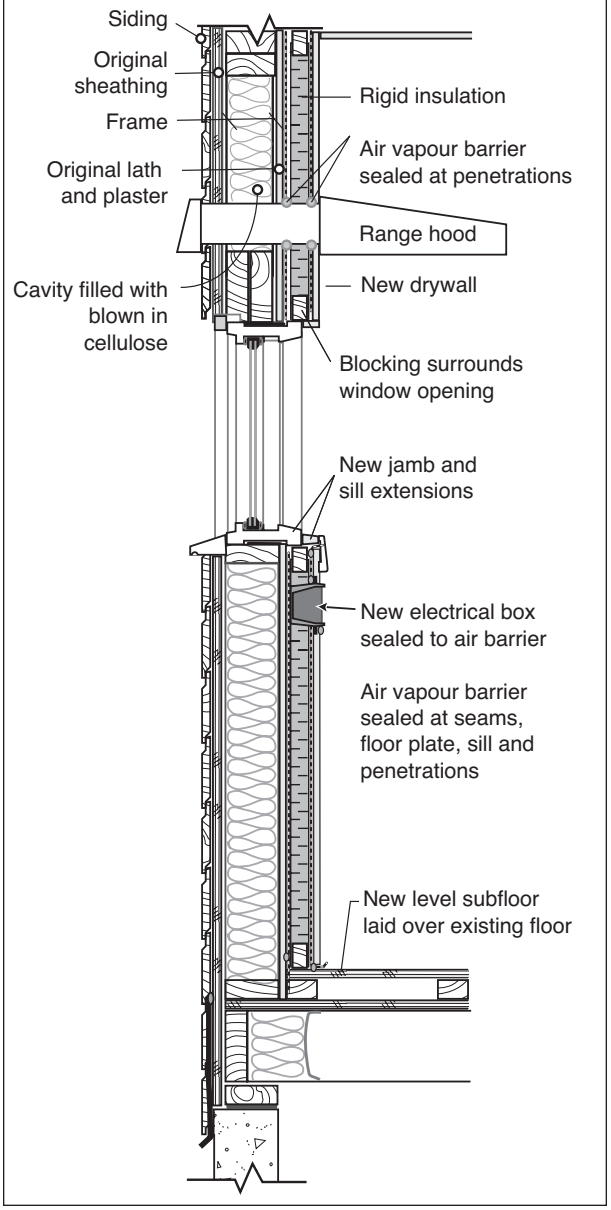
When old cabinets are removed and exterior walls exposed, it is the ideal time to make the room more comfortable by upgrading insulation. If the original plaster or drywall is in good condition, insulation may be blown into the walls and the walls simply touched up. If the plaster needs replacing, rigid insulation may be installed directly over the old plaster and the wall finished with new drywall. Whichever approach you use, the wall must have a vapour barrier and a continuous air barrier. This can be done in three ways.

1. Polyethylene sheet material can be both a vapour barrier and a continuous air barrier, when it is six-mil thick and sealed at all joints and edges. Caulk or gasket penetrations, such as vent openings and electrical outlets, in the outside wall.

2. Using another method, the drywall serves as the air barrier when the edges and all penetrations are sealed. The vapour barrier may be provided by polyethylene sheet underneath the drywall (it does not have to be caulked) or by vapour-barrier paint applied to the drywall.

3. If insulation is blown into the walls, the existing plaster or drywall can be the air barrier if it is sealed at all openings, baseboards, outlets, and so on. Vapour protection may be provided by vapour-barrier paint.

**Kitchen wall details**




### Ventilation

Pay attention to ventilation, even for a minor kitchen renovation. Always vent stove tops directly to the outside. Choose an exhaust fan that can operate at two or three speeds and which has a low noise rating. Range hoods that extend toward the front of the stove and are close to the cooking surfaces capture the most moisture and, for gas stoves, the most combustion by-products as well. However, ease of cooking will also play a large part in selecting an appropriate range hood.

If there is a whole-house ventilation system, do not vent the stove to the exhaust air stream.

Take extra care when installing range-top barbecue exhausts. These appliances exhaust very large quantities of air and can create conditions where furnace chimneys will backdraft. When installing this type of system, have the air pressures throughout the house tested and install a fresh air supply to the house if necessary.

### Windows

Kitchens are areas of high humidity. Condensation is often a problem on kitchen windows. Upgrading the windows to a higher insulating value will create a warmer window surface and minimize condensation.

### Plumbing

Moving a sink or removing walls requires changes to the plumbing; new drain and vent connections and water supply pipes. If the basement has not been finished, it is generally easy to get to the plumbing from below.

#### Heating

Heating is often forgotten in kitchen projects. Changes to kitchen layout may require relocating the ductwork, heating outlet or radiator. Do not cover the heat vents or take the shortcut of distributing heat through the kick plate of the base cabinets. This will not result in comfortable temperatures.

### Electrical

Electrical codes have changed significantly over the past 40 years. Kitchens now require several dedicated circuits for counter outlets, appliances, general outlets, lighting and an exhaust fan. Allocate enough circuits to provide both central overhead fixtures and task lighting along the counters in the lighting plan. If the main electrical panel is not large enough for eight more circuits, a sub-panel or larger main distribution panel may be required.

### FlexHousing™

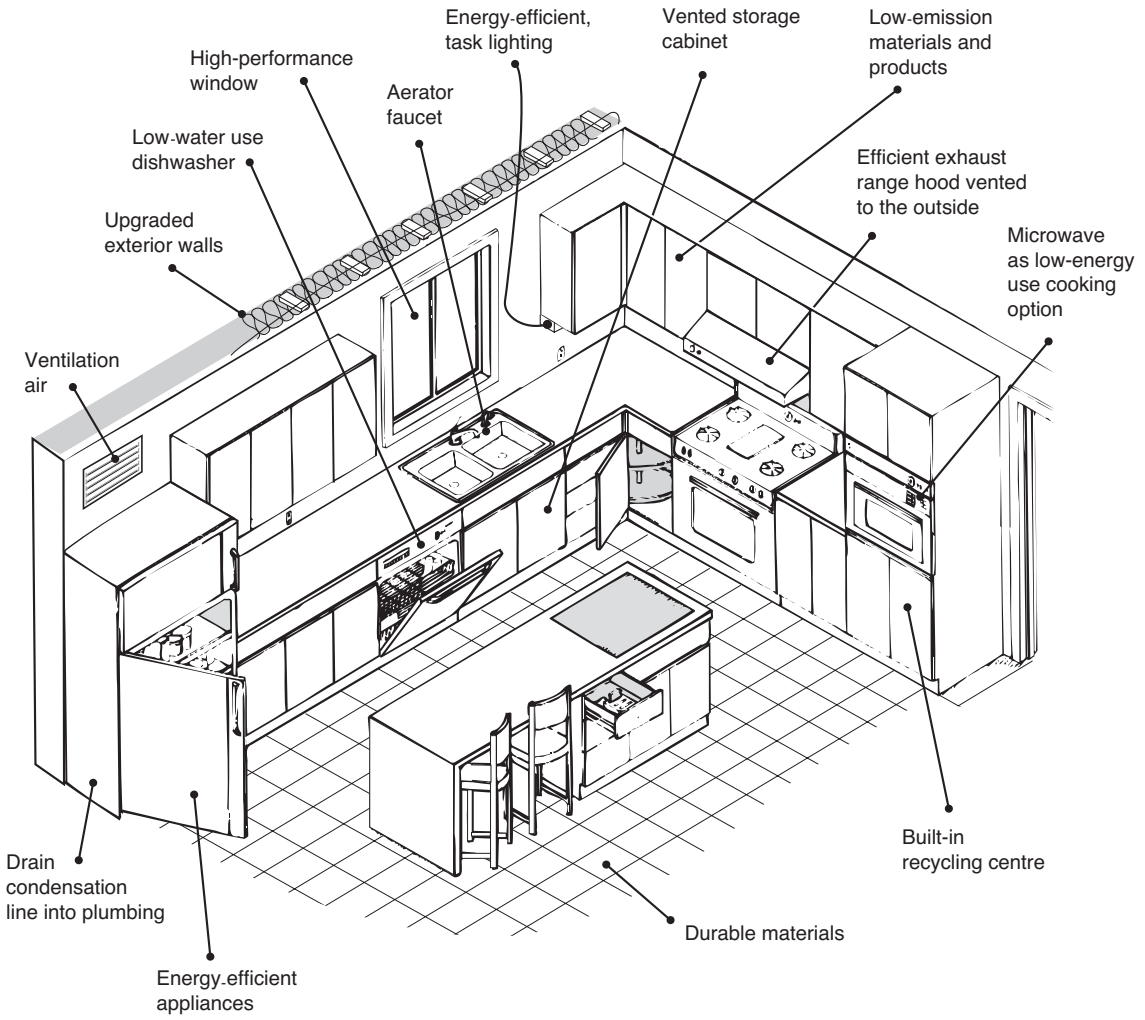
When new cabinets and kitchen layout are in order, consider features that will make the kitchen more accessible to a person with limited mobility. Sufficient floor space to manoeuvre a wheelchair, pull-out work boards and electrical outlets at the front of some cabinets will not add significantly to costs if they are built in from the beginning. Some features can be roughed-in for possible use at a later date. For example, plumbing and countertops can be installed so that the sink and stovetop can easily be dropped to table height if required (see Accessibility retrofit, page 62, for more details.)

### Healthy Housing™

Because so much activity occurs in the kitchen—cooking, washing, food storage and so on—there are many opportunities to improve indoor air quality, upgrade energy and water efficiency and use new materials wisely. An efficient ventilation system is a must to remove excessive moisture, odours and fumes. (Ventilation options are described in the section on construction.)

Choice of materials for kitchen cabinets, flooring, paints, glues and caulking will all affect indoor air quality. Avoid cabinets of particleboard, or seal all exposed surfaces and edges to prevent offgassing

**Healthy Housing features**




• Managed construction wastes

of formaldehyde. Choose low-emission paints, glues and caulking. Hard vinyl composition tiles are less prone to offgassing than sheet vinyl. Linoleum sheet or tile is another alternative.

If outside walls will be exposed during the renovation, consider upgrading them with insulation and an effective air and vapour barrier. The kitchen will be warmer in winter and cooler in summer as a result. If new appliances are in order, use the EnerGuide rating to choose the most energy-efficient model—fridges and even stoves of comparable size can vary significantly in energy requirements. Compact fluorescent lighting offers warm light with low energy use. Avoid excessive use of pot lights, which can use high amounts of energy and produce heat. Pot lights in bungalows may also cause problems with air leakage into the attic. Also, look for a water-efficient dishwasher, as it will save on both water and energy.

Careful choice and management of materials will result in less waste during the renovation and a more durable end result. Reuse old cabinets and fixtures in a basement or garage workshop or recycle them through a local building re-use centre. Choose durable, repairable materials—such as solid wood cabinets or formaldehyde-free, medium density fibreboard (MDF) over particleboard—to ensure that the renovation will be attractive for many years.

**Financial Implications**

Kitchen remodelling has the highest rate of cost recovery of any renovation activity. On average, 68 to 73 per cent of the costs are recovered at resale.

# BATHROOM REMODELLING

## Overview

Unless a bathroom has suffered severe moisture damage, the main motivation for bathroom remodelling is comfort and appearance. Bathrooms in homes of the ’60s and ’70s were generally small and utilitarian. Worn-out finishes and outdated fixtures call for a facelift. Where additional space can be found, it’s possible to add amenities, such as a separate shower stall, bidet or sauna.

**New master bathroom**
***Photo: Brent Applegate***

## Design considerations

### Scope

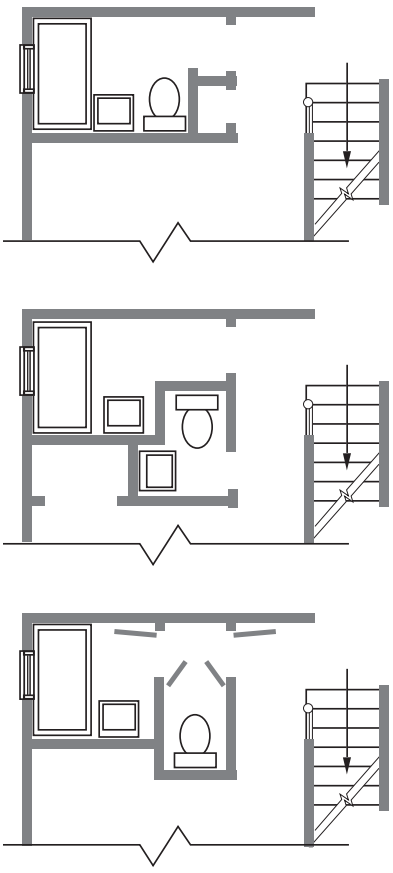
As with kitchens, the scope of the project is the first consideration. Is it simply a matter of replacing older fixtures and giving a facelift to wall and floor finishes? Or is a complete remodelling required, involving expanding the bathroom and adding additional fixtures? Changing the layout will involve moving walls, fixtures and venting, with associated plumbing costs.

If there is moisture damage, it is important to check the condition of structural members, particularly those next to the tub and shower enclosure. They may need to be replaced before the wall is concealed behind new finish materials.

### Layout

If a second bathroom is desired, but space is at a premium, one solution is to put a toilet and small sink in a half-bath. The main bathroom would contain tub, shower and a vanity sink.

**Bathroom layout options**



Leaving the floor plan alone requires less work, but if you want a larger bathroom you may have to move walls. One solution is to steal some space from an adjoining bedroom. Just a foot or two will often make a big difference in placement of fixtures and convenience in the bathroom.

Some popular amenities, such as a heat lamp or a glass shower enclosure, take up very little space.

### Style

Duplicating the quality of original materials is often difficult within today's budget. Before discarding worn fixtures or ripping out original fixtures, ceramic tile walls or floors, check with a restoration specialist. Enamel resurfacing is an option for the fixtures and it may be possible to bring the tiles back to nearly new condition. Retaining some vintage features can provide a focal point for the redecorating scheme. On the other hand, you many want to replace the coloured fixtures that were a distinctive feature of many '60s and '70s homes.

## Construction

### Moisture control

Water in all its forms is the enemy of buildings. Bathrooms are particularly vulnerable to damage from water leaks and from water vapour. Failed ceramic tile and shower enclosures are the most common and costly failures in bathrooms. Leaks around tub enclosures can damage finishes and weaken the building structure. If replacing the interior wall around the shower or tub, do not install tile on standard drywall—water-resistant drywall or cement backer-board is essential. Alternately, one-piece shower-tub enclosures minimize water-related problems. Whichever method is used, make sure that the tub enclosure is well sealed and do not install a window in the shower enclosure.

Openings to the outside must be tightly sealed to prevent water vapour escaping into the wall cavity or attic, where it can condense and cause damage. Make sure that the opening for the bathroom fan is tightly sealed and that baseboards and window trim are tightly sealed and caulked.

Mold growth is one unhealthy result of excessive moisture. After correcting the source, make sure that molds are destroyed by soaking the surface in a bleach solution. When redecorating, look for the mold-resistant paints and sealants that are now available for bathrooms and other high humidity areas.

### Ventilation

Many older homes do not have a bathroom fan even though effective ventilation is essential in controlling moisture. Often, existing fans are ineffective and noisy. Look for a fan with a rating capacity rating of 25 L/s (or 50 cfm—cubic feet per minute) at 25 Pa of air pressure and a low noise factor (one sone rating or less). People will use quiet, quality fans; they won't use cheap, noisy ones. Take care to install the fan with as little ductwork as possible—the ideal is to install the fan through the bathroom wall. If the duct runs through the attic space, make sure that:

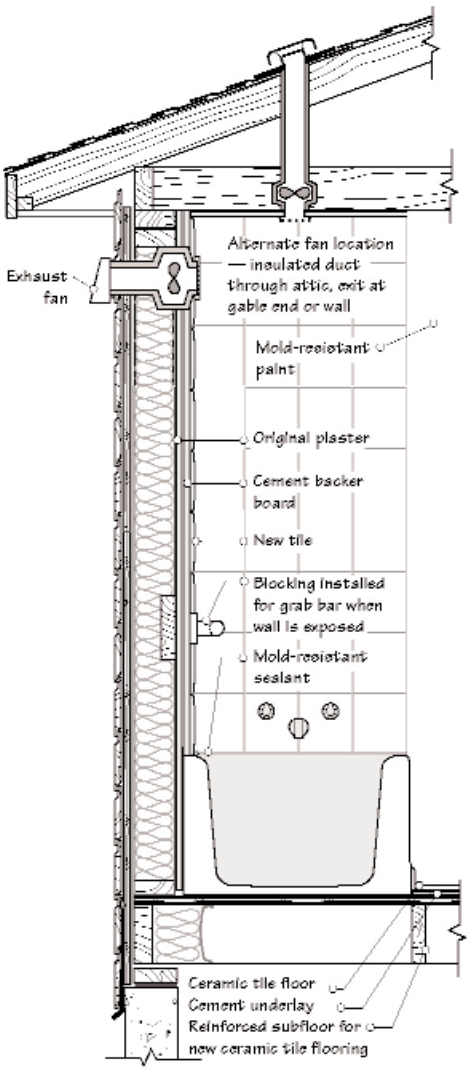
- It vents outside.
- The opening into the attic is tightly sealed.
- The duct run is as short and direct as possible.
- It is well-insulated.

The fan can be controlled by a (quiet) timer or by a dehumidistat. If the fan is to be manually controlled, make sure that it is on a separate circuit and not tied to the operation of the bathroom light. The occupant should be able to override the control for continuous ventilation, if needed.

### Plumbing

When major plumbing renovations are being undertaken, where practical, replace galvanized supply piping with copper. To prevent lack of water pressure in the bathroom, run feed lines directly from the basement, not off the kitchen lines. In some urban centres, water pressure is a neighbourhood problem. This can be alleviated by installing a separate pressure tank in the basement or installing a new main link with the street line.

**Bathroom details**




### Fixtures

When choosing new fixtures, ensure that they will fit the existing plumbing layout, or be prepared for modifications. Some toilet models are available that can fit into tighter spaces than the standard clearance. Look for water-efficient toilets, which use 6 L (1.3 gal.) or less per flush. These are now required by some provincial building codes. Tanks with good insulation are less likely to “sweat”. Low-flow showerheads are also good water savers.

### Electrical

Bathrooms from the early ’60s often had no outlets at all or an outlet but no ground-fault protection. Building codes now require an outlet near the sink but the outlet must have a ground-fault circuit interrupter (GFCI) or the circuit must be equipped with an interrupt at the main electrical panel.

Many bathrooms of the period had “razor only” silver receptacles with ground-fault protection. However, modern appliances have either a large-prong polarized plug or a three-prong plug and so will not fit in these receptacles. The solution is to upgrade the two-prong receptacle to a three-prong ground-fault circuit interrupter.

Light switches must be located out of reach of the tub and shower light fixtures must be moisture-proof. When redoing the lighting, consider energy-efficient compact fluorescent lamps. Any ceiling-mounted fixtures must be airtight and insulation-ready. A combination of overhead and vanity lighting is most effective.

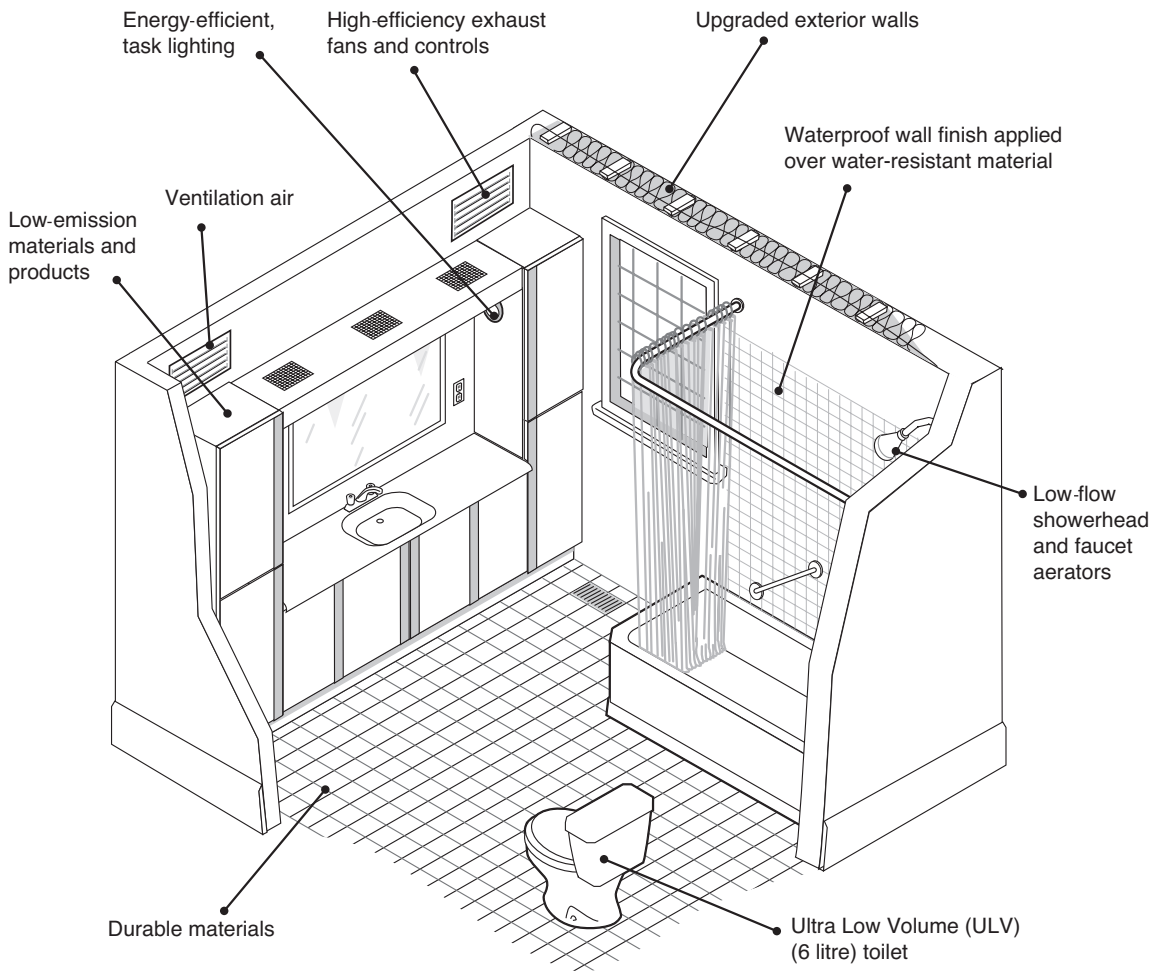
### Flooring

Install new flooring before reinstalling the fixtures. If you are considering ceramic tile flooring, the subfloor may require additional support to strengthen the floor and to take the added weight of the tiles and cement underlay.

### FlexHousing™

With some foresight during the renovation, the bathroom can be easily adapted at a later date to the needs of an elderly or frail person. For example, if renovation exposes the walls, blocking can be installed at the tub to provide support for grab bars that may be added later. If a separate shower stall is provided, it could be made large enough to serve as a wheel-in shower. Similarly, if the layout and entrance are changed, a wider doorway and more floor space will make it possible for a person with a walker or wheelchair to manoeuvre in the space. Non-slip flooring and a non-slip bathtub would be appreciated by all members of the family, whatever their age.

**Healthy Housing features**




### Healthy Housing™

Careful attention to control of moisture will eliminate the growth of harmful molds and keep the house humidity at healthy levels. If renovation exposes outside walls, they should be insulated and provided with an air and vapour barrier.

A low-flow showerhead, (9.5 L or 2 gal. per minute) will save on both water and energy. A low-flow toilet (6 L or 1.3 gal. per flush) will result in water savings of 50 per cent or more over typical fixtures of the ’60s and ’70s. To secure the water savings, put the old toilet out for garbage collection; do not reuse it at the cottage.

As with the kitchen, make use of energy-efficient lighting. Fluorescent lighting is now available in warmer, flattering colours. For improved air quality, use low-emission cabinetry, paints and finishes.

### Financial Implications

Bathroom remodelling is one of the most favourable renovation projects, returning 64 to 71 per cent of the cost outlay on resale.

# RE-SIDING AND NEW WINDOWS

## Overview

The appeal of new siding and windows can’t be denied. Today’s materials make exterior painting a thing of the past—less ladder time, more leisure time. However, re-siding is not as simple a job as it may seem. Nothing will change the appearance of the house as much as re-siding and replacing windows. If done with care, a siding and window retrofit can significantly improve comfort and energy efficiency. But—siding and windows must be installed properly or they will contribute to moisture problems and deterioration.

**Typical front window**

*Photo: Charles Wood*

## Design considerations

### Appearance

The first question to decide is whether the goal of re-siding is to totally change the look of the house or to simply find a look-alike material that requires less maintenance. If a totally new look is desired, there are a host of choices, including wood, stucco, brick or stone. Some options are more costly than others and some, such as brick, may require additional structural support.

If low maintenance is the issue, today’s vinyl, hardboard and aluminum sidings replicate the look of horizontal wood siding.

However, when installing the siding, there is the temptation to save on labour costs by reducing or eliminating exterior trim around doors, windows, soffit wall junctions, and so on. For the most pleasing appearance, it is best to retain whatever trim is original to the house. Besides detracting from the house appearance, skimping on trim can also make joints more vulnerable to water penetration.

Similar design problems arise when upgrading windows. In some renovation projects it may be desirable to enlarge windows to provide increased daylighting. When choosing window sizes and styles, consider how the installed window will look from the exterior and whether it suits the age, style and proportions of the house.

In general, beware of fads that detract from the appearance of the house and ultimately from its value. Unless you are prepared to do a complete makeover, don’t try to make the house look like something it is not by adding minor elements of a different style. The best design solutions focus on retaining and enhancing the integrity of the house (see CMHC’s *Sensible Rehabilitation of Older Houses*).

The photos show the dramatic change in appearance that can result from a complete change in windows, roofline and siding.

### Underlying problems

If old siding has failed, it is important to understand the root cause and to correct the problem before concealing it with new siding. Any problems with flashing around doors and windows should also be remedied before re-siding. This is particularly important with moisture-related problems. Signs of moisture problems on old wood siding include blistered or peeling paint, warped or cupped siding and wood decay. On masonry siding, moisture problems show up as efflorescence or spalling.

Replacing older, leaky windows with new, tighter units will make the house less drafty, but it will also reduce the amount of dry winter air leaking into the house. As a result, the moisture levels in the house may increase.

**Stages of a renovation**

*Photos: Brent Applegate*

For a house with too much humidity to begin with, new windows can be the last straw, resulting in condensation, dampness and mold growth. As a general rule, whenever a measure significantly tightens up the house, controlled ventilation should be added.

### Thermal upgrade

Replacing siding and windows offers an excellent opportunity to make the house easier to heat and more comfortable. The incremental cost of adding insulation is small compared to the overall cost of the job.

Insulated siding has a thin layer of insulation (often polyurethane foam) sprayed on the back of the siding. But this offers only a minimal improvement in insulation level and is ineffective if applied over furring strips. Instead, consider installing insulation separately. This can be done with little additional expense and it allows for much higher insulation values.

Horizontal sliders—whether wood or aluminum—are the least energy-efficient of all window types. Aluminum or wood, sashless sliding windows are common to houses of the ’60s and ’70s and they are particularly inefficient. The weatherstripping is weak or non-existent and there is no thermal break in the frame. As a result, they are prone to icing and severe condensation.

There are several strategies to upgrade sashless sliders. Some companies replace the sashless sliding light with a new slider set in a sash. This may improve the weatherstripping but does not address the lack of thermal break in the window frame. Another option involves adding magnetic storms on the interior. This creates a better air seal, but still does not address the issue of the frame.

Many owners opt to replace the complete aluminum window unit with a high-efficiency, thermal pane window set in a vinyl frame.

For single-pane wood windows, installing new, permanent storms will eliminate the maintenance factor and somewhat improve the thermal performance of the windows. To further improve comfort as well as convenience, replacement of older single-paned wood windows with new double- or triple-glazed units is always an option. Where the original window is sound, there are other retrofit options as well:

- Upgrade thermal performance of the original windows by simply installing new weather-stripping and ensuring that the joint between the window frame and wall is sealed well.
- Improve performance even further by retrofitting the existing windows with custom, double-glazed units in the original sash.

- Install removable interior plastic storm windows.

- Install all-weather aluminum storms and screens to the exterior frame.

Properly cared for, wooden windows will last for decades. However, if windowsills and sashes have been allowed to deteriorate, replacement may be in order. The simplest, least-expensive approach is to have identical wood replacement windows custom made to fit the opening, but this will not improve thermal performance.

New, double-pane windows with low-emissivity coating and insulated spacers and filled with inert gases, such as argon or krypton, are a real breakthrough in window technology and achieve higher insulating values. Besides making the house easier to heat, energy-efficient windows can actually expand usable space, since the area near the windows will no longer be drafty and cold.

When choosing new replacement windows, look for the Energy Rating or ER number, administered by the Canadian Standards Association International (CSA International). This comprehensive rating system takes into account the total performance of the window and frame over the heating season.

## Construction

### Siding

#### Moisture

Controlling unwanted moisture in walls is important in order to maintain the structural integrity of the building, ensure a long service life for the siding and provide a healthier interior environment. To achieve dry, sound walls a three part strategy is required:

1. Prevent moisture from inside the house leaking through the walls by installing a vapour barrier and a continuous air barrier on the inside of the wall.

2. Protect the wall from water penetration from the outside by providing eavestroughs, properly installed siding, and, where possible, generous roof overhangs. Pay special attention to how the siding sheds water, especially at horizontal joints of dissimilar materials. Ensure that flashing is installed underneath the building paper at the base of the wall and at the top of windows and doors.

3. Provide an escape for any water that does penetrate the siding by installing siding using the rain screen principle. This allows for an air space and drainage behind the siding. The air space also reduces heat buildup behind the siding and prevents buckling of the siding.

#### Installing exterior insulation

The simplest method to provide upgraded insulation from the exterior is to fasten rigid insulation directly to the existing walls of the house. When furring strips are fastened over the insulation they provide a nailing surface for the siding and the necessary air space behind the siding.

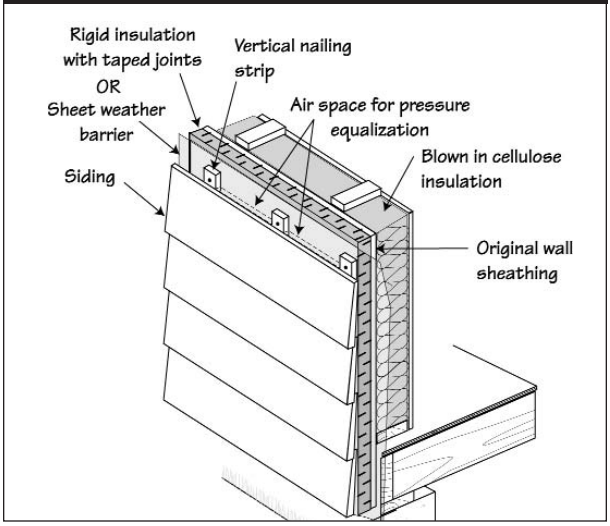
The only product currently available for this application is an impermeable, rigid polystyrene insulation. While this method has been successfully employed in thousands of houses, there is still some concern about whether applying an impermeable insulation on an exterior wall will lead to moisture problems. The decision to use this method should be based on a thorough understanding of regional climate and the house itself.

Some things to keep in mind when insulating from the exterior:

- If the original siding is not removed, make sure there is not an air space behind it that will allow cold air to circulate behind the new insulation, rendering it ineffective.

- Provide a vapour barrier and air barrier. This is usually done from the interior, using a vapour barrier paint and caulking all openings to provide the air barrier. This includes penetrations for electrical service, gas and oil pipes, electrical outlets and fan openings.

**Exterior insulation details**




- To provide a continuous weather barrier, seal the rigid insulation at all seams, at the window and door frames and all penetrations, or install a sheet material (a house-wrap type product) over the old siding.
- Make sure that the eaves are wide enough to prevent water from getting behind the siding. Add flashing at the top of the exterior insulation, above windows and doors and at any other joints.

## Windows

When installing new windows, make sure to insulate and air-seal the space between the window frame and the wall. This is usually done using low expanding polyurethane foam. It is important to connect the window frame to the new air barrier. Also, consider the location of the window in the opening. For thermal performance it is best to position the window pane closest to the warm side of the wall.

The sill is the most vulnerable part of a wall assembly. Sills, whether masonry or wood, may have to be upgraded when the window is replaced. Also, on the exterior, ensure that there is a drip cap over the top of the window and a brick mould or flange around the sides to cover the gap between the window frame and the wall.

## FlexHousing™

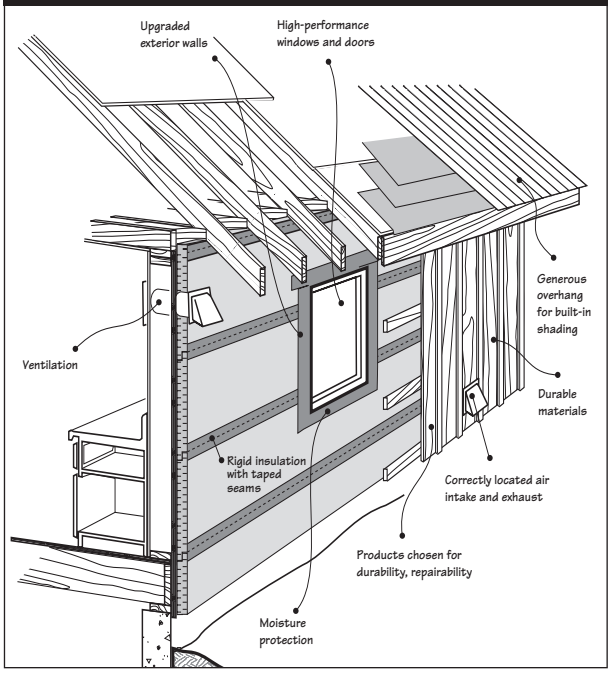
Changing window size and location affects the interior space as well as the exterior appearance of the house. If changing windows, consider installing windows with a lower sill height. Taller, narrow windows let in more light and allow people to see out from a seated position.

## Healthy Housing™

Windows alone can account for 25 per cent of the heat lost from a house. Adding more insulation and upgrading windows will not only make the house more comfortable, it will reduce demand on energy resources. By admitting winter sunshine, windows can provide passive solar heating and reduce the demand for purchased energy. Position the largest window area on the south side of the house and keep blinds or curtains open on bright, sunny winter days.

It is also important to provide adequate daylighting to living areas and bedrooms in the basement. As a rule of thumb, bedroom windows should be equal to five per cent of the floor area and windows in living areas should be 10 per cent of the floor area. When replacing windows, consider enlarging the basement units.

**Healthy Housing features**



# UPGRADING HEATING, VENTILATION AND AIR CONDITIONING (HVAC) SYSTEMS

## Overview

Putting in a new furnace isn’t usually at the top of a homeowner’s wish list for renovation. More likely, an upgrade to the heating, ventilation or cooling system is triggered by one of several reasons: other renovation work, an older system needs replacing, the house is too hot in summer or too cold in winter, the homeowner wants to change the distribution system or fuel source or there is a concern about indoor air quality.

Whatever the reason, there are far more heating and cooling options available today than in the ’60s or ’70s. As well, there is a better understanding of the need for ventilation in the home and the factors that can lead to increased ventilation requirements. The challenge is to apply today’s products and knowledge to an older home in an appropriate way.

**New mid-efficiency furnace**
***Photo: Brent Applegate***

## Design considerations

### Heating

Upgrading the heating system could involve anything from a simple tune-up to replacing the furnace or even changing the distribution system or energy source. This is one area where it definitely pays to have an impartial professional assess the existing system (including the chimney) before proceeding.

One of the first considerations is the size of system. The size of the house and the energy efficiency of its envelope will affect the size of the heating system. If a new addition is energy-efficient and the furnace is not too old, it may not need to be upgraded to meet the additional load.

If the house is uncomfortable, it is more effective to first make it more energy-efficient by draftproofing and insulating than to automatically increase the capacity of the furnace.

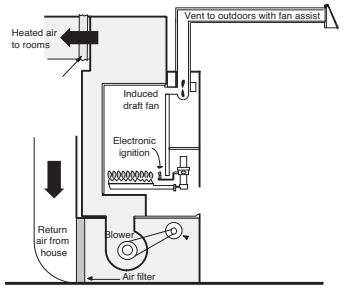
There are two approaches to improving heating system performance. The first involves tuning up the existing system. Older furnaces that still have a long service life can be upgraded with a simple tune-up, replacement of the burner and addition of a thermostat with setback controls. Upgrading gas or oil burners or furnaces will often require the addition of a chimney liner.

The second approach involves replacing equipment. New systems range from induced draft, mid-efficiency furnaces to high-efficiency condensing units that do not require a chimney. Integrated systems have also been developed for houses where the building envelope is very energy-efficient. These systems basically use the burner in the hot water tank to heat the house as well as to heat the domestic hot water. Whether you choose an integrated or separate system, it is wise to consider efficiency improvements to the hot water supply as well as to space heating.

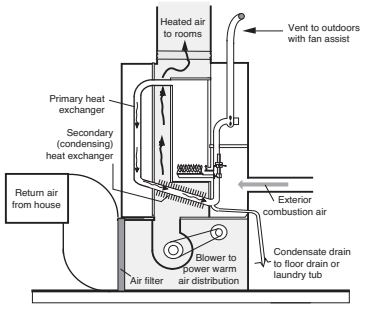
Besides replacing the heating equipment, changing the fuel source or the distribution system is also an option. Homeowners may change the fuel source because of operating costs or health considerations. This will be costly if switching from electric baseboards to a forced air system as new ductwork will be required. However, depending on location, savings in fuel costs may justify the expense over the long term. Retrofitting a home with a hot water distribution system (radiators) will require the installation of new piping. This will be less costly if the walls have to be opened up as part of the other renovation work.

**Heating options**

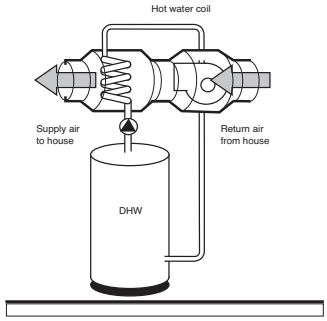
Mid-efficiency, induced draft furnace




High-efficiency, condensing furnace




Integrated space heat and hot water heating system




### Supplementary heating

Sometimes the least expensive option is to provide supplementary heating to a hard-to-heat area of the house. There are many options here, including wood burning stoves, gas or electric baseboard heaters and portable electric radiant heaters. Where available, a natural gas, direct-vent fireplace (not the decorative log sets, but a real heating unit) is often the least-expensive form of supplementary heating. These systems will also help to prevent freezing of the house plumbing system in the event of a prolonged power failure.

Caution: Do not use unvented propane or oil space heaters for supplementary heating as they release dangerous carbon monoxide fumes into the home. This can create life-threatening situations.

### Cooling

Hot water heating systems are not compatible with central cooling. Other cooling options for these houses include individual room units and through-the-wall units that pour cool air down the stairwell where it dissipates to other rooms.

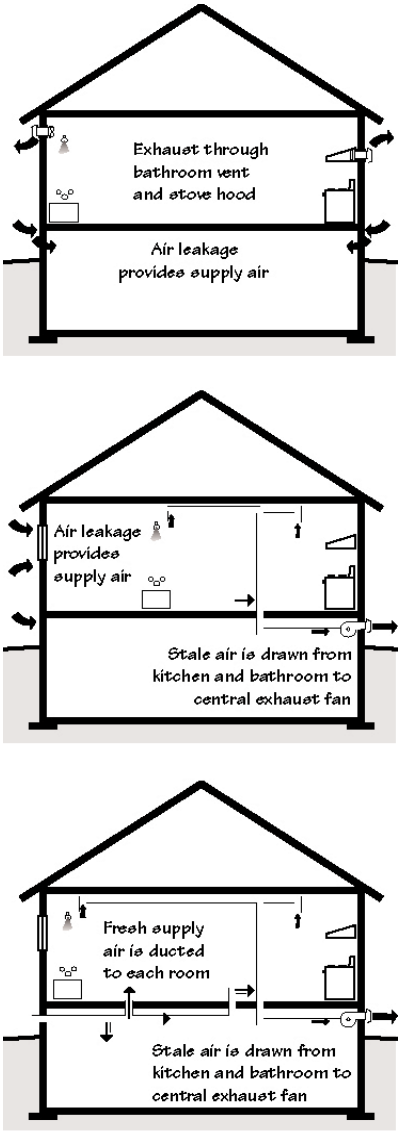
### Water heating

Water heaters have a service life of 15 to 25 years. When renovating, it may be wise to replace an older hot water heater. Also, the addition of a basement rental apartment may make it necessary to upgrade the size of the tank or to install two tanks in tandem.

### Ventilation

All houses require ventilation. Ventilation provides fresh air for occupants and combustion air for gas appliances, furnaces, wood stoves and fireplaces. It also removes stale air, odours and excess moisture. In summer, houses from the ’60s and ’70s relied on windows to provide ventilation. In winter, air leakage through the building shell introduced fresh air at the lower level and allowed stale air to leak out at the upper levels.

**Ventilation options**




Any change to the house envelope, such as air sealing or replacing siding or windows, will affect air leakage and the ventilation system. Similarly, any change to the heating system, such as conversion to electric baseboard heating, or the addition of exhaust appliances such as central vacuum or an indoor grill with exhaust, will affect house ventilation.

Mechanical ventilation is now required in all new houses. Strategies for upgrading ventilation in older houses range from installation of exhaust fans to central systems with heat recovery.

At a minimum, kitchens and bathrooms should be equipped with exhaust fans that will expel stale moist air to the outside. Another strategy involves installing exhaust fans in each bathroom, controlled by a timer to remove moisture from showers and bathing. This is supplemented by a hallway exhaust fan, controlled by a humidstat, to detect and remove excess humidity in the house.

It is important to circulate fresh air throughout the house. Bedrooms often have high carbon dioxide levels as a result of inadequate circulation. The simplest solution is to undercut bedroom doors to allow free flow of air, even when the door is closed.

Central ventilation systems are a step up from spot ventilation fans. A central exhaust fan can be quiet and effective but may unbalance house pressures. If you have fuel-burning appliances with chimneys (such as a furnace or fireplace), a balanced ventilation system with an exhaust and supply (such as a heat recovery ventilator or HRV) may be a safer, but more expensive alternative.

### Construction

When there is any uncertainty about requirements for ventilation and combustion air, it is best to have the house tested.

Do not exhaust house air into the attic, but through it to the outside. Avoid ductwork in the attic if possible. Any ductwork passing through the attic should be sealed and insulated to prevent condensation. Carefully seal all attic hatches and other penetrations through the ceiling.

Choose higher quality, quieter bathroom fans as they are more likely to be used.

### Healthy Housing™

More and more homeowners are becoming concerned about the quality of indoor air. The primary strategy to improve indoor air quality is to avoid the use of materials and household products with high levels of chemical emissions. For individuals who are dust sensitive, high-efficiency furnace filters are available that will considerably reduce particulate matter in the air.

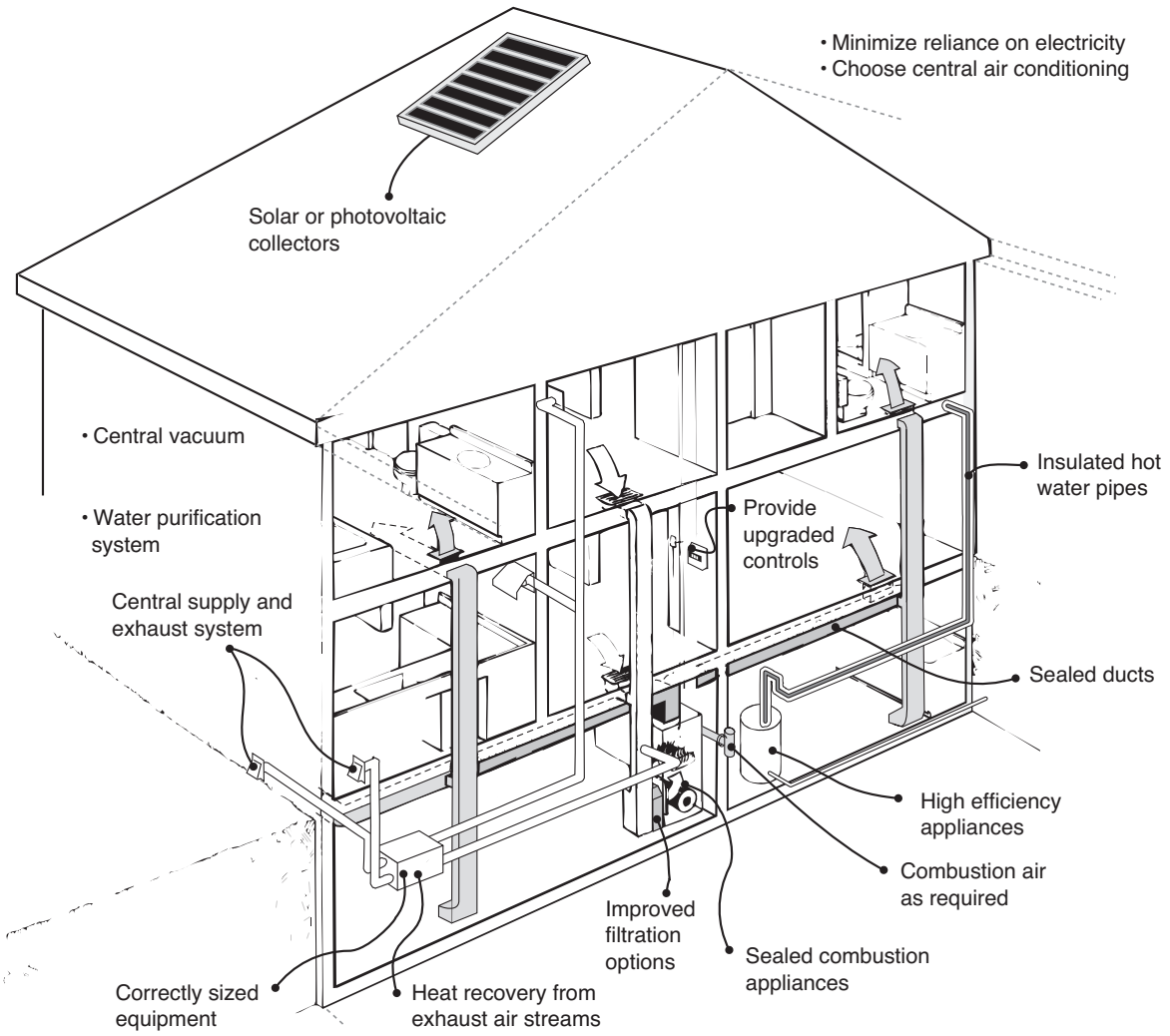
Improvements to heating system efficiency also reduces the demand for natural resources.

Consider renewable sources of energy for the home. Solar water heating systems are now available for the Canadian climate and they can significantly reduce purchased energy requirements for hot water. Make use of south-facing windows to collect heat from the sun in the winter. Use shade trees, awnings and vines to protect the house in the summer and reduce the need for cooling. For more details, see these CMHC publications: *Tap the Sun: Passive Solar Techniques* and *Home Designs; Building Materials for the Environmentally Hypersensitive, Healthy Housing™ Renovation Planner* and *Clean Air Guide*.

## Financial implications

Upgrading the heating system can provide up to 48 to 50 per cent cost recovery on resale. It may also reduce operating costs.

**Healthy Housing features**



# RE-ROOFING AND ICE DAMMING

## Overview

Keeping the roof in good repair is essential. The roof not only shelters occupants from the weather, it protects the building structure from damage. Replacing the shingles or re-roofing is a common renovation task, required every 15 to 20 years for asphalt shingle roofs. Re-roofing presents opportunities to change the appearance of the house and upgrade insulation. However, if the job is not done properly it can cause premature failure of the shingles and damage to the building structure. Changing the roofline of the house can also alter its appearance dramatically as shown in the photos below.

Photos: Brent Applegate

## Design considerations

### Choice of material

When deciding on a new roof it is important to choose a material that is appropriate to the age and style of the house. Most houses from the ’60s and ’70s were originally roofed with asphalt shingles. These are still widely used today and are a logical choice. Other options include wood shingles or shakes and metal roofing, both of which last longer than asphalt shingles, but are more expensive. Concrete or clay roofing tiles are also becoming a popular, long-lasting option, if the roof structure can support the additional weight.

Whatever the material, colour is an important consideration. Sunlight and summer heat can cause hardening and premature deterioration of the shingles. Lighter colours will reflect the sunlight and prevent heat buildup in the summer months. A lighter coloured roof can also lead to lower indoor temperatures.

### Scope

There is more to re-roofing than simply replacing shingles. For example, it is important to check the condition of seals and flashing around any roof penetrations, such as plumbing stacks or chimneys. Also, when re-shingling roofs with dormers, the dormer flashing will have to be renewed as well. Removal of the old shingles is best practice, but is optional if there is only one layer on the roof.

### Underlying problems

Where the roofing has failed, underlying problems should be addressed as part of the re-roofing job. Some common failures on sloped-roofed houses are:

- Water penetration through the roof because of improper shingle or flashing installation.
- Premature deterioration of shingles from wind and weather.

- Water damage to roof structure and ceiling caused by ice damming.
- Blocking of soffit vents with insulation, causing moisture build-up in the attic.

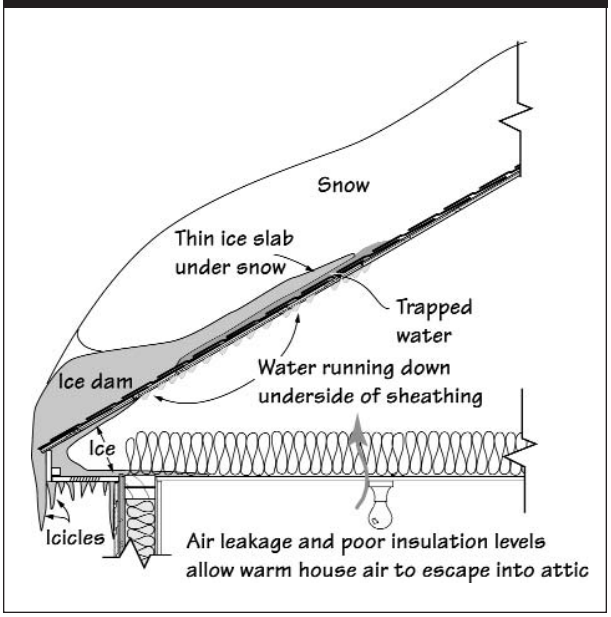
### Ice damming

An ice dam is an accumulation of ice at the eaves, which prevents melting snow from freely draining off the roof.

Ice dams themselves do not cause building problems, but they do cause water to collect on the roof. If the shingles and sheathing allow the water to penetrate the roof, the resulting water leakage can:

- Damage attic and wall insulation.
- Damage interior finishes.
- Reduce thermal performance of building assemblies because of wetness.
- Promote mold growth and wood rot if wetness persists.

**Ice dam details**




Ice dams form when heat escaping from the house melts snow on the roof. The water drains down the roof, but refreezes when it reaches the cold section of the roof over the eaves. After some time, a layer of ice can build up to extend more than a metre beyond the roof’s edge. The increasing amount of melt water becomes trapped between the ice slab and the roof. In this circumstance, the water can work its way under the shingles and penetrate the roof sheathing to cause damage to the attic space and rooms below.

The conditions necessary to cause ice damming are:

- Snow accumulation.
- Sustained below-freezing temperatures.
- A warm roof over the attic space—caused by inadequate insulation and leakage of warm air from the house, or both.
- Cold surface temperatures over the eaves.
- Inadequate roof ventilation.

These conditions are often found in one-storey houses where:

- It is difficult to insulate the section of roof at the sloped ceiling portion of the attic.
- Air leakage can carry warm, moist house air into the attic.

## Construction

### Mitigation

There are several strategies to mitigate the effects of ice damming and prevent leakage. Two of the most popular are waterproofing and heating cables. Most building codes require eave protection in the form of a minimum 900-mm (35-in.) wide layer of waterproof material laid under the shingles. This does not prevent ice dams but stops water from leaking through the roof sheathing.

Many homeowners install electric heating cables at the eaves to melt channels in the ice and allow the water to drain away. However, this adds to electricity bills and may detract from the appearance of the house. The best solution is to prevent ice dams from forming in the first place.

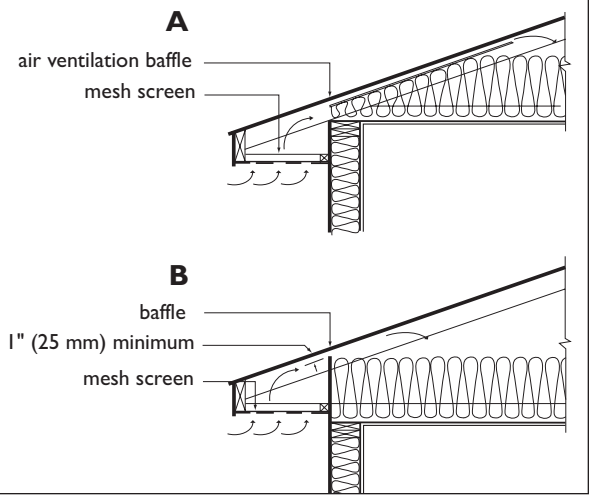
### Prevention

The key to avoiding ice damming is to prevent heat from escaping from the house and warming the roof space. This requires sealing and insulating the attic floor so that the roof presents a uniformly cold surface. This may be done in two ways.

Where the shingles are in good condition and re-roofing will not be needed for some years, it is possible to seal and upgrade insulation from the inside.

Insulation over the wall top plate at the eaves should be upgraded and a baffle installed to allow air circulation from the soffit vents. See the graphic. Note that with roof A there will always be insufficient insulation over the outside wall, due to the lack of space. It may be better to use insulating foam at this point rather than batts or loose fill, as foam has the highest R-value by thickness. Attic B has enough space for a full depth of conventional insulation. Attic B is rarely found in older houses. The attic spaces should be air sealed from the interior, paying attention to all junctions and to any penetrations such as electrical outlet boxes.

**Roof insulation upgrade**




When air sealing, pay special attention to:

- Plumbing stacks or plumbing walls.
- Chimney penetrations through the attic.
- Any light fixtures.
- Electric wiring.
- Ducting for fans or heating systems.
- Perimeter walls.
- The tops of partition walls.
- Junction of cathedral ceiling with open attic spaces.
- Where additions meet an older section of the house.
- Dormers.

If reroofing is in order and part of the roof is a cathedral ceiling, there is an opportunity to upgrade the insulation and seal the roof from the exterior. The exterior approach involves removing the old shingles and the roof decking, air sealing from the exterior, redecking and reshingling.

Another approach is to spray foam insulation into the rafter spaces. This eliminates the need for any separate air sealing. Since the spray-on foam completely fills the rafter spaces, with this approach it is possible to do without the roof ventilation. The decking is installed immediately on top of the rafters.

### Healthy Housing™

A lighter roof colour will contribute to longer life for the roofing material. It can also help to keep the second storey cooler in the summer months, thereby saving on energy used for air conditioning. Healthy Housing™ options also include durable, long-life roofing materials, such as metal.

If the house has a south-facing roof slope with good exposure it is a good candidate for a domestic, solar hot water heating system. Solar panels are typically installed after any re-roofing work is completed. (See CMHC’s *Tap the Sun: Passive Solar Techniques and Home Designs*.)

# CHAPTER 7: RESOURCES

## A. Federal

**Canada Mortgage and Housing Corporation (CMHC)**
CMHC provides information on all aspects of housing for both homeowners and the housing industry. CMHC's *Guide to Wood Frame House Construction* is the definitive manual on standard house construction practices and is a useful reference when planning an addition or second storey bump-up.

CMHC's publications cover every aspect of the renovation process from designing additions and spaces for people with special needs and correcting problems such as poor indoor air quality to hiring a contractor. The catalogue of information materials also includes several instructional videos for the do-it-yourselfer. To obtain CMHC's catalogue contact:

CMHC Web site: **www.cmhc.ca**

Canadian Housing Information Centre
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario K1A 0P7
Tel: 1 800 668-2642
E-mail: chic@cmhc-schl.gc.ca

**Health Canada**
Publications
Health Canada
Ottawa, Ontario K1A 0K9
Tel: 1 800 267-1245

Health Canada's publications focus on the health-related aspects of renovation such as cleaning up asbestos or lead-based paint or safe methods of working with pressure-treated wood.

**Canadian Home Builders' Association**
The *Canadian Home Builders' Association Manual* also covers new wood-frame house construction but provides details on upgrading standard construction practices to R-2000 highly energy-efficiency standards.

Canadian Home Builders' Association
150 Laurier Avenue West, Suite 500
Ottawa, Ontario K1P 5J4
Tel: (613) 230-3060
Fax: (613) 232-8214
E-mail: chba@chba.ca

**Natural Resources Canada (NRCan)**
Natural Resources Canada provides information relating to energy efficiency in housing. Their publications include a homeowner's manual on upgrading insulation (*Keeping the Heat In*) and booklets on topics such as various types of heating systems, energy-efficient windows and doors, air leakage control and appliances. For a complete catalogue, contact:

Energy Publications
c/o Canada Communication Group
Ottawa, Ontario K1A 0S9
Fax: (819) 994-1498

## B. Local and Provincial

Closer to home, many municipalities and most provincial governments have information on some aspects of home renovation. At the municipal level, local planning and building departments, public health departments and electric utilities often have how-to information on renovation. As well, local building departments may have information outlining homeowner and contractor responsibilities and requirements for building permits.

Provincially, utilities and various provincial departments often produce information for homeowners. A few examples are listed below.

### Newfoundland

**Department of Mines and Energy**
P.O. Box 8700
St. John's, Newfoundland A1B 4J6
Tel: (709) 729-5759

The Department has produced a booklet on sunspace additions to existing homes.

**Newfoundland Power**
Tel: 1 800 663-2802

The provincial utility carries publications on improving home comfort as well as a guide to PowerSmart programs and services.

**Newfoundland and Labrador Housing Corporation**
P.O. Box 220
St. John's, Newfoundland A1B 3P6
Tel: (709) 737-5600

The provincial housing agency has a fact sheet on helpful hints in home renovation.

## Prince Edward Island

**Department of Economic Development and Tourism**
Energy, Minerals and Technology Branch
P.O. Box 2000
Charlottetown, Prince Edward Island C1A 7N8

The Energy Branch has booklets on energy-related aspects of home performance, including air leakage control, ventilation and heating with oil.

## Nova Scotia

**Department of Housing and Consumer Affairs**
P.O. Box 815
Dartmouth, Nova Scotia B2Y 3Z3
Tel: (902) 424-4483

Consumer Affairs has produced several fact sheets on the legal and financial aspects of home renovation. Topics covered include guarantees, contracts and how to hire a contractor.

**Department of Natural Resources**
Energy Management Division
P.O. Box 698, 1701 Hollis Street
Halifax, Nova Scotia B3J 2T9
Tel: (902) 424-5019

This department has several fact sheets and booklets on energy-related aspects of renovation and new home construction, including pieces on various types of heating systems, passive solar homes and energy-efficient windows.

**Nova Scotia Power**
P.O. Box 910
Halifax, Nova Scotia B3J 2W5
Tel: 1 800 428-NSPI

The provincial electric utility has publications on various aspects of energy efficiency including heating systems, lighting and appliances, and basement insulation.

## New Brunswick

**Department of Natural Resources and Energy**
P.O. Box 6000
Fredericton, New Brunswick E3B 5H1
Tel: (506) 453-2206

The Department has produced two pamphlets on energy retrofits.

## Quebec

**Hydro-Québec**
Service des communications commerciales
Centre de diffusion
1010 Sainte-Catherine West, 8th Floor
Montréal, Quebec H3C 4S7
Tel: (514) 392-8425

The provincial electric utility produces *Enermate*, a quarterly magazine on energy efficiency. They have also published a book on energy efficiency in the home.

**Ministère des Ressources naturelles**
Energy Efficiency Directorate
5700 Fourth Avenue West
Charlesbourg, Quebec G1H 6R1
Tel: (418) 644-7062

Contact the Ministry for a list of new titles.

## Ontario

**Ministry of Environment and Energy**
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5
Tel: (416) 323-4551

**Ontario Association of Architects**
111 Moatfield Drive
Don Mills, Ontario M3B 3L6
Tel: (416) 449-6898

The Association has two pamphlets on finding and engaging an architect for a home renovation.

**Ontario Home Builders' Association**
20 Upjohn Road
North York, Ontario M3B 2V9
Tel: (416) 443-1545

The Ontario Home Builders' Association has provided several pamphlets on the business side of renovation, including how to hire a contractor and a standard renovation contract.

## Manitoba

**Manitoba Energy and Mines**
Information Centre
3300 Graham Avenue, Suite 555
Winnipeg, Manitoba R3C 4E3
Tel: (204) 945-4154

The Manitoba government has published several booklets on upgrading the energy performance of housing, including insulating attics and basements, replacing doors and windows, and sealing and caulking the house.

**Manitoba Hydro**
Head Office, P.O. Box 815
Winnipeg, Manitoba R3C 2P4
Tel: (204) 474-3311

The provincial electric utility has several pamphlets relating to energy use including one on retrofitting a home to the PowerSmart guidelines.

## Saskatchewan

**SaskEnergy**
Marketing
1945 Hamilton Street, Suite 1110
Regina, Saskatchewan S4P 2C7
Tel: (306) 777-9411

SaskEnergy has publications on natural gas heating and water heating.

**SaskPower**
2025 Victoria Avenue
Regina, Saskatchewan S4P 0S1
Tel: (306) 566-2121

The provincial electrical utility has two booklets on energy-efficient lighting and energy efficiency in the home.

## Alberta

**Alberta Association of Architects**
10515 Saskatchewan Drive
Edmonton, Alberta T6E 4S1
Tel: (403) 432-0224

The Association has several pamphlets on the role of architects in new housing and renovation projects.

**Alberta Municipal Affairs**
Housing and Consumer Affairs Division
10155 102 Street, 16th Floor
Edmonton, Alberta T5J 4L4
Tel: (403) 427-8862

Publications from the Alberta government address various aspects of housing, including energy efficiency in new construction and renovation.

**Canadian Western Natural Gas**
909 11th Southwest Avenue
Calgary, Alberta T2R 1L8
Tel: (403) 245-7110

The gas utility publishes booklets on heating with gas and wood burning fireplaces.

**Transalta Utilities Corporation**
1202 Centre Street SE
Calgary, Alberta T2P 2M1
Tel: 1 800 267-5300

Transalta has produced *EnergyMatters*, a series of booklets on saving energy. The series includes titles on reinsulating and air sealing, heating systems and energy-efficient windows.

## British Columbia

**Power Smart**
475 West Georgia Street, 3rd Floor
Vancouver, British Columbia, V6B 4M9
Tel: (604) 540-8883 or 1 800 663-0431

B.C. Hydro’s Power Smart program has produced a series of over 25 brochures, guides to energy management. They focus on energy-efficient appliances and various aspects of home heating.

## Yukon

**Yukon Electrical Co. Ltd.**
Box 4190
Whitehorse, Yukon Y1A 3T4
Tel: (403) 633-7000

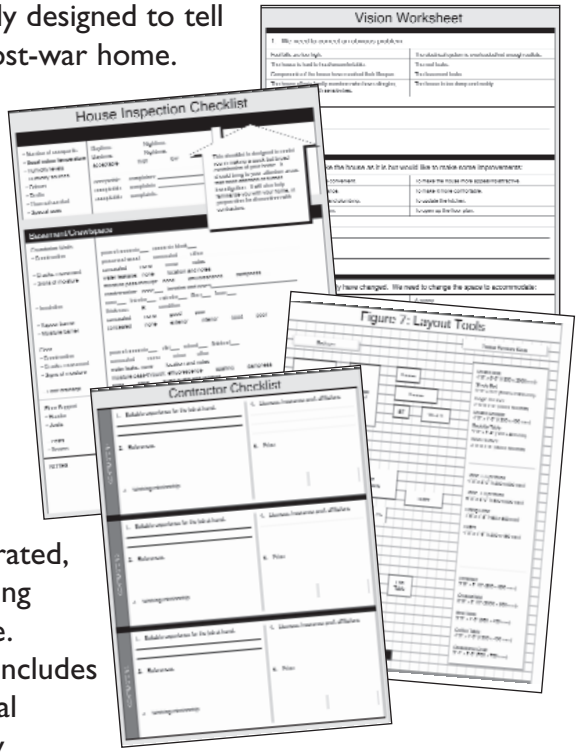
The utility’s publications include an energy audit which homeowners can do themselves, and information on operating costs of appliances.

## Northwest Territories

**Department of Energy, Mines and Petroleum Resources**
P.O. Box 1320
Yellowknife, Northwest Territories X1A 2L9
Tel: (403) 873-7203

The Territories government has published several pamphlets on energy efficiency in the home, including information on how to save on energy bills and on caulking and weatherstripping. Some are available in Inuktituk as well as English.

This special **Renovating Distinctive Homes** edition was specifically designed to tell you everything you need to know about renovating a 1 1/2 storey post-war home. You will learn all about the unique characteristics of these homes, how they were developed, designed and built. It describes the renovation process from concept to completion, with detailed drawings; Renovation Planning Worksheets; Vision Worksheet; House Inspection Checklists; and layout tools to assist you.




**Renovating Distinctive Homes** guide is just the beginning. CMHC carries these publications to help you with your home renovation/building projects:

**Canadian Wood-Frame House Construction**
The national best-seller on building wood-frame houses in Canada. A field companion for builders and renovators alike, this richly illustrated, step-by-step guide covers everything from breaking ground to finishing touches. It is a superior learning tool and essential job-site reference. The guide conforms to 1995 National Building Code requirements; includes new illustrations and handy sizing tables; presents metric and imperial measurements; planning ahead and checking back notes; plus Healthy Housing tips. Convenient lay-flat binding. Revised 1998.
Order # 61010 $25.95

**Healthy Housing Renovation Planner**
The *Healthy Housing Renovation Planner* is a practical and interactive guide to planning a renovation project from beginning to end, whether hiring a contractor or doing the work yourself. Relevant for both major and minor projects, the reader can pick and choose information necessary to make decisions. This guide uses a systemic planning approach to renovation projects that contributes to occupant health, reduces energy consumption, conserves natural resources, minimizes environmental effects and balances cost and feasibility.
Order # 60957 $34.95

**Glossary of Terms**
The A-Z of housing terms! Do you know a beam from a truss? A sash from a sill? This useful housing dictionary lists more than 1,200 up-to-date definitions and provides the French term for each. Revised 1997.
Order # 60939 $8.95

**FlexHousing™: The Professionals' Guide**
Build your market share by building homes that can last a buyer a lifetime. Welcome to the innovative concept of FlexHousing™—building homes that meet client demands for adaptability, accessibility, safety and security. Learn how to adapt traditional design and building practices to put space to new and profitable use, from the basement to the attic. Also includes a special chapter on marketing FlexHousing™.
Order # 61844 $24.95

Please visit the **About Your House Series** on our Web site for more information on home renovation at: **www.cmhc.ca**

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