HOUSING AN AGING POPULATION

GUIDELINES FOR DEVELOPMENT AND DESIGN
2ND EDITION

Government of Canada
National Advisory Council on Aging
Ottawa
KIA OK9

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More information on this report may be obtained from:

National Advisory Council on Aging
OTTAWA, Ontario
KIA OK9

Tel: (613) 957-1968
Fax: (613) 957-9938

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It was with great sorrow that we learned of the tragic death on 12 November, 1986, of Joan Simon who so ably chaired the Task Force.

This book is respectfully dedicated to her memory.

Acknowledgements

In preparing this second edition, the National Advisory Council on Aging (NACA) benefited again from the expertise of Mr. Jean-Rémi Champagne who updated the specifications contained in **The Design Workbook.** We would like to thank Mr. Brian Gray and Mr. Luis Rodriguez from the Canada Mortgage and Housing Corporation (CMHC) who provided their technical expertise. The Council is grateful to the CMHC for lending its financial support to the re-edition and reprinting of this document. Finally, our appreciation also goes to the many people who gave us their views on how to improve the second edition.

The preparation of the first edition of this report was guided by an interdisciplinary task force. Their effort remains, as do the drawings of architect Maurice Clayton and the text of Andrew Aitkens and Wendy Finan.

Preface to the Second Edition

Goals of the Report

The goal of the first edition of *Housing an Aging Population: Guidelines for Development and Design* was to help to maximize housing choices for seniors in Canada by promoting a wider range of housing options that are appropriate and well designed, affordable and marketable. The document was intended to present the necessary design information, but in a sufficiently general way that it could be applied in all provinces.

Seniors have consistently told the National Advisory Council on Aging (NACA) that they wish to live independently in the community as long as they are able. Living in a home that is adapted to one's needs and abilities, affordable to maintain and with ready access to services is an essential condition for independence. The report came about in response to the growing expectations of seniors for a wide range of housing choices. The underlying philosophy - maximizing choices - points the way to a future in which changing lifestyles will necessarily result in a wide range of new options.

The production of the report was a complex undertaking, requiring much expert advice and many meetings of a task force, chaired by the late Joan Simon of the Canadian Housing Design Council. It was Yhetta Gold, Chairperson of NACA from 1983 to 1986, who initiated this project; the late Charlotte Matthews, Council Chairperson from 1987 to 1990, guided the document to publication. It is now my privilege, as the current Chairperson, to direct the revision of this outstanding legacy.

Since its initial publication in 1987, the report has been re-printed twice. Users and housing experts alike have commented on its usefulness and clarity. However, new developments in seniors' housing, the extensive research conducted by the Canada Mortgage and Housing Corporation, and the release of *Barrier-free Design* by the Canadian Standards Association (CSA) in 1990 have prompted NACA to revise and update parts of the text, the bibliographic references and the design specifications. Also, to make **The Design Workbook** easier to use, its pages have been numbered separately and can be readily removed and copied.

Overview of the report

Throughout the document, the housing process is examined from the senior's point of view. Chapter I looks at the characteristics of seniors and the housing choices currently available to establish a framework for determining the special housing requirements of an aging population. The process of developing a housing project is outlined in some detail in Chapter 2, with applications to both remodelling an existing dwelling and planning and constructing a multiple-unit residence. A sample flow chart shows the steps in decision-making and the interplay of design, regulations and financing.

The Design Workbook constitutes the final chapter. It identifies design issues to be addressed in the planning stage by both project developers and seniors who are involved with the project as sponsors, planners or future residents. The emphasis on decision-making throughout the process highlights the importance of considering seniors' input at each stage. The Workbook sets out architectural guidelines in a series of worksheets which are to be used at the appropriate points in the development. There currently is a variety of concepts in housing, including accessible housing, adaptable housing, barrier-free housing and universal design. The Workbook is explicitly based on the barrier-free concept; the specifications are taken from the 1990 guidelines for barrier-free design produced by the CSA. In some instances, the specifications recommended by the CSA may differ from those strictly required in the National Building Code; this is because they represent an ideal standard rather than minimum legal requirements.

Selected readings, a list of documents and other information required during the development of a housing project round out the report.

A number of target audiences will find this document useful. Seniors wishing to renovate their homes or considering a move to another kind of dwelling will be able to make informed choices. Architects and designers, town planners and policy developers will have the information to tailor their work more effectively to the requirements of the senior population. Housing providers - developers, sponsors and citizens' groups - will find a clear model for making the decisions that will provide appropriate marketable housing.

The National Advisory Council on Aging is pleased to release this updated version of ***Housing an Aging Population: Guidelines for Development and Design*** for the use of housing providers and for the benefit of all seniors in Canada.

August 1992

Blossom T. Wigdor, C.M., Ph.D.
Chairperson

1 MAXIMIZING CHOICES

A nation-wide series of meetings of Canadian seniors called **"Listen to Me!"** was organized in 1984 by the National Advisory Council on Aging. The workshops and discussion groups consistently came to this conclusion:

The primary interest of seniors is to continue to live independently in the community and preferably in their own homes.

If seniors are to achieve this goal, a wide range of appropriate housing choices - dwelling types and living arrangements - must be available. This chapter looks at some of the pertinent characteristics of seniors and reviews existing housing options to arrive at a means of defining "appropriate housing", and then proceeds to develop a framework that can be used to determine ways of meeting the housing requirements of seniors in the future.

Changing Characteristics of Seniors

Research shows that seniors are very different from one another in terms of physical capacity, social and economic situations and needs. Moreover, Canada's seniors are changing. Here is a brief look at some of the factors that will describe the seniors of the future.

Seniors are living longer. As better medical care, nutrition and fitness levels have lengthened lives, the number of seniors living to age 85 and over is growing. In the years to come, most seniors may well be stronger and healthier than ever before.

Also in flux are traditional patterns of family life. Careers take children and siblings across continents, marriages break up, and the fragmented family becomes a fact. Many seniors are single, and in older age brackets there are many more women than
men. A major result of these changes is stress on the informal support structure of family, friends and neighbours that traditionally has been a key factor in enabling seniors to live in their own homes.

Seniors are becoming better educated and informed. They are more active, with broader life experience. They plan for and expect a high-quality, stimulating life in their retirement years. The demands of the postwar generations are unlikely to diminish as they age. Many elements of Canadian society will reflect the nature of these groups in the future.

There are many conclusions to be drawn from these changes. In particular, housing providers concerned with environmental design of residential units must consider who the users will be and how they will interact with the environment.

Those who prepare now to respond to the rising expectations of this market will be in the forefront tomorrow.

Housing Choices for Seniors

The following shows the options from which many Canadians can choose today, defined in terms of:

1. dwelling type (single or multiple);
2. tenure (form of ownership or rental);
3. living arrangements (with spouse, adult children, non-relatives or alone);
4. support services (medical and non-medical); and
5. shelter packages (combinations of the above).

Housing involves more than just shelter. Social interaction with the people with whom we may be sharing living quarters, the psychological effects of our home environment, financial considerations and the response to our physical needs for safe and comfortable shelter all contribute to housing satisfaction. As we age, changes in family, job status and physical condition strongly influence how we relate to daily surroundings. By appropriately combining housing elements listed here, a "shelter package" is created to respond to the characteristics and needs of the market or population to be housed.

1. Dwelling Types

The structure of a dwelling influences many aspects of our lives.

a. Single-unit housing. These are typical single-family or single-person private, detached dwellings. Estimates are that most of the housing of this sort that will be needed in Canada by the year 2000 has already been built. It follows that redesign and modification of existing dwellings to maintain good housing standards and improve their suitability for seniors will stimulate the renovation industry.

It is worth noting that the preference of seniors to remain in their homes and "age in place" implies a responsibility on the part of seniors, their communities and local governments to support such autonomy. Innovative approaches to zoning regulations, neighbourhood planning and development, support services, financing and design will be required to make the most of every opportunity to improve quality of life for residents.

b. Multiple-unit buildings Multiple-unit buildings are home to many Canadians. The term refers to any building with three or more self-contained dwelling units, each made up of a private kitchen, a private bathroom and sleeping facilities, in the form of apartments or townhouses.

A building containing only bedroom units, with other facilities shared, does not fall under this definition. Nursing homes and other institutions are not discussed in this document.

2.Tenure

Tenure is the term used to define the manner in which the dwelling is owned or rented. Typical Canadian tenure types are:

a. Home ownership. In a recent Statistics Canada survey, 65% of senior household heads indicated that they owned their home. Under this category, a home may be mortgaged or have other claims on it. An owner has the right to modify the house within the by-laws governing the areas.

b. Rental. A tenant pays a fee to the owner of a dwelling for the use of the space, typically in high-, medium- or low-rise apartment buildings and some townhouses. Basic upkeep is the responsibility of the owner, and modifications by a tenant are usually restricted. In addition to private market rental, public housing, owned by a province or municipality, may offer rent geared to income or another form of subsidy. Some religious or ethnic societies and private, non-profit corporations operate rental buildings.

c. Condominium housing (Strata Titles in British Columbia). A person owns an individual unit in a multi-unit project and has joint ownership of common areas such as sidewalks, roof, stairs, etc. A condominium owners' association oversees the common elements and management of the building and may or may not affect owners' freedom to sell or modify their units.

d. Co-operative housing. This is an arrangement where individuals become members of a non-profit co-operative corporation, entitling them to a unit in a building. All decisions on property management are controlled collectively by the co-op members, including a member's freedom to modify within the unit. Members pay a monthly occupancy charge based on actual costs. The corporation always retains ownership of the unit. In an equity co-operative, members make a down payment on a unit as well as monthly payments and may sell their unit subject to the approval of the membership.

Affordable housing for modest incomes

Over the years, governments have implemented a number of programs to increase the affordability of tenure arrangements for Canadians of low and moderate incomes, particularly when the private market was not meeting needs adequately. The housing stock created under these programs continues to be available today.

Some uses of tenure and financing are being considered for seniors, including:

Life interest. This is resident-financed housing, usually beginning with a non-profit corporation developing a housing project. A senior buys into the project and receives a life-long lease to a dwelling unit in return for a capital investment and a monthly fee. The owner of the unit can sell it on the market or to the corporation.

Reverse mortgage. This is similar to a mortgage, but in reverse: it allows seniors to use capital that is tied up in their real property to supplement income. The homeowner arranges to be paid a monthly amount by a financial organization, using the property as collateral.

A good source of further information is the report *Housing for Older Canadians: New Financial and Tenure Options,* published by Canada Mortgage and Housing Corporation (CMHC).

3. Living Arrangements

From living alone to multi-generational family life, living arrangements vary tremendously. Seniors often experience major changes in their home life as they age and circumstances change. The following list describes some current options. An excellent reference for more information on housing options is the recent CMHC report entitled *Housing Choices for Canadians over 75 Years Old.*

a. Foster care. A senior moves in with an unrelated family who provides meals and housekeeping services.

b. House/Home sharing. This program is operated in several Canadian cities by social agencies who match owners or renters who have extra space with potential tenants. Owners/renters may simply want to share costs or they may want to have the assurance of someone else around. They might also accept personal care or housekeeping and maintenance services from tenants in place of or in exchange for reduced rent. Home sharing is a special term referring to living arrangements where the owner and tenant have a personal relationship in sharing the living space, as distinct from a rooming house arrangement.

c. Group home. A group home exists when several unrelated people live together and share the expenses and management of a house. Each person's private space is usually only a bedroom; bathroom facilities may be private or shared. Kitchen and dining facilities are shared and there may be a common living room. A non-profit organization may act as a back-up and resource group, and hiring of staff may be involved, particularly if the group determines to age in place. Local zoning can sometimes stand in the way of such arrangements and may have to be appealed.

A similar arrangement in apartment buildings is currently operating in the USA. Four to eight residents share common kitchen and dining areas and have private sleeping and bathroom facilities in a section of an apartment building. The units are usually specially designed for this purpose.

d. Accessory apartment. An extra self-contained unit is created in a single-unit house by converting part of the dwelling or adding one or more rooms to the structure. A senior can generate income by adding an accessory apartment and renting it to a tenant or live in the unit and rent the house, perhaps to family or friends.

e. Granny flat. A granny flat is a self-contained, portable unit installed temporarily on the property of a single- unit home, sharing its electricity, water and other services. The living arrangement enables seniors to live in close proximity to their families. Some zoning regulations may have to be revised to permit the extra unit, and neighbours convinced to accept the concept.

Support Services

People who require assistance with some activities of daily living can call upon a range of services, available in most communities, to help them maintain an independent lifestyle within any of the structures, tenure or living arrangements listed above. This important aspect of housing is frequently overlooked by planners who forget that people tend to "age in place" and that their support service needs may increase accordingly.

a. Visiting homemakers, Meals on Wheels, etc. Local agencies provide homemaking services, such as housecleaning, meal preparation, shopping and laundry. Meals on Wheels deliver a hot meal once a day, as many times during the week as needed. Both visits can encourage social interaction. User fees may be charged; some provinces or municipal governments provide subsidies.

b. Social service agencies. Elderly people who are coping with loneliness or death of a spouse, depression, anxiety and other psychosocial problems can arrange for visits from a social worker who may provide help or a referral to an appropriate agency.

c. Personal care (non-medical). This level of care consists of assistance with bathing, dressing, eating and some homemaking activities, usually provided by an agency or by direct hiring of the helper. Financial support may be available.

d. Home care (medical). A person who needs some ongoing medical care at home can benefit from a visit by a nurse or other licensed care giver who can administer medication, change dressings, assess or monitor conditions and perform other medical activities. Services may be covered by a provincial health plan.

5. Shelter Packages for Seniors

Combining some of the above housing choices, shelter packages for seniors can be seen to form a continuum focusing on the degree of independence, from total independent living to full institutionalization. Some of the packages that maximize opportunities for seniors to live independently are outlined here.

a. Independent living. This is a typical pattern for an individual who "ages in place." The senior maintains residence independently in the family home (the dwelling may have to be modified to improve accessibility) or an apartment with some or no support services. Assistance can come from an informal support network of family and friends or from an agency or local government program. All of the dwelling and tenure types and living arrangements listed previously are suited to this package.

b. Retirement home. Seniors rent or own apartment- or townhouse-style units, private or shared, with sleeping quarters, a private bathroom and a kitchenette. Communal dining and other facilities, as well as optional medical and non-medical care, are typical of this shelter package. A hired administrator manages the daily operation.

c. **Multi-level care facilities.** These are government- or privately-owned multiple unit buildings that offer accommodation and services ranging from independent living to chronic care. Shared dining facilities and activity areas are typical parts of a complex of this kind. Different buildings or parts of buildings may be devoted to particular levels of care, permitting a couple with differing care needs to remain together. A day program may be available to seniors who are living in the community.

d. Retirement communities. Here housing is just one part of a whole network of facilities for seniors. Under various forms of tenure, dwelling units are often self-contained, sometimes including land for private use, and are designed to permit independent living. The community is organized in the form of a small village, complete with shopping and other facilities. A range of care and support services is available under the administration of a central management office. In the USA, mobile homes are a popular dwelling type in a retirement community.

e. Support services housing (called Sheltered Housing in Great Britain, Congregate Housing in the USA). These terms refer to living arrangements for seniors who have some degree of support service requirement. Residence is taken up in a designated portion of an existing neighbourhood, section of an apartment building, or specially designed multiple-unit building. Under various forms of tenure, residents have their own self-contained unit with a call system connecting them to an administration centre. A range of support services is available, and residents generally come together once a day for a meal and social activities. Fees for service are incorporated into the rental or charged through a monthly fee structure.

Location and site

Evidence from some of the most successful housing developments for seniors suggests that a location close to shopping, recreation, services and other people has encouraged residents to participate actively in community life. While land may be plentiful and inexpensive in outlying areas, the effects of reduced access to the community will be a critical factor in choosing a location.

Seniors are full members of our society, and neither wish nor deserve to be excluded from the mainstream of social and community activity. The question of intergenerational housing vs. ghettoization of the elderly must be addressed by housing providers and seniors alike when developing housing projects. Planners will want to ensure that each community supports its elderly population without forcing individuals to move away from familiar surroundings to find suitable accommodation, and that facilities for seniors are not overly concentrated in any one area.

Why Seniors' Housing Needs May Be Different

In *Environment and Aging,* Powell Lawton has said that "although the most important generalization in gerontology may be that older people are, on the whole, pretty much like the rest of us, there is an important message: where the capabilities of older people do differ from those of younger people, unique needs requiring unique satisfiers may result. Hence the suggestion that what is good for people in general will be good for the elderly is only partly true."

Lawton's statement reinforces the importance of maximizing housing choices for seniors. It gives us a framework within which to identify the unique needs of the elderly, suggesting that we look for age-related differences in capabilities that affect housing needs.

Functional capability affects how we accomplish our daily activities in our environment. This capability may be only loosely related to aging: a younger person may have more or less functional capability than an older person. Planning for future changes in functional capacity is an important part of housing design.

The rate of change of all five senses varies widely among people in the same age group; one person at a certain age may have much better use of specific senses than another who is much younger in chronological terms. Generally speaking, however, older people as a group tend to experience sensory impairments or reductions. Also possible are mobility limitations ranging from weakness because of frailty or illness, through stiff joints and bad backs, tremors and loss of coordination, to situations requiring the use of a walking aid or wheelchair.

Environmental design can compensate for many of these losses. Wall and floor surfaces that reduce reflected sound will help someone with impaired hearing carry on a conversation. Strong and well diffused lighting can improve depth perception and minimize shadows, helping a person see that next step more clearly. Furniture arrangements should let people sit close enough to see and hear each other comfortably.

The psychosocial aspects of aging have an impact on our housing needs as well. As occupational and family roles change, different activity patterns may result. More time may be spent in the home, making its design more critical to the resident. Changes in roles also affect the need for support from social networks. Living environments should allow for the many qualities and lifestyles that tend to distinguish seniors from the population at large.

Given that differences resulting from the aging process do exist, it is fair to examine how well they are taken into account in housing design guidelines and standards by asking whether special needs that tend to be associated with aging require more, better or different treatment. Existing standards for housing may mention the special needs of elderly people in passing, but they often fail to provide consistent provisions to meet these needs. The guidelines in the Design Workbook of this document are based on the standards developed by the Canadian Standards Association (CSA), using the above framework to develop specific criteria for seniors. At the core of the Workbook is the concept of barrier-free design.

Barrier-free Design

Design is said to be barrier-free when an environment contains no architectural, design or psychological features that might prevent anyone, able-bodied or impaired, from using the environment to the full extent of his or her abilities.

It is useful to examine the implications of this definition from two points of view: existing environments, and those on the drawing board.

Most of us have seen the ramps, wider parking spaces and amplifying telephones that are among the most obvious attempts to make the environment more accessible to people with functional impairments. Accessibility modifications to an existing home can range from buying a few simple aids and devices for daily living to a full retrofit job with ramps and lifts at changes of level and a remodelled kitchen and bathroom, all, of course, depending on the degree of functional capability of the resident, not to mention financial resources.

When a building is in the conceptualization stage, however, the opportunity exists to create good, accessible design before barriers are built. There can be no excuse for designing a sunken living room, a tiny bathroom or narrow doorways. Barrier-free design is founded on the principle of promoting continuing utilization, and takes into account the possibility of future changes in functional capacity. The Design Workbook reflects this by describing design criteria that will suit residents with a range of functional ability, so that all individuals, regardless of strength or mobility, will find the environment safe and negotiable at all times. Simply put, design that takes into account the full range of physical needs will respond to the needs of the greatest number of residents.

Conclusion

People of all ages want to know that their basic life-supporting requirements are taken care of: that their housing and immediate physical environment are affordable, accessible and comfortable, that they are safe and secure from intrusion, attack or extremes of weather, and that they can work or engage in a variety of activities and make and maintain social contacts. Privacy, control, security, freedom of choice, independence and self-sufficiency are important to all of us Factors related to aging, such as physical and sensory changes, as well as shifting social patterns and needs and altered economic circumstances, all play a role in housing design. Maximizing housing choices that incorporate good design to respond to these factors can improve the quality of life for seniors.

2 THE PROJECT DEVELOPMENT PROCESS

Individuals and communities across Canada are becoming increasingly aware of the need for adequate housing for an aging population. Housing options for independent and semi-independent seniors can range from modified single unit dwellings to multiple dwellings that offer shared services. For individuals interested in modifying their own home or sponsors interested in embarking on a seniors' housing project, this chapter outlines a step-by-step approach that can be used to ensure that housing objectives are met economically and effectively.

The project development process can be complex and is often frustrating. The task can be organized, however, by approaching the process in four stages, starting with conceptualization, progressing through detailed project planning to actual construction and, finally, operation.

I CONCEPTUALIZATION	II PROJECT PLANNING	III CONSTRUCTION	IV OPERATION

Figure 1: THE PROJECT DEVELOPMENT PROCESS

This process can be used in small projects - for example, the new construction or conversion of a single-unit dwelling to enhance its livability or provide an accessory apartment. It can also be used for multi-unit projects.

Although the process is the same, the time schedule, complexity and even sequence within each stage will vary according to the nature of the particular project and the jurisdiction in which it is located. The overall process from conceptualization to operation can be a lengthy one. A minimum of two years could be required for a modest project.

Essential to the success of any project is the commitment of the project team to common goals and its determination to work, over a long term, to overcome obstacles and bring the project to a satisfactory completion.

The general model offered in this chapter is intended to encourage a rational approach to project development, enabling individuals and groups to tackle what otherwise might seem a mammoth and intimidating task. The chapter is meant to alert those involved in a housing project to the tasks they must be ready to do and the tasks they must ask the housing professionals to do in order to make the project a success.

In the following sections, the four stages in the project development process are outlined in turn. An effort is made to provide guidance for individuals involved in their own single-unit projects, as well as for seniors involved in large multi-unit projects.

Single-unit projects may include a family's project to prepare for their own housing needs or the needs of an aging relative or relatives. The multi-unit project includes housing for larger numbers of seniors who will share certain common amenities. Comments of interest in the single-unit project are marked with an asterisk (*) throughout the following text for ease of reference.

I. The Conceptualization Stage

Every housing project, no matter how large or small, starts with an idea. An individual might decide to modify a single-family home to provide more appropriate accommodation, or a sponsoring group in the community might decide to develop multi unit accommodation for seniors. The initial idea can be simple or complex, but it must be clearly defined at the beginning. If it is not, costly changes at the construction stage will be almost inevitable.

I CONCEPTUALIZATION	II PROJECT PLANNING	III CONSTRUCTION	IV OPERATION
1. User/User Group **2. Housing Requirements** **3. Housing Options** **4 Financial Feasibility** **5 Project Financing**			

Figure 2: THE CONCEPTUALIZATION STAGE

The initial idea or concept in any project derives from several common elements:

1. the user - the individual or user group that will be living in the dwelling (this may or may not include the project sponsors);

2. the specific housing requirements to be considered;

3. the housing options currently available;

4. the financial feasibility/affordability of the project; and

5. the financial resources obtainable.

Looking at the conceptualization stage in this way helps to focus clearly on the needs to be addressed and to develop a plan that is suitable and economical.

1. User/User Group

*It is important to identify correctly who will be using the new housing. In single-unit projects, this is a relatively simple process.

In the case of multi-unit projects, it is essential to know not only the number of residents but also as much as possible about their characteristics - age, health, marital status, income, ethnic origin, religion, family proximity, interests, resources, mobility. A general profile of the users the housing will make it easier to identify actual housing requirements.

2. Housing Requirements

In planning housing with or for seniors, it is necessary to assess current and future housing requirements by considering health; special mobility needs; space for visiting family; requirements for space or special facilities for work or hobby interests; and financial resources available for the construction/modification/purchase of housing and its continuing maintenance.

Seniors who are considering whether to relocate should examine not only the physical nature of the house and neighbourhood characteristics, but also the availability of community support services which could be required in the future. It is important to consider social activities and friendship when making decisions about relocation.

It is especially important to recognize that the health and mobility of residents may change over time and that the corresponding need for nearby social and health-care services may also change. Accessible shopping, recreation, entertainment and place of worship are all extremely important. Convenient transportation is therefore critical to seniors.

*In a single-unit project, it is a relatively straightforward task to determine basic housing requirements. Because there are fewer individuals involved, it is easier to choose a suitable housing form or to modify an existing one.

In multi-unit undertakings, the exercise is more complicated because a project aimed at housing a large number of seniors must provide for a range of special requirements according to the characteristics of the group. If the user group is made up of seniors with relatively similar characteristics, the task of assessing housing requirements is less difficult than where the group varies widely. In some cases, it may be necessary to focus on the requirements of a smaller section of the group, in order to narrow the range of requirements to be met in a single project.

The long-term marketability of a multi-unit project will require careful consideration of changing lifestyles and increasing expectations. It would be a mistake to plan only on the basis of current need and demand.

3. Housing Options Available

In developing an idea for a seniors' housing project, it is important to be aware of the range of housing options available and to be open to new forms and innovative ideas that have been developed in other communities and other countries. The public library, community resource groups interested in housing issues, housing professionals, such as architects and developers, as well as local government planning departments and provincial departments of housing or municipal affairs, can be helpful sources of current information.

The outline of housing options in Chapter 1 provides a breakdown of the elements that can be considered, including structure type tenure, living arrangements and support services. These elements can be put together in different combinations to form the "shelter package" most suitable for the intended users. Note that the options focus on housing for independent and semi-independent seniors - that is, seniors with the capacity to look after all or most of their daily needs. Housing for dependent seniors requiring extended care in nursing homes or chronic care homes is not covered in this document.

In formulating the idea for a seniors' housing project, the requirements of users are matched as closely as possible with a housing option that falls within the resources available to the project.

4. Financial Feasibility/Affordability

In assessing which of the available housing options best meets identified housing requirements - whether it is a single-unit project or a multi-unit project - a major consideration must be financial feasibility. The cost of developing, operating and maintaining the project must be worked out to determine whether the housing will be affordable for users. There must be some assurance before construction begins that rental income or occupancy charges are sufficient to cover debt services and operating costs.

Costs include capital costs (land and construction), as well as operating costs (municipal taxes, utilities, maintenance and administration) and debt servicing (mortgage and loan payments and interest). A good way to determine current costs in these areas is to talk to local builders, development consultants and lenders (banks or credit unions, mortgage, trust or insurance companies). A rough guide for estimating building costs per unit is to multiply the number of square feet per unit by the local construction cost per square foot.

To be affordable, the cost of shelter generally should not exceed 25% to 40% of gross household income. If affordable payments or rents will not cover costs, it will be necessary to find some means of subsidizing the project.

*In single-unit projects, seniors can check with the local and provincial housing development officials to determine if they offer construction or renovation grants or loans or shelter allowances to help with the cost of a project. Appendix 1 lists provincial housing departments which may provide helpful information.

For multi-unit projects, it would be helpful to speak with a development consultant familiar with federal, provincial and local
programs that could be of assistance. Local service clubs and religious groups may also be approached to assist in fund-raising.

If the cost/affordability equation can't be balanced by subsidies or independent fundraising, it may be a signal that the project must be reformulated or abandoned.

5. Project Financing

A final step in developing a viable project idea is to assess the general level of resources available. Although detailed investigations of funding sources are made at a later stage in the process, it is important to have an initial indication that the size and scope of the project are not outside the bounds of available resources. This is not meant to discourage ambitious projects but rather to emphasize that, at the conceptual stage, the project idea has to take realistic account of the financial resources available.

In projects involving new construction, there are requirements for financial resources at different stages in the process. The following kinds of funds are required in both the single-unit and the multi-unit project:

a. Start-up Funds: These monies come from savings, government grants or building funds and are used to fund zoning applications, commission architect's plans and meet other miscellaneous development costs and professional fees that arise before construction starts.

b. Equity Funds (down payment): These funds also come from savings or a building fund and are used as a down payment to raise a mortgage. The down payment usually represents between 25% and 35% of the project cost.

c. Interim Financing: Money borrowed from lending institutions or provided by financial backers fills the gap between the construction start and the availability of the actual mortgage.

d. Mortgage Funds: These funds come from lending institutions and are offered over a long period to cover the remaining construction cost. Where the project involves renovations to a property that is already owned, a building loan in the form of a second mortgage may be necessary.

e. **Bridge Financing:** In multi-unit projects, these funds are used to bridge the gap between completion of the project and cash flow (rental income).

f. Rental Income or Occupancy Charges: These funds are generated by residents or owners and must cover operating expenses, including municipal taxes, mortgage and loan repayment and maintenance. Provincial rent subsidy programs may be available.

g. Subsidies: Some provinces provide subsidies to cover the 25% to 35% equity needed to obtain a mortgage loan. Appendix 1 may be helpful for investigating the subsidies available in each province.

Some lenders may require insurance and will ask for documentation showing that Canada Mortgage and Housing Corporation (CMHC) or the Mortgage Insurance Company of Canada (MICC) will cover the loans related to the purchase, construction or renovation of housing in Canada. Some provinces provide mortgage insurance on projects that receive assistance under provincial programs.

A careful assessment of the financial resources available is essential before the project can proceed.

To sum up, individuals or sponsoring groups formulating a project should ask a number of important questions:

• *Is there a real need and demand for the housing project?*

• *Who will live in the housing?*

• *What are the particular housing requirements of those who will live in the housing.?*

• *What housing options are currently available?*

• *Which options best suit the needs identified?*

• *Which of the options are financially feasible/affordable?*

• *What are the payments/rent likely to be?*

• *What project financing is available for the project?*

If these kinds of questions have been considered carefully, and if the answers have been used to develop a well-defined project concept, the next step is the Project Planning Stage.

II. The Project Planning Stage

With the initial concept for a housing project mapped out and preliminary questions answered, the next task is the detailed and thorough planning of the project. This planning stage is essentially the same whether the task involves modifications to a single-unit dwelling or construction of multi unit seniors' housing.

I CONCEPTUALIZATION	II PROJECT PLANNING	III CONSTRUCTION	IV OPERATION
1 . User/User Group 2. Housing Requirements 3. Housing Options 4. Financial Feasibility 5. Project Financing	1. Organization 2. Promotion and Approval 3. Finalizing Arrangements		

Figure 3: THE PROJECT PLANNING STAGE

Project planning involves making the many decisions, individually and in sequence, that move the project along in the most efficient manner from conceptualization to construction and operation. The steps involved in project planning are grouped under three headings: 1. organization; 2. promotion and preliminary approval; and 3. finalizing arrangements.

The discussion in this section reflects the nature of project planning, which moves from generalities to specifics, from flexibility to contractual commitment and from low initial expenditures to full financial commitment. It is important that certain details be attended to early in the planning stage when there is still enough flexibility to allow for change. In general, the more advanced the project, the higher the cost of changes.

Throughout the project planning stage, it is necessary to reassess financial viability. Critical points at which reassessment is helpful are suggested in this model, but project organizers are encouraged to assess and adjust project plans whenever the need or the opportunity arises as the result of new information. For this reason, it is important to work with an architect or developer who is experienced in reassessment procedures.

1. Organization

By this point in the project, individuals or an interest group in the community have identified a demand for seniors' housing and have come up with a specific idea of the type of housing option that would meet requirements. They have also determined that the option is feasible within the resources available to finance the project. It is now time to organize and pursue the project actively and in detail.

a. Establish a legal entity. Early in the project, it is necessary to incorporate. This will create a legal entity to enter into contracts and provide protection for a board of directors.

The requirements for incorporation are set out by the appropriate federal or provincial department. Incorporation requires that a board of directors be formed and officers named, along with the adoption of a by-law describing the goals and responsibilities of the corporation. The onus is placed on the corporation to follow acceptable accounting procedures and to be identified as either a for-profit or a non-profit corporation, for taxation purposes. If it is non-profit, a corporation can, under certain conditions, seek charitable status with Revenue Canada in order to be able to issue donation receipts for tax purposes.

b. Choose the project team. The first action of the board of directors is to choose the project team that will be responsible for the project.

*In the single-unit project, the team is small, consisting of, for example, the owner and an architect or contractor.

For multi-unit projects, the team is larger. The team requires board members with a high degree of commitment to the project and the ability to approach its development in an organized, efficient manner. The team should not be large - nine members is a workable number.

The kinds of skills that will be valuable for the particular project must be represented on the project team. Financial expertise and organizational skills, as well as practical knowledge of housing design standards and construction and the special requirements of seniors, are essential. Other valuable skills should include knowledge of local zoning, by-law and planning procedures, and community relations, fund-raising experience and political savvy.

To maintain continuity in the planning process, every effort should be made to avoid changes in personnel. This means making careful assessments and selections for the initial team.

To spread the workload of the project team and facilitate teamwork, smaller sub-groups should be set up, headed by a team member. Sub-groups might include fund-raising, land search, regulatory requirements and design.

c. Select the project advisors. In each project, decisions must be made about what can be done by team members and what will require the services of consultants.

*In the single-unit project, the advisors will be few in number: an architect, a lawyer, a lender and a contractor.

In the multi-unit project, it becomes most important to identify the range of expertise that will be required. Early in the process, a paid development consultant should be selected to work closely with the project team. The development consultant will ensure continuity and coordination and act as an intermediary with the project advisors. Other advisors will include an architect, a lawyer, an accountant, a lender and a project manager. Many professionals will initially provide services without charge, on the understanding that they will receive the contract when the project materializes.

The advisors need not be restricted to those mentioned. The nature of specific projects will suggest the kind of expertise required to carry them forward successfully.

A list of the kind of consultants who can contribute to projects is included in Appendix 2. Professional fees should be determined in advance, as they are a development cost that must be included in assessing the financial viability of the project.

Special attention should be paid to architectural assistance. The architect is the principal consultant because all projects require design work, preparation of working drawings and supervision of project construction. In addition, the architect may represent the project group before regulatory bodies such as planning boards and zoning committees. The architect may also administer the contract between the owner or board and the general contractor.

The choice of an architect should be made through an interview process in which architects present credentials and work experience. The architect should be familiar with local conditions, zoning by- laws, contractors, and provincial and municipal authorities.

The contract with the architect selected should make provision for cancellation of the project. Some architects will work on speculation until financing is assured. The architect's fee for services is also negotiable. It is important to note that the architect is involved in the project until the construction warranty period expires, a year after completion.

d. Elaborate the housing option. The preliminary task of the project team is to define the project in as much detail as possible by discussing initial costs, locations, regulatory hurdles and so on. These initial details will evolve throughout the early days of project planning.

*In the case of a single-unit project, the project definition is straightforward. The individual assesses the requirements and develops a general idea about how the project should look. The architect or contractor checks on zoning or other legal restrictions, develops plans and specifications, estimates the cost and drafts a construction schedule. The lawyer reviews contracts before the owner signs, and the lender advises on the availability and cost of financing.

In multi-unit projects, the detail emerges more gradually, but the clearer the initial definition, the easier will be the process of modification. A comprehensive review of the architectural drawings and specifications throughout the pre-construction period ensures that all requirements are satisfied.

Groups are often overwhelmed by the complexity of the process and fail to see the details that later cause inconvenience, maintenance problems or even safety hazards. Here some homework with the Design Workbook (Chapter 3) will be helpful. Visits to other projects may be useful as examples of what is worth repeating and what should be avoided in the new project.

e. Take a need/demand survey.
*In the case of the single-unit project, determining needs and demands is relatively direct.

In a multi-unit project, however, the need and demand for the type of housing project being proposed must be documented. The board must identify the market they are addressing and demonstrate clearly that the current supply of housing does not meet the demand for units of the proposed type. It is important that the demand in this market be considered thoroughly before questions are raised in negotiations later in the process.

A strategy map showing the areas served by existing facilities can be used to show gaps where new facilities are appropriate.

The work already done to establish the characteristics of the user group will be helpful. The number of prospective residents, their special characteristics, including the level of rent they are willing or able to pay, and the amenities required (for example, parking, food services, support services) must all be taken into account in the survey.

If the project requires rent at a level that seniors cannot or will not pay, subsidies should be sought from government or the private sector.

A public meeting to bring together prospective residents to discuss housing needs and to gauge community receptiveness to the project proposal would provide valuable information for assessing demand.

The need/demand survey is an important tool for use in talking to financial backers, bankers and local authorities. This survey is a job for professionals. Weaknesses in the assessment of market characteristics could jeopardize a worthwhile project. It is important to check that similar projects are not already in the planning stages.

f. Develop functional programming. Following the need/demand survey, a functional program should be developed to document all the requirements of users and include suggestions for the best response to these requirements.

The functional program is drawn up by the project team, with the help of the development consultant and advisors. Beginning with a clear statement of objectives for the project, it describes in some detail user characteristics, expected functions and activities, space utilization, staff requirements and necessary equipment. It provides the detailed basis for elaborating the organizational structure, preparing the architectural program and forecasting capital and operating budgets.

This document can be a useful reference tool in all phases of the project development process. Its first use is in determining cost parameters for the project.

g. Develop preliminary cost parameters. Once the project team and consultants have elaborated the functional program, the task is to develop ball-park estimates of the costs associated with land purchase, development expenses, construction and financing. If the project is already over budget, timely adjustments can bring the project within budget before proceeding. If costs cannot be cut sufficiently, it may be necessary to reformulate or abandon the project.

h. Begin land search. Many projects start out with a confirmed or previously selected site or with an idea of what is suitable and available.

*In the single-unit project, a senior may wish to modify an existing dwelling or build a home on a vacant lot purchased some time ago. In this situation, land search options are straightforward. It should be emphasized that proximity to transportation, shopping, social and medical services, churches and recreational facilities is an essential factor.

In the case of multi-unit projects, however one of the most critical elements is the search for an appropriate site. With the concept in mind, the project team must find land to fit the project. The site should already be zoned to allow the development. Applications for zoning changes are slow, confrontational, costly and often not successful. Neighbours may resist applications for zoning changes. Compromises must be made. No site is perfect, and a "best buy" analysis usually must be done by the team and consultants. The amenities mentioned in relation to single-unit projects are equally important in location decisions related to multi-unit projects. The project team is cautioned against a hill location.

If there is a site that is a best buy, and if the vendor is willing to sell, the board of directors must consider placing an option on the land. In this situation, the group negotiates with the vendor to hold the land during any re-zoning period that may be required. Because this can take months and even years, there must be sufficient cash motivation for the vendor to take the land off the market during this period. Normally, the offer is conditional on confirmation of re-zoning and includes a sum of money that the purchaser forfeits if the conditions are not met.

The vendor may also want a 24-hour clause, giving the board of directors that period of time to close on the land if another serious offer is made for it. The board is advised to retain a lawyer with land development experience to draw up the offer to purchase. A development consultant can negotiate on its behalf.

Appendix 3 provides a list of elements to be considered when investigating a prospective property.

i. Commission the preliminary plans and architectural renderings. *In the single-unit project, expensive renderings may not be required. The architect or contractor develops a set of sketches and plans as a basis for discussion with the owner. These are amended until a satisfactory design is agreed upon. In multi-unit projects, after the need and demand requirements have been satisfied and the architectural concept is developed, and if it appears that the proposal is well conceived, the board of directors will proceed to the promotion and approval steps. (See Section 2b below.) Attractive artist's preliminary drawings and a site plan will assist in fund-raising and in discussions with local officials and neighbourhood groups. Care should be taken that the plans are not so detailed that they detract from the flexibility of the project. Some modifications will be required as the project evolves, and at this point the drawings must not be so specific that they could be seen as misleading advertising if the project plans change.

2. Promotion and Preliminary Approval

Project promotion and approval involve persuading funding sources, local authorities and community members of the viability and desirability of the project. The following sequence of steps will ensure that important matters are covered in an effective manner:

a. Visit the funding sources. In both the single-unit and the multi-unit project, the nature of the undertaking will determine the type of financing required. Readers are referred to the earlier discussion of project financing for the range of funding options that can be explored with lenders. Borrowers should review and compare loan terms and conditions as well as interest rates, to ensure the most suitable and economical financing arrangement.

*In the single-unit project, mortgage arrangements can be discussed with a bank or with a mortgage or trust company if a loan is required. A conventional mortgage for new housing usually requires 25% equity or down payment. The owner's equity in an existing home can be used in renovation or conversion projects to increase the first mortgage or to negotiate a second mortgage to cover costs.

In multi-unit projects, funding is more complex. In the initial stages, start-up funds are required to finance the need/demand survey, incorporation of the sponsoring groups, a best-buy land analysis, sketches for the preferred land site, the option on the land selected, organization costs and the re-zoning application.

Equity funding commitments may be given by private donors or service groups or by the users themselves. Innovative fund-raising projects can be planned to supplement these commitments. Established banks and trust companies should be approached to discuss financing arrangements, including any interim financing, mortgage funding and bridge financing that may be required. Federal and provincial government housing assistance programs applicable to seniors' projects should be investigated. Appendix 1 lists provincial housing departments that can be contacted to identify the funding that may be available in the particular jurisdiction.

Limits on government programs now require that a portion of the cost be raised by the project sponsor; this portion can run as high as 25% to 35%. Without this equity, the cost of servicing the debt would be so high that, when combined with operating costs, it would jeopardize the viability of the project in a rent-controlled environment. To bridge the viability gap, some provinces offer second mortgages in which interest is deferred or forgiven for a period of time.

If the project is of the condominium type, purchasers' equity can be used through a system of down payments and progressive deposits. In this case, a lending institution will provide bridge financing as long as a sufficient number of commitments can be obtained.

Keeping in mind that multi-unit projects may take a number of years to complete and that federal tax laws can change from year to year, there may be tax shelter arrangements that will allow private investors to buy into a seniors' housing venture, providing equity for the project and a tax-sheltered investment for themselves. Project sponsors interested in financing by this means should seek expert tax advice and legal assistance to ensure that the arrangement is both attractive to investors and sound enough to withstand changes in the investment environment.

In larger undertakings, remember that most projects suffer a gap between construction payments and lender advances. In all projects, sufficient funds must be held back so that, if the builder goes into receivership, the building can be completed with the funds held back.

When construction is completed and the project enters the operation stage, it may be necessary to obtain second-mortgage financing to cover rent-up (the time it takes initially to fill the units), vacancy losses and contingencies.

From the foregoing discussion of financing, it is evident that, in promoting the project, sponsors must ensure that objectives, plans and accompanying documentation, including a need/demand survey, are as thoroughly researched as possible. The materials to make the case to funders and local authorities are prepared by the project team assisted by the development consultant and the architect.

Without this assistance, the sponsoring group may miss significant items in the need/demand survey, rendering the results invalid or unacceptable to a lender or insurer. The group might also amass a great deal of detail but lack the ability to focus or analyse the information in a way that will persuade authorities that the project is viable. Funds spent to make the case for the project are a good investment.

b. Visit local authorities. *If a single-unit project involves controversial zoning amendments, it could be advantageous to discuss the matter with the local council which may be able to lend advice or support for the change that is required.

In the case of multi-unit projects, it is important to provide a firsthand introduction of the proposed project to the mayor and interested members of council, and possibly to the local federal and provincial Member of Parliament, in order to present the proposal in the best possible light and obtain the support of elected officials. For this purpose, the artist's renderings and preliminary plans are important, as are arguments based on the need/demand survey. Specific mention should be made of proposed sites and any zoning variances that would be required to implement the project.

The formal presentation of a re-zoning application is discussed later in this chapter. The purpose of the initial meeting with members of council is to introduce the project and test the waters.

c. Visit neighbourhood groups. *In single-unit projects, even those small in scope, there is no guarantee that plans will meet with no objection from neighbours or community groups. The best tactic is thorough research on the aspects of the plan that could prompt objections and on the regulations that apply. A discussion with city planners regarding a compromise or to explore alternate options will be helpful.

In multi-unit projects, once the mayor and interested council members have been introduced to the project, it is imperative to discuss the proposal with those living around the proposed site. Early efforts can help to allay fears and opposition.

Explanations by project team members may eliminate community concerns and objections. This is also an opportunity to take those concerns or objections into consideration. If more extensive difficulties are anticipated, however, the assistance of a lawyer familiar with development problems is a must. In many cases, it will be easier and less costly to explore alternative sites rather than fight a prolonged battle for re-zoning.

d. Make a public announcement. If it appears from preliminary fund-raising discussions that there is an interest in the proposed project if qualified, conditional commitments for backing are given, and if local authorities and interested individuals and groups in the community offer no major objection, it is time to make a public announcement about the project. From a marketing perspective, early publicity can draw interest from prospective residents that will be useful in seeking funding.

e. Conduct initial financial feasibility study. *With single-unit projects, the initial feasibility study takes place at an earlier stage, when the owner presents the project idea to the architect or contractor. These professionals can provide fairly accurate estimates of costs. It is important, however, even in the individual projects, to reassess and adjust for the cost implications of any changes or unforeseen factors that may appear at any stage in the process. The costs outlined below for the multi-unit project may be a helpful framework for the single-unit project.

In the multi-unit project, when progress has been made to the point where there appears to be interest from funding sources and no major opposition from local authorities or the community, it is time to look closely at financial feasibility. The appropriate consultants, usually the architect or a quantity surveyor, together with a development consultant, should develop financial estimates, including:

(1) Acquisition and servicing costs: land cost; off-site servicing; legal fees; survey costs; levies; re-zoning costs.

(2) Fees and charges: interest; taxes, insurance and utilities during construction; architect's and consultants' fees; other legal costs; organization expenses; mortgage application fees; lenders fees; rent-up costs; audit charges.

(3) Building and landscaping costs: building permit; construction costs; rehabilitation/ conversion costs; elevator; equipment (stoves, fridges, laundry); furnishings; landscaping; on-site servicing.

(4) Contingency: a percentage of construction costs for the unexpected, usually 3%.

(5) Operating and other expenses: property taxes; insurance; maintenance (repairs, painting, gardening, fumigating, elevator); replacement; operating (janitor, heat, light, power, water, security, snow/garbage removal); administration/management.

A pro forma checklist for deriving these estimates is provided in Appendix 4. It is important to estimate both capital and ongoing operating costs as accurately as possible. These financial estimates provide the input for the next important step.

f. Reassess and adjust. The importance of reassessment and adjustment in both the single-unit and the multi-unit project cannot be overemphasized. It must be done after financial feasibility information has been formulated, but it is equally important at any point where new information or variables have been introduced which may affect overall costs or project viability.

In the case of reassessment on the basis of new financial estimates, adjustment may mean scaling down the project size, selecting another location to reduce land costs or modifying the design to reduce long-range operating costs and make the project more cost-efficient.

g. Draw up preliminary plans. It is time to finalize the design. The following should be considered:

• site plan, including building location, parking, building access, preliminary grading and landscaping;
• building floor plan;
• unit floor plans;
• building sections and elevations; and - details of special features.

These plans should show the details necessary to comply with the requirements of authorities giving the various approvals. The architect prepares the plans, but in both single-family and multi-unit projects, it is in the owner's interest to review the plans carefully with the architect to be sure that all identified needs are taken into account.

A checklist of features that may be included in preliminary floor plans is provided in Chapter 3.

h. Start the zoning/by-law approval process. Modifying a single-unit dwelling in a way that involves structural, electrical or mechanical changes or additions requires an application to the city planning department for zoning approval. The board of directors for a multi-unit project will also have to seek zoning approval.

*In the single-unit project, the architect or contractor can advise from experience whether planning approval is likely to be given. It may become evident, however, that zoning regulations or other by- laws will have to be adjusted or amended to allow the project to proceed. Find out from the city planning office what the procedures are and how long they might take.

*Remember that, even in relatively simple single-unit projects, obtaining approvals for variances or exemptions from regulations is not a simple task. The municipal approval process includes the opportunity for neighbours to raise objections if they believe the project will affect their properties adversely. Do not assume that approval will be given automatically, and be aware that attempting to fight city hall after objections have been raised or the application has been turned down is time-consuming and expensive.

In multi-unit projects, re-zoning will probably be required along with other municipal variances. This process can also be time-consuming and frustrating. It begins during site selection because before purchasing the land, the project team will require the comments of the municipal planner, whose support in the application for re-zoning is valuable. A site that presents serious planning problems is not a good choice.

In addition to any previous meetings the board of directors may have had with local authorities or neighbourhood groups to introduce the project, most municipalities require a community information meeting on multi-unit projects. Preliminary plans and sketches are shown formally to neighbours who may be concerned about the effect of the development on their community in terms of traffic congestion, property values, parking, and so on. The meeting is usually arranged by or with a municipal councilor, whose support for the project is helpful.

To make an effective presentation, the board should use the services of its architect to present and explain the artist's renderings. With the support of the planner or development consultant and a favourable response from the community, the board can file an application for re-zoning with the municipal authority. The application must be accompanied by a fee, which should come from the project's start-up funds. Appendix 1 lists the municipal departments that may have input into the approval process.

Re-zoning applications usually require hearings before the municipal council. At this time, the project sponsors make another presentation to persuade the councilors of the merits of the proposal.

Other interested parties also have the opportunity to state their views. The council decision, which may be deferred to another session pending reports from the planner and other municipal consultants and staff, will be either refusal or approval, with or without specific conditions. If approval is given, a site-specific development agreement drawn up by the municipality is drafted incorporating the municipality's or the community's requirements, with respect to matters such as density, parking allowances, landscaping and buffering, among others. In some jurisdictions, the decision of the local authorities is final. In other provinces, there is a formal appeal process to a municipal board or similar body.

I. Talk to other authorities with jurisdiction. While the preliminary plans are being considered by City Hall, it would be time well spent to discuss project plans with any and all authorities that may be in a position to place restrictions on the project if the proposal does not comply with the regulations they administer. It would be wise to check and double check that no authority is left out, because modifying plans at this stage to meet their requirements is still a relatively simple matter.

Some of the groups that may have jurisdiction or may want to comment include: regulatory bodies, such as hydro, river or conservation authorities; fire departments; independent planning bodies; regional governments; licensing agencies; telephone/ cable TV; and environmental groups.

j. Reassess and adjust. *In the single-unit project, the architect takes into account the comments or restrictions that have surfaced in the zoning approval process and in discussions with officials from other regulatory bodies. The architect advises on modifications to plans and the costs associated with them. With this information, the owner can decide whether to proceed with the project.

In the multi-unit project, the additional information and suggested modifications can be used to update the preliminary plans and cost estimates. A financial plan should be drawn up by the development consultant to provide details on land and building costs as well as debt servicing. The financial plan provides the background information required by lenders and should cover all aspects of the project in as much detail as is available.

3. Finalizing Arrangements

This is the final step in the Project Planning Stage and will set the basis to start construction of the project. Preparation previously made will minimize problems at this point. This step deals with obtaining financing, developing working drawings, refining cost estimates, deciding on tendering procedures, actually closing the land purchase, obtaining the building permit, and signing the building contract.

a. Obtain financing. *In the single-unit project, the borrower approaches the lender (if required), which may be a bank or a trust company, with detailed information about the project, its costs in detail, the funds available for down payment, the loan period, the building permit and evidence of government loans or grants, if they are available. The terms of the mortgage loan are worked out between the borrower and the lender. It is important for the owner to have shopped around to find the best terms available. It is often possible to bargain with the lender.

In multi-unit projects, the project team has previously identified funding sources that are favourably disposed to the proposal. By this point, there should be a firm idea of the type and level of funding required. It is time to get a major commitment for the down payment or equity portion of the funding and to arrange for a mortgage and for bridge financing, if required. For these purposes, it will be necessary to give the prospective lender some assurance that the land is available and that zoning is approved. It is assumed that the original option obtained on the site has been maintained. For these financial discussions, the latest estimates available on both land and building costs are necessary.

It is also necessary to have a confirmation that the insurance available from the Canada Mortgage and Housing Corporation or that the Mortgage Insurance Company of Canada will cover the loan.

b. Commission the working drawings. *In the single-unit project, once a lender has given mortgage or loan approval, the architect can proceed to draw up the final drawings. The Design Workbook (Chapter 3) will be helpful in seeing that all details have been included.

In multi-unit projects, commissioning working drawings represents a major commitment. It calls for major expenditures which, until this stage, have been kept to a minimum. The preparation of working drawings usually represents 50% of the architect's fees. The following should be included in the contract documents:

- architectural working drawings;
- structural working drawings;
- mechanical and electrical working drawings;
- landscape, grading and drainage plans; and
- complete architectural, structural, mechanical, electrical and landscape specifications and timetable.

c. Prepare a final estimate. The architect's plans in the single-unit project and working drawings in the multi-unit project provide the basis for preparing detailed costings of what was previously estimated. To prepare the detailed costing, the architect or quantity surveyor uses experience from similar projects, discusses costs with suppliers of major components, and draws upon knowledge of the current state of the local construction industry.

d. Reassess and adjust. The detailed costings should be reviewed carefully to ensure that the project is still within its budget. This is an important exercise because it is still possible to adjust plans if trade-offs are necessary.

e. Purchase the land, obtain zoning approval, obtain the building permit. If reassessment on the basis of the detailed costing indicates that the project can proceed, the next steps come together. They involve closing the land purchase, applying for final zoning approval, signing a development agreement with the municipality and applying for a building permit. Assistance from the development consultant, project architect and lawyer will ensure that these tasks are handled expeditiously.

f. Call for tenders. *In the single-unit project, the architect may supervise construction. The architect will usually call for tenders from a number of local contractors and compare the bids. The contracting firm should be well established and in good financial standing to ensure that there are no difficulties in completing the contract.

In multi-unit projects, once the land has been purchased, zoning approval given, a building permit issued and financing assured, the contract documents are used to obtain the services of a contractor. If government financing, subsidies, or insurance are involved in the project, there may be an obligation to go to public tender. An advertisement is placed in local newspapers and/or construction trade papers. It is not necessary to accept the lowest bid, nor to accept the bid of a contractor whose expertise or financial situation are questionable.

Another procurement technique is the invitational tender, in which several contractors are invited to submit bids. Because those invited to tender have been pre-screened, the lowest bid is often accepted. The bids can be opened with the architect and development consultant present, along with a representative of the board.

If the project group wants to be involved in selecting construction sub-trades, the construction management technique can be used. A manager (a contractor or construction firm) is hired to oversee construction for a flat fee or a percentage of construction costs. Bids are then requested from subcontractors and are opened in the presence of the group responsible for the choice.

The turnkey approach is another procurement technique. A contractor, with or without land, agrees to build a project and provide all the financing for an agreed sum, turning over the project to the sponsoring group on completion.

The board, the architect, other consultants, the lender and the project circumstances will determine which of these procurement techniques is most appropriate.

g. Reassess and adjust. The tendering process may give rise to the need for further reassessment of the project's viability and may indicate where adjustments are necessary.

h. Complete final arrangements. Prior to entering contract negotiations, the final details of equity funding, mortgage arrangements and bridge financing must be worked out. In order to confirm the amount of the mortgage, the lender will confirm loan insurance with CMHC or MICC, if applicable.

i. Enter contract negotiations. *In the single-unit project, owners can protect themselves by using a standard contract form approved by the Canadian Construction Association. The obligations of both parties to the contract must be spelled out, and costs must be stated explicitly. Other provisions could include arrangements for choosing hardware and finishings. It is essential to have the contract reviewed by a lawyer. The contract must describe in detail the arrangement for withholding a percentage of the contract until satisfactory completion.

Multi-unit projects present more complex contract negotiations. Once a contractor is selected a draft contract is prepared, usually on a standard form approved by the Canadian Construction Association. It contains the usual caveats protecting both the contractor and the client from certain risks. The sum of the contract is included and provision is made for contingencies and extras.

Allowances are provided in the contract for items such as hardware, floor coverings and landscaping. This permits flexibility so that the project team can choose a higher standard at extra cost. The contractor may also suggest areas of savings which then become addenda to the contract. No changes should be made without a written cost estimate signed by both sides.

The contractor must provide a performance bond. This is an insurance policy to protect the project group in the event that the contractor does not perform as specified. The bond usually covers labour and materials and adds to the cost of construction. A builder's all-risk insurance covers the contractor's liabilities, but the project group should also have a liability policy for protection during the construction period, as well as the marketing period, when would-be residents are touring the building.

j. Reassess and adjust. In both the single unit and the multi-unit project, issues may have arisen in contract negotiations that require reassessing project viability and adjusting the plans. This final check should be made prior to signing the contract. Review the Design Workbook (Chapter 3) and date it so that there is a record of work to be completed.

k. Complete the signing. When lender, architect, and lawyer have reviewed and amended the contract, and when funding is secured, the contract is signed by the board of directors and the contractor. In some cases, the contract may be signed subject to financing being available. Once contract arrangements have been finalized and financial arrangements concluded, the project can move into the construction stage.

III. The Construction Stage

The construction stage provides visible evidence of activity on the site. This section outlines what individuals and groups need to know about the construction stage of their project, including project supervision, the construction schedule, monitoring progress, completion and marketing.

I CONCEPTUALIZATION	II PROJECT PLANNING	III CONSTRUCTION	IV OPERATION
1. User/User Group 2. Housing Requirements 3. Housing Options 4. Financial Feasibility 5. Project Financing	1. Organization 2. Promotion and Approval 3. Finalizing Arrangements	1. Project Supervision and Inspection 2. Construction Schedule 3. Progress Monitoring 4. Completion 5. Marketing	

Figure 4: *THE CONSTRUCTION STAGE*

1. Project Supervision and Inspection

In both single-unit and multi-unit projects, the architect inspects the contractor's work. Structural and electrical/mechanical consultants oversee work in their areas. The architect and other consultants must certify that the work has been done in accordance with the contract.

Progress certificates are issued by the architect and other consultants, and the contractor must supply these along with any claim for funds. The project is examined by a building inspector who determines whether the work was done according to the National Building Code. The building inspector, the builder, the architect, the owner's representative and the site superintendent document deficiencies, which must be corrected as noted.

2. Construction Schedule

In both kinds of projects, the architect monitors and the contractor maintains the construction schedule. In multi-unit projects, delays are costly in terms of rents forgone, and in both single- and multi-unit projects, delays mean extra financing costs.

The responsibility for timely delivery must be established in the contract. Penalty clauses for delays and bonus clauses for early completion can be included.

The construction schedule usually takes the form of a bar chart showing all activities on the site, their proper sequence and duration, and the rate of production for each activity.

Depending on the complexity of the project, a separate schedule may be drawn for the structural aspect alone, as well as for such activities as site servicing and landscaping.

3. Progress Monitoring

Depending on the contract arrangements, the architect and the owner's representative are responsible for monitoring conformity with plans. It is in the interests of the board to monitor progress through the project team and development consultant.

*In the single-unit project, regular meetings with the architect and the contractor will ensure that all parties are aware of progress and any changes that are requested or required.

In the multi-unit project, the progress of the project is normally discussed at site meetings. Progress review meetings are always held on site before claims for payment are submitted and are attended by a representative of the project team, the architect, the consultants, the contractor, engineers, subtrades suppliers and sometimes the inspector. Site meetings provide opportunities to discuss and resolve problems that may arise in any aspect of the project.

In both single-unit and multi-unit projects, unforeseen design and construction problems will occur during construction. These changes may cause amendments to the construction contract. The architect will discuss the changes with the project team to secure approval in principle and the contractor will provide an estimate of the cost of the proposed changes. If these are acceptable to the client, the architect then issues a change order.

The project team should avoid using this procedure to make changes because changes at this time add to the cost of the project.

The architect inspects the construction to ensure that the building is being constructed in accordance with the contract drawings and specifications. Municipal inspectors check that various aspects of the work have been carried out according to the appropriate building code. If the project loan is insured by CMHC, its inspectors will also be involved.

In any project, decisions about design and detail preferences should be documented, using the Workbook in Chapter 3, and the architect or development consultants must check to ensure that they are being incorporated into the project.

4. Completion

Decisions about finishes, equipment and furnishings should be made in advance so that orders can be placed to assure delivery at the appropriate time.

The cost of appliances, furnishings and carpets is usually set out in a separate section of the budget. It is often in this area that cuts are made if funds run short. A rule of thumb is that lower quality furnishings require more maintenance and earlier replacement and affect the marketability of the project. If inexpensive furnishings are chosen, an adequate replacement fund should be included in the budget.

Landscaping is important to enhance the visual character and marketability of both single- and multi- unit projects. Particularly in the multi-unit project, a landscape architect may be required to design the landscaping, grading and drainage plans. This is often required by lenders and municipalities.

*There are several important steps necessary to establish substantial completion. They apply equally to single-unit and multi-unit projects.

a. At the end of construction. Obtain the architect's and engineer's certificates of completion. These documents certify that work has been completed in accordance with the contract.

b. Before occupancy. (I) Obtain an occupancy certificate from the municipality. Some municipalities (not all) issue this document to certify that the building meets appropriate fire and safety standards.

(2) Perform a deficiency inspection using the Design Workbook in Chapter 3 and the contract to identify missing or inadequate items that are covered in the contract. In consultation with the architect, draw up a deficiency list and have it priced in order to hold back from the final payment an amount equal to the value of the deficiencies until they are adequately dealt with.

(3) Obtain all specified warranties, operating instructions, Workers' Compensation Board Release, etc.

c. One year after completion. (l) Together with the architect/development consultant, perform a warranty inspection to establish that all the work has been done as required under the contract.

(2) Check that deficiencies have been corrected as per the list.

(3) Initiate any action that may be required by the warranty inspection.

(4) When all deficiencies and warranty modifications have been dealt with in a satisfactory manner, approve payment of funds that might have been held back.

5. Marketing Plan

A marketing plan influences substantially the success of a multi-unit project. Depending on the size of the project and local market demand, the project team should consider advertising the project as early as possible during the construction phase.

An attractive rental or sales office, an effective brochure, media advertising and a furnished model suite are effective marketing tools. When marketing experience is not available among the project team members, hiring a professional marketing company can provide an alternative means of marketing the project.

Seniors are discerning consumers. For this reason, the image of the project is an important marketing consideration.

IV. The Operation Stage

In both single- and multi-unit projects, a management plan and a maintenance program help to ensure the success of the project during operation. The final section of this chapter looks at management plans and maintenance programs.

I CONCEPTUALIZATION	II PROJECT PLANNING	III CONSTRUCTION	IV OPERATION
1. User/User Group 2. Housing Requirements 3. Housing Options 4. Financial Feasibility 5. Project Financing	1. Organization 2. Promotion and Approval 3. Finalizing Arrangements	1. Project Supervision and Inspection 2. Construction Schedule 3. Progress Monitoring 4. Completion 5. Marketing	1. Management 2. Maintenance Programs

Figure 5: THE OPERATION STAGE

1. Management Plans

*In a single-unit project, household management is a straightforward responsibility. In a multi-unit project, however, there may be a need for assistance from a professional property management firm.

In the multi-unit project, it is necessary to articulate the management philosophy and determine the management style early in the process. Such matters as the involvement of residents in decision making, management's responsibilities and mechanisms for residents' feedback should be discussed.

The management philosophy and style will influence the operational costs of the project and resident satisfaction. For a small project, management may consist of a live-in superintendent who performs a variety of tasks, including tenant applications, rent collection, light maintenance and janitorial duties. A host couple is often employed to undertake the social and physical aspects of management. Financial management is usually assigned to a member of the sponsoring group who has financial training and/or experience.

In a larger project, consideration should be given to professional management and financial accounting. One alternative is to engage a management firm that hires the administrator/manager and the maintenance staff and assumes complete responsibility for the effective operation, including the renting, of the project. The contract for this service should not exceed three years, should specify a reporting arrangement, and should have a termination clause in the event of disagreement.

2. Maintenance Programs

Maintenance is becoming increasingly expensive and presents a significant problem for many seniors who wish to live independently in their own homes or apartments.

*In a single-unit dwelling, a preventive maintenance program should be developed to assure the upkeep of the house.

*In planning single-unit housing projects, seniors should gather information on maintenance assistance available in their community or province.

Contract services are becoming increasingly popular in larger centres and these are especially useful to seniors who wish to maintain a single-family dwelling or operate a rental property. Painting, window-washing, landscape maintenance, snow removal and household cleaning are some of the services that should be taken into account in assessing ongoing maintenance costs.

In larger communities, realty and property management firms offer contracting services. Seniors' groups in some communities provide cooperative services, and department stores in some cities offer maintenance services on a contract basis.

In multi-unit projects, maintenance services must be spelled out in the management plan. Options range from a superintendent/janitor arrangement to full-scale contract services for the maintenance of both the site and the building.

In determining the maintenance program that is suitable for the project, the following maintenance categories should be kept in mind. An effective and cost-efficient maintenance program will consist of an appropriate mix of all three categories:

a. Preventive maintenance. Consists of routine checks of all operating systems (e.g. heating/cooling, ventilation, light/electrical, humidification, elevators, security) to ensure that appropriate professional servicing and inspection is taking place, on schedule, and that malfunctions are dealt with before they become major problems.

b. Ongoing maintenance (can be viewed as preventive). Involves the day-to-day care and repair that is required to keep the building and grounds functional and attractive (washing/waxing floors, washing windows, replacing window panes, repairing/ replacing fixtures, painting, mowing lawns, planting and maintaining flower beds).

c. Crisis maintenance. Consists of advance contingency planning for possible emergency situations that could damage buildings or grounds (burst water pipes, storm damage, power failure, fire, sewer back-up).

It is important for the marketability of the project that all common facilities be maintained to high operational and visual standards. The cost of maintaining these standards must be included in the maintenance and operating budget.

Summary

This chapter has considered the Project Development Process in a sequential framework. For the purpose of a visual summary, the bar chart in Figure 6 presents this process and illustrates concurrent interaction among the various aspects involved.

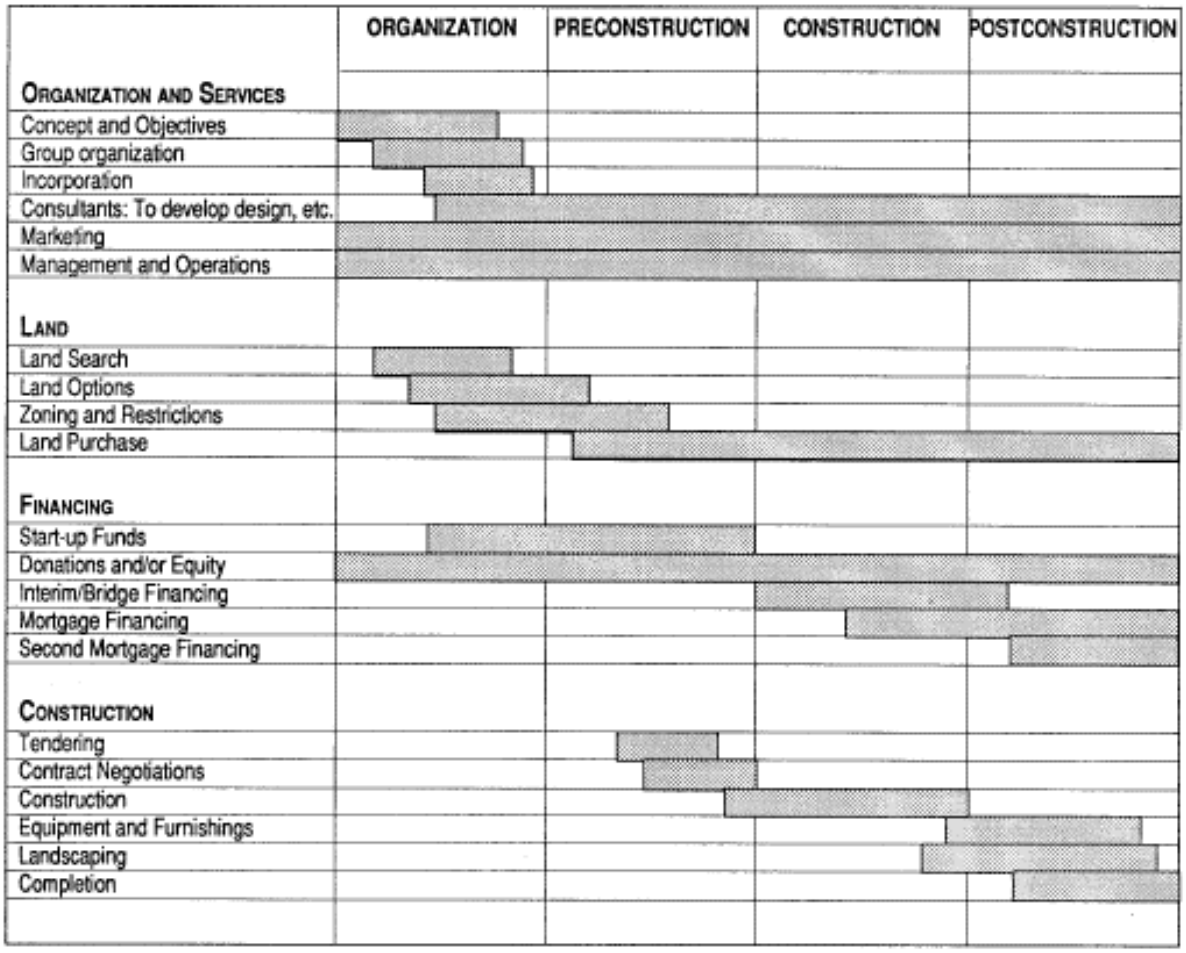


Figure 6: *THE PROJECT DEVELOPMENT PROCESS*

APPENDICES

1. Government Housing Offices: Federal, Provincial and Selected Municipal Offices
2. Consultants Involved in the Project Development Process
3. Checklist of Desirable Site Characteristics
4. Pro Forma Checklist for Preparing Estimates
5. References and Further Reading

Government Housing Offices

Federal

Canada Mortgage and Housing Corporation
Canadian Housing Information Centre
700 Montreal Road
Ottawa, Ontario
KIA OP7
Tel: (613) 748-2000
Fax: (613) 748-6192

Provincial

Alberta
Alberta Municipal Affairs
Housing Division North
9405 50 Street
Edmonton, Alberta
T6B 2T4
Tel: (403) 422-0880
Fax: (403) 427-2946

Alberta Municipal Affairs
Housing Division South
18th Fl., 10155 102 Street
Edmonton, Alberta
T5J 4L4
Tel: (403) 427-4828
Fax: (403) 422-9561

British Columbia
Ministry of Social Services and Housing
Housing Division
Parliament Buildings
Victoria, British Columbia
V8W 3EI
Tel: (604) 387-7088
Fax: (604) 387-6775

British Columbia Housing Management Commission
4330 Kingsway, Suite 1701
Bumaby, British Columbia
V51-1 4G7
Tel: (604) 433-1711
Fax: (604) 439-4722

Manitoba
Manitoba Housing
287 Broadway Avenue
Winnipeg, Manitoba
R3C OR9
Tel: (204) 945-4748
Fax: (204) 945-3830

New Brunswick
Department of Municipalities,
Culture and Housing
Box 611
Fredericton, New Brunswick
E313 5132
Tel: (506) 453-7755
Fax: (506) 452-2991

Newfoundland
Newfoundland and Labrador Housing Corporation
2 Canada Drive - Box 220
St. John's, Newfoundland AIC 5J2
Tel: (709) 745-0100
Toll free: 1-800-563-6542
Fax: (709) 745-2388

Northwest Territories
Northwest Territories Housing Corporation
Box 2100
Yellowknife, N.W.T.
XIA 2P8
Tel: (403) 873-7850
Fax: (403) 920-8024

Nova Scotia
Department of Housing
Box 815
Dartmouth, Nova Scotia
B2Y 3Z3
Tel: (902) 424-4483
Fax: (902) 424-5327

Ontario
Ministry of Housing
Communications Branch
777 Bay Street
Toronto, Ontario
M5G 2E5
Tel: (416) 585-7041
Fax: (416) 585-8227

Ontario Housing Corporation
777 Bay Street
Toronto, Ontario
M5G 2E5
Tel: (416) 585-6000
Fax: (416) 585-7610

Prince Edward Island
P.E.I. Housing Corporation
3 Queen Street,
Box 2000
Charlottetown, P.E.I.
CIA 7N8
Tel: (902) 388-5770
Fax: (902) 388-6471

Québec
Société d'habitation du Québec
(Québec Housing Corporation)
1054, rue Conroy
Édifice G, Aile St-Amable, 4e étage
Québec, Québec
GIR 5E7
Tel: (418) 643-3024
Fax: (418) 643-5580

Saskatchewan
Saskatchewan Community Services
Housing Division
#900 2500 Victoria Avenue
Regina, Saskatchewan
S4P 3V7
Tel: (306) 787-4177
Toll free: 1-800-667-7667
Fax: (306) 787-8571

Yukon
Yukon Housing Corporation
Box 2703
Whitehorse, Yukon
YIA 2C6
Tel: (403) 667-5754
Fax: (403) 667-3664

Selected Municipal Offices

Calgary
Housing Division -
Land and Housing Department
Box 2100, Station M
Calgary, Alberta
T2P 2M5
Tel: (403) 268-1455
Fax: (403) 268-1948

Edmonton
Land Management Branch
Planning and Development Department
#200,10015,103 Avenue
Edmonton, Alberta
T6J OH I
Tel: (403) 428-3735
Fax: (403) 428-8769

Guelph
Wellington and Guelph Housing Authority
292 Speedvale Avenue West, Unit 7
Guelph, Ontario
NIH IC4
Tel: (519) 824-7822
Fax: (519) 824-5169

LaSalle
City Engineer's Department
55 Dupras Avenue
LaSalle, Québec
H8R 4A8
Tel: (514) 367-1000
Fax: (514) 368-1434

London
Community Improvement Division
7th Floor, City Hall
300 Dufferin Avenue London, Ontario
N6A 4L9
Tel: (519) 661-5464
Fax: (519) 661-5184

Montréal
Habitation et développement urbain
276, St-Jacques
2e étage
Montréal, Québec
H2Y 1N3
Tel: (514) 872-3883
Fax: (514) 872-3883

Niagara Falls
East Niagara Housing Authority
4701 St. Clair Avenue
Box 656
Niagara Falls, Ontario
L2E 6V5
Tel: (416) 354-1678
Fax: (416) 354-4870

Oshawa
Durham Regional Housing Authority
50 Centre Street South, 4th Floor
Rundle Tower, City Hall
Oshawa, Ontario
LIH 3Z7
Tel: (416) 434-5011
Fax: (416) 434-7147

Oshawa Housing Company Limited
c/o City Clerk's Department
City Hall
50 Centre Street South Oshawa, Ontario
LIH 3Z7
Tel: (416) 725-7351
Fax: (416) 436-5697

Saint John
Department of Community
Planning and Development
Housing and Property Management Branch
City Hall
Box 1971
Saint John, New Brunswick
E2L 4LI
Tel: (506) 658-2866
Fax: (506) 658-2837

Saskatoon
Saskatoon Housing Authority
535, 24th Street East
Saskatoon, Saskatchewan
S7K 4K9
Tel: (306) 665-6330

Thunder Bay
Thunder Bay District Housing Authority
1111 East Victoria Avenue
Thunder Bay, Ontario
P7C IB7
Tel: (807) 623-4288

Toronto (City)
City of Toronto Housing Department
20 Adelaide Street East
Toronto, Ontario
M5C 2T6
Tel: (416) 392-7945
Fax: (416) 392-0580

Toronto (Metro)
Metropolitan Toronto Housing Company
Limited
20 York Mills Road
3rd Floor
Willowdale, Ontario
M2P2C2
Tel: (416) 392-6000
Fax: (416) 392-3974

Vancouver
Greater Vancouver Housing Corporation
4330 Kingsway
Burnaby, British Columbia
V5H 4G8
Tel: (604) 432-6300
Fax: (604) 432-6251

Victoria
Capital Region Housing Corporation
516 Yates Street
Victoria, British Columbia
V8W IK9
Tel: (604) 388-6422
Fax: (604) 361-4970

Windsor
Windsor Housing Authority
945 McDougall Street
Windsor, Ontario
N9A 6R3
Tel: (519) 254-1681

City of Windsor Housing Company Ltd.
(Winhome)
68 Chatham Street East
Windsor, Ontario
N9A 6S1
Tel: (519) 255-6405
Fax: (519) 255-7910

Winnipeg
Director of Planning
395 Main Street
Winnipeg, Manitoba
R3B 3EI
Tel: (204) 986-5155
Fax: (204) 942-2008

Consultants Involved in the Project Development Process

Depending on the type of project, a professional team, which could be headed by the architect and co-ordinated by the development consultant, may consist of:
• architect;
• concrete testing engineer;
• construction surveyor;
• cost consultant or estimator;
• development consultant;
• elevator consultant;
• hardware consultant;
• interior designer;
• landscape architect;
• legal surveyor;
• mechanical and electrical engineers;
• roofing consultant;
• site services engineer;
• soils engineer;
• sound attenuation engineer or acoustical consultant;
• structural engineer.

Additional consultants may be required to meet special requirements such as:

• health services consultant;
• management services consultant;
• marketing consultant;
• recreation consultant;
• social services consultant.

Typical Duties of Consultants:

Architect. The architect plays the leading role in planning, design and construction of a housing project for seniors, coordinating the work of other consultants, advising the project team, undertaking inspections and overseeing the development of the project. The architect can also perform the role of management consultant.

Concrete Testing Engineer. Usually retained on a large project to provide the structural engineer and the project team with laboratory or on-site testing of concrete.

Construction Surveyor. Prepares building layout plan and roadway layout plan. During construction, installs project benchmarks and key grid line for the subcontractors and other consulting team members. Locates building excavation, building foundation, and, where necessary, provides additional reference points as the construction proceeds. Provides key locations as required for purposes of proceeding with utilities, roadways and other construction elements.

Cost Consultant or Estimator. Depending on the complexity of the project, may be retained to prepare preliminary estimates, which then would progress to elemental cost analysis and eventually a trade-by-trade working budget. Provides input to the project and professional teams. Prepares the documentation in support of mortgage advance applications and performs monthly field inspections for same.

NOTE: This list is adapted from a document prepared by Thomas C. Assaly Corporation Ltd., Ottawa, Ontario. The order is alphabetical and does not reflect importance or timing.

Development Consultant. Provides coordination services for the project team; helps to expedite the

development process; represents the project team on a day-to-day basis; documents and reports periodically on the situation to the board; monitors the professional team and project timetable.

Elevator Consultant. Required during the early stages of design to confirm fundamental data to the consulting team regarding number of shafts, dimensions, and production timetable. Prepares a specification/functional expectation for the elevator and assists the project team with the tendering and award of a sub-contractor.

Hardware Consultant. Produces a schedule of finishing hardware for the project and a cost estimate.

Interior Designer. May work directly for the architect, depending on specific needs and complexity of project. Designs interior spaces.

Landscape Architect. Prepares design drawings and specifications for landscape work. Coordinates closely with the site services engineer. Performs field inspections as required.

Legal Surveyor. Carries out land surveys. Prepares Land Titles Reference Plans, confirms the architect's site plan. Prepares plans for condominium ownership, easements, etc. Also certifies work for the purposes of obtaining mortgage approval.

Mechanical/Electrical Engineers. Design the mechanical/electrical systems for the building. Often prepare cost studies on optional systems that may be available to the client.

Roofing Consultant. Provides input into the design of the roof. Also provides cost analysis, maintenance requirements, and field review during construction.

Site Services Engineer. Designs and specifies all sewer main, water main, roadways and walkways for the project, as well connection of the buildings and the internal systems to the existing municipal systems. Prepares the project grade control plan and, on larger tracts of land, a cut/fill calculation. Services include field inspection and full-time supervision.

Soils Engineer. Provides data to the architect and structural engineer early in the conceptualization stage indicating soil types, bearing capacity, major geodetic elements such as rock, water table, or unsatisfactory subsoils. May also contribute to the design of special foundations such as enlarged footings, special subsurface drainage, and piles.

Sound Attenuation Engineer or Acoustical Consultant. Performs studies and makes recommendations on acoustical matters arising from bordering noise sources such as arterial roadways, airports, and railways.

Structural Engineer. Provides the structural design and specifications for the building(s). During construction, performs field inspections and reviews structural shop drawings.

Checklist of Desirable Site Characteristics

The development consultant and/or the architect should coordinate or provide advice on the following areas during the land search:

1. Zoning. Determine the limitations and requirements of all existing zoning and bylaw requirements affecting the property. Obtain specific information on:

- zoning specifications;
- floor space index (FSI);
- permitted uses of the land;
- number of units permitted;
- number of people permitted;
- minimum lot dimensions;
- yard requirements;
- height restrictions;
- unit size requirements;
- open space requirements per unit;
- community amenity and open space requirements;
- traffic regulations;
- parking requirements; and
- survey availability of desired health and social services.

If the existing requirements are not acceptable, investigate the possibility of re-zoning.

2. Dimensions. Determine the exact area of the property in hectares or square metres. Obtain a property survey.

3. Existing Documents. Obtain any existing boundary, reference or topographical survey plans.

4. Sewers and Water Flow. Confirm the availability, adequacy and depth of collector, sanitary and storm sewers and water mains. Determine whether fill will be required to compensate for the elevations of the sanitary and storm sewer mains. The necessary information can be obtained from the municipality or from the Ministry of the Environment.

5. Installations. Check installation of electricity, telephone and cable TV infrastructure.

6. Encumbrances, Restrictions and Problems. Identify any other possible legal factors which may affect a development. These may include:

- air traffic lanes (Department of Transport);
- proximity of power lines;
- rights of way;
- easements on the property;
- reserves (Land Title Restrictions);
- ditches;
- proposed highways;
- proximity of railway lines or other noise sources;
- mortgages, liens or claims; covenants;
- neighbours' concerns.

NOTE: This list is adapted from a document prepared by Thomas C. Assaly Corporation Ltd., Ottawa.

7. Registration. Determine whether the property is listed under the old Registry System, or in the new

Land Titles. If it is not under Land Titles, it may have to be registered there prior to any other registrations.

8. Community Restrictions. Inquire about the use of the property with each of the following:
• Municipal government (including the Planning, Building, Works, and Fire departments);
• Regional government;
• Ministry of Environment;
• Canada Mortgage and Housing Corporation; Boards of Education; Ministry of Transportation and Communications.

During these inquiries, identify:
• any impediments to developing the property;
• any impediments to the type of development;
• any municipal, regional, provincial or federal plans for the area of the property;
• any major road patterns for the area of the property;
• number of accesses permitted to abutting roads;
• any setbacks required for abutting roads;
• all the approvals that will be required for the development;
• noise attenuation requirements;
• any dedications of land that are required for parklands;
• any dedications of land that are required for road widening;
• required school sites;
• all fees which are to be paid to local authorities and utilities;
• any permits that would be required if the property is close to a provincial highway.

9. Present Use. Determine the effect on the property of the present use of the surrounding land, i.e., industrial or commercial, residents' level of income, etc.

10. Services. Check the availability of:
• schools;
• churches;
• parks;
• shopping;
• bus services and other transportation services;
• health and other care services;
• recreational services;
• home support services.

11. Soil. Check soil conditions for:
• type of soil;
• bearing capacity;
• rock depth;
• top soil availability;
• water table;
• any resulting additional costs to services.

12. Topography. Examine the topography of the property to identify:
• possible site planning problems;
• the relationship to surrounding properties or roads;
• likely cut and fill relationships.

Pro Forma Checklist for Preparing Estimates

Shelter Capital Costs	**FIRST ESTIMATE**	**REVISED ESTIMATE**	**REVISED ESTIMATE**
Acquisition and Servicing Costs			
1. Purchase price (land if new construction)			
2. Off -site servicing			
3. Total serviced site costs (line 1 + 2)			
Miscellaneous Acquisition Costs			
4. Legal services fee (for land acquisition)			
5. Survey, title and recording fee			
6. Imposts and levies, connection charges			
7. Other (specify): soil tests, land transfer tax			
8. Subtotal			
Fees and Charges			
9. Interest: Mos. @ % on $			
10. Taxes during construction			
11. Insurance during construction			
12. Utilities during construction			
13. Architect and consultant fees (attach breakdown)			
14. Resource group fees (attach breakdown)			
15. Legal charges (other than for land acquisition)			
16. Organization expenses (attach breakdown)			
17. Mortgage application fees			
18. Lender's fees.- Mortgage Insurance fee			
19. Rent-up costs			
20. Audit charges			
21. Other (building permit. site development fees)			
22. Subtotal			
Building and Landscaping Costs			
23. Building construction costs (purchase price if existing)			
24. Rehabilitation/conversion costs			
25. Elevator			
26. Stoves, refrigerators, laundry equipment			
27. Other kitchen equipment			
28. Hard furnishings (attach details)			
29. Landscaping			
30. On-site servicing			
31. Other (including soft furnishings and supplies)			
32. Subtotal			
33. Total shelter capital costs (line 8 + 22 + 32)			
34. Plus contingency			
35. Subtotal			
36. Less: revenue prior to Interest Adjustment Date (attach details)			
37. Total shelter capital cost			

Operating and Other Expenses			FIRST ESTIMATE	REVISED ESTIMATE	REVISED ESTIMATE
38. Property taxes (excluding water and sewer)					
39. Insurance					
40. Maintenance: repairs					
41. Painting		Wages			
42. Landscaping		materials and			
43. Fumigation		contracts			
44. Elevator					
45. Other (specify)					
46. Replacement reserve					
47. Operating: janitor (payroll, including all benefits)					
48. Heating					
49. Light and power					
50. Water/sewer rate or tax					
51. Security					
52. Garbage removal					
53. Snow removal					
54. Administration: management (fees, wages, telephone)					
55. Supplies					
56. Audit					
57. Other expenses (specify)					
58. **Total operating expenses** (add lines 38 to 57)					
59. Annual ground rent					
60. Contingency for vacancies and bad debts					
61. Annual loan repayment					
62. **Total annual shelter revenue required** (add lines 58 to 61)					

References and Further Reading

Chapter 1

Canada Mortgage and Housing Corporation. *Conference Proceedings. Options: Housing for Older Canadians, Halifax,* October 17-20, 1988. Ottawa: 1989.

Canada Mortgage and Housing Corporation. *Housing Choices for Canadians over 75 Years Old.* By C.K. Davis of Social Data Research Ltd. Ottawa: CMHC, 1991.

Canada Mortgage and Housing Corporation. *Housing for Older Canadians: New Financial and Tenure Options.* Ottawa: 1988.

Canada Mortgage and Housing Corporation. *Innovations in Housing for Seniors.* Ottawa: 1988.

Canadian Aging and Rehabilitation Product Development Corporation (ARCOR). *Independent Living Environments for Seniors and Persons with Disabilities. Proceedings from Directions '91.* Winnipeg: 1991.

D.P.A. Group Inc. *Garden Suites: An Evaluation Report with Suggestions for Implementation. Final Report.* Ottawa: Canada Mortgage and Housing Corporation, 1989.

Goldblatt, S., Cates, F. and Phillips, J. *Housing Canada's Seniors.* Winnipeg: Institute of Urban Studies, University of Winnipeg, 1986.

Gutman, G. and Blackle, N. (eds.). *Aging in Place: Housing Adaptations and Options for Remaining in the Community.* Burnaby, B.C.: Gerontology Research Centre, Simon Fraser University, 1986.

Gutman, G. and Blackie, N. (eds.). *Innovations in Housing and Living Arrangements for Seniors,* Burnaby, B.C.: Gerontology Research Centre, Simon Fraser University, 1986.

Health and Welfare Canada. *Living Accommodations for Seniors: Facility Planning and Design Guidelines. Vol. 1. Accommodation and Independent Living. Vol. 2. Accommodation for Semi-Independent Living. Vol. 3. Accommodation for Continuing Care Living.* Ottawa: Minister of Supply and Services, 1989.

Hickey, G.F. and McKell, C.J. *Housing and the Elderly: Making the Technological Transition.* Ottawa: Canada Mortgage and Housing Corporation, 1990.

Hoglund, J.D. *Housing for the Elderly: Privacy and Independence in Environments for the Aging.* New York: Van Nostrand Reinhold, 1985.

Lawton, M.P. *Environment and Aging.* Belmont, CA: Wadsworth, 1980.

Murray, C. C. *Supportive Housing for Seniors: The Elements and Issues for a Canadian Model.* Canada Mortgage and Housing Corporation, 1989.

National Advisory Council on Aging. *Understanding Seniors' Independence: The Barriers and Suggestions for Action.* Ottawa: 1989.

N. Barry Lyon Consultants Ltd. *Resident Satisfaction with Retirement Community Living in Ontario.* Ottawa: Canada Mortgage and Housing Corporation, 1991.

Newcomer, R.J., Lawton, M.P. and Byerts, T.O. *Housing an Aging Society: Issues, Alternatives and Policy.* New York: Van Nostrand Reinhold, 1986.

Sanford, B. *Cooperative Housing as a New Lifestyle Option for Seniors.* Ottawa: Canada Mortgage and Housing Corporation, 1989.

Wilson, J. *Housing Options for Older Canadians.* Vancouver: Self-Counsel Press, 1991.

Chapter 3: Design Workbook

Barrier-free Design Centre. *Directory of Barrier-free Building Products.* 2nd Edition. Toronto, 1991.

Barrier-free Design Centre. *Source Book: Architectural Guidelines for Barrier-free Design.* Toronto: 1987.

Canada Mortgage and Housing Corporation. *Housing Choices for Canadians with Disabilities.* Ottawa: 1992.

Canada Mortgage and Housing Corporation. *Housing for Elderly People: Design Guidelines.* Ottawa: 1987.

Canada Mortgage and Housing Corporation. *New Made-to-Convert Housing.* Ottawa: 1988.

Canadian Standards Association. *Barrier-free Design.* CAN/CSA-B65I -M90. Toronto: 1990.

Canadian Standards Association. *Elevating Devices for the Handicapped.* CAN/CSA-B355-M86. Toronto: 1992.

Canadian Standards Association. *Elevating Devices for the Handicapped in Private Residences.* CAN/CSA-B613- M87. Toronto: 1987.

Canadian Standards Association. *Safety Code for Elevators.* CAN/CSA-B44-M90. Toronto: 1990.

Carstens, D. *Site Planning and Design for the Elderly*. New York: Van Nostrand Reinhold, 1985.

Grant, M.C. *A Survey of Colour Preferences of People Over 65.* Winnipeg: Manitoba Association on Gerontology, 1980.

Kushner, C., Falta, L.P. and Aitkens, A. *Making your Home Accessible: A Disabled Consumer's Guide.* Ottawa: Consumer and Corporate Affairs Canada, 1983.

National Research Council of Canada. *National Building Code of Canada* (section 3.7 Barrier-free design). Ottawa: 1990.

National Research Council of Canada. *National Fire Code of Canada.* Ottawa: 1990.

Newman, 0. *Defensible Space: Crime Prevention through Urban Design.* New York: MacMillan, 1972.

Newman, 0. *Design Guidelines for Creating Defensible Space.* Washington, D.C.: Law Enforcement Assistance Administration, 1976.

Public Works Canada. *Barrier-free Design.* Ottawa: 1985.

Pynoos, J. and Cohen, E. *Home Safety Guide for Older People: Check it Out, Fix it Up.* Washington, D.C.: Seris Press, 1990.

Zeisel, J., Epp, G. and Demos, S. *Low Rise Housing for Older People: Behavioural Criteria for Design.* Washington, D.C.: U.S. Department of Housing and Urban Development, 1977.

Zeisel, J., Welch, P., Epp, G. and Demos, S. *Midrise Elevator Housing for Older People.* Washington, D.C.: U.S. Department of Housing and Urban Development, 1983.

Database Search

Ageline. Keywords: hous*; design*; architectur*; guideline*; standard*; quality-of-life.

Suggested Periodicals

Adult Residential Care Journal
Publisher: Human Sciences Press (New York, New York)

Housing the Elderly Report
Publisher: Community Development Services, Inc. (Silver Spring, Maryland)

Housing and Society
Publisher: American Association of Housing Educators (College Station, Texas)

Journal of Architectural and Planning Research
Publisher: Locke Science Publishing Co. (Chicago, Illinois)

Journal of Housing
Publisher: National Association of Housing and Redevelopment Officials (Washington, D.C.)

Journal of Housing for the Elderly
Publisher: Haworth Press (New York, New York)

Journal of Independent Living
Publisher: National Centre for Housing Management Institute (Washington, D.C.)

Research and Development Highlights
Publisher: Canada Mortgage and Housing Corporation (Ottawa, Ontario)

Seniors Housing Update
Publisher: Gerontology Research Centre, Simon Fraser University (Bumaby, B.C.)

Suggested Reports

Canada Mortgage and Housing Corporation. *At Home with Alzheimer's Disease: Useful Adaptations to the Housing Environment. Ottawa: 1990.*

Canada Mortgage and Housing Corporation. *Bibliography on Congregate Housing.* Ottawa: 1988.

Canada Mortgage and Housing Corporation. *Development of Innovative, Financial and Tenure Approaches for Seniors' Retirement Housing Projects.* Ottawa: 199 1.

Canada Mortgage and Housing Corporation. *Home Adaptations for Seniors' Independence.* Ottawa: 1991.

Canada Mortgage and Housing Corporation. *Home Adaptations for Seniors' Independence: Guide.* Ottawa: 1992.

Canada Mortgage and Housing Corporation. *Home Equity Conversion Mortgages: New Financial Options for Senior Homeowners.* Ottawa: 1991.

Canada Mortgage and Housing Corporation. *Housing Choices for Older Canadians.* Ottawa: 1987.

Canada Mortgage and Housing Corporation. *Housing and the Elderly: A Bibliography.* Ottawa: 1988.

Canada Mortgage and Housing Corporation. *Garden Suites: A New Housing Option for Elderly Canadians?* Ottawa: 1987.

Canada Mortgage and Housing Corporation. *Maintaining Seniors Independence in Rural Areas: A Guide to Planning for Housing and Support Services.* Ottawa: 1991.

Canada Mortgage and Housing Corporation. *Maintaining Seniors' Independence - A Guide to Home Adaptations.* Ottawa: 1989.

Canada Mortgage and Housing Corporation. *The Senior Citizens Department of the Regional Municipality of Niagara, Ontario, and its Continuum of Care Model: A Case Study.* Ottawa: 1990.

HOUSING AN AGING POPULATION
CHAPTER 3

The Design Workbook

Worksheet Reference table

Dwelling Unit

Common Features

List of Illustrations

Introduction

This section of *Housing an Aging Population is* a Workbook. It is meant to be used as a tool for planning, decision-making and checking during the design and construction of a multi-unit housing project for seniors or renovations or conversion of a single-family house. The instructions below explain the structure and organization of the Workbook, how to create a customized workbook, and how to use it.

Any person or group buying, renting, building or renovating accommodation should be able to use this Workbook independently and/or in working with the consultants or agencies responsible for the planning and execution of the project. Some Worksheets - those on parking lots, signage, elevators, for example - may not apply to the single unit dwelling but they will to multi-unit projects.

Barrier-free Design

The information in this chapter has been based on accepted design standards. Because elderly people may experience sensory losses (vision, hearing, touch, etc.) and mobility problems (walking, reaching and so on), as well as the psychosocial changes that can accompany the aging process, it is essential that housing environments accommodate their needs. Accordingly, the framework described in Chapter 1 has been used to determine features where the special characteristics of seniors require more, better or different treatment. In addition, the guidelines reflect the underlying principle of barrier-free design, also discussed in Chapter 1.

Design is said to be barrier-free when an environment contains no architectural, design or psychological features that might prevent anyone, able-bodied or impaired, from using the environment to the full extent of his or her capabilities.

Barrier-free design features are not a major cost issue if they are implemented when a project is in the design stage (usually less than 0.5%). In fact, barrier-free design avoids problems before they occur. It is attractive, functional and spacious, and very marketable. It ensures that an environment is accessible to all people, regardless of their functional capacity or use of aids. Such an environment typically has wider passageways, fewer changes of level, good lighting, low ambient noise levels, and everything within easy reach - about the middle of the body. Given this basic accessibility, special adaptations can then be made to a unit to suit the special needs of the resident.

If the design guidelines in this workbook are followed, the project will provide a quality living environment: safe, comfortable and accessible to residents and their visitors.

The impairments referred to in this Workbook are defined as follows:

1. **No disabilities**. People with no functional impairments.

2. **Blind**. People with severe visual impairment, up to and including total blindness.

3. **Visually impaired**. People who are near-sighted, far-sighted, those with tunnel vision, depth perception problems, cataracts and other light-reducing problems, and colour blindness.

4. **Deaf.** People with no hearing.

5. **Hearing impaired**. People with partial hearing and users of hearing aids.

6. **Mobility impaired - wheelchair**. People who use wheelchairs.

7. **Mobility impaired - walking aids**. People who use walkers, canes, crutches or other aids.

8. **Mobility impaired - Other**. People with reduced strength, endurance, coordination, equilibrium, dexterity, etc.

9. **Mentally impaired**. People with learning disabilities or other mental impairments.

10. **Situation impaired**. People who may experience a conflict with the environment because of a particular circumstance; e.g., carrying parcels, pushing a stroller or shopping can, pacemaker, pregnancy, obesity, height.

11. **Allergy-prone**. People with allergic reactions to substances, humidity levels, etc.

The Design Worksheets

The right-hand pages, called the Design Worksheets, are the heart of the Workbook. A sample is shown on the opposite page. These pages cover all parts of any seniors' housing project in a checklist format and contain the factual detail necessary for making design decisions, such as the recommended height of a handrail and where lighting is required. For reference purposes, each entry is keyed by number(s) in the lefthand column to one or more of the impairments or conditions described above to explain why the feature is necessary.

Note that the references to 10 (Situation impaired) and 11 (Allergy-prone) are shown as "0" and "1" in the appropriate columns of the worksheets.

Legend (see Introduction)	Specifications	Date
6780367890	ramps or lifts/elevators at all changes in level lighting level at least 300 lux at top and bottom of stairs, ramps and changes in elevation	

This entry shows that ramps are required at changes of level for people using wheelchairs (6) or walkers or other mobility aids (7,8), as well as for those who are hampered by a situation (0), such as pushing a stroller. The example also shows that all changes of elevation require good lighting at the top and bottom, particularly for those with low vision (3).

These design features improve environments for everyone, not just the groups specified.

Space has been left at the bottom of each Design Worksheet to insert design features for the project desired by the planners that are not already listed.

At the right-hand side of the Design Worksheet is a set of date columns. Each time the Workbook is used, the date should be written in at the top of a column, and a check mark entered beside each feature that is to be included in the design. (See Using the Workbook below.) This makes the Workbook into a design checklist for the project.

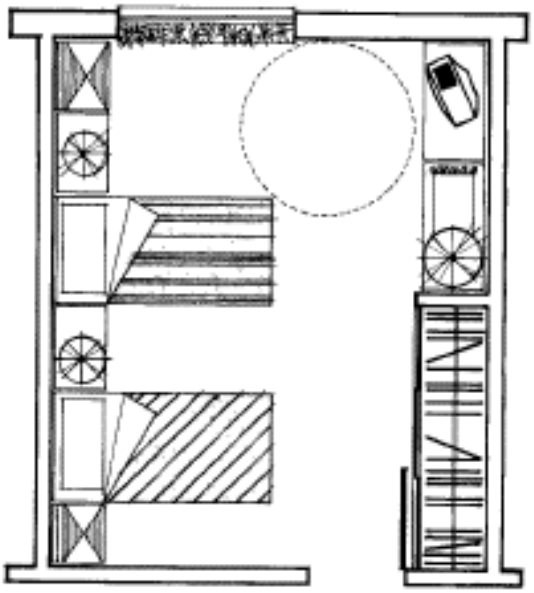
The Design Notes

Facing each Worksheet is a page of notes and illustrations expanding on the ideas in the guidelines.

In this example, a drawing shows a good bedroom size and layout. The dotted turning circle shows that a wheelchair user can enter and use the room.

Ideas from the Design Notes, or those that develop through group discussion or further reading, can be entered on the Design Worksheets, thus becoming part of the checklist.

The Notes also contain definitions of terms that may be unfamiliar to some readers and suggest further reading by listing publications which deal with topics in greater detail.



Structure of the Workbook

The Workbook describes the parts of a house or housing project, starting at the edge of the site, proceeding through the entrance, carrying on through public areas, then entering the dwelling unit itself.

Although the emphasis is on multi-unit projects, those planning to build or modify a single-unit house can follow the titles identified with an asterisk (*) on the Worksheets and in the Worksheet Reference Table. Much of the information in the Workbook will be helpful in home renovation projects.

Components such as walls, floors and windows are common to most interior spaces. To avoid repetition, these are presented in a Common Features section at the end of the Workbook. Reference is made to them when necessary throughout the Design Worksheets. The project group will want to examine these features for each part of the project. This will require making up a customized workbook as described below.

Using the Workbook

It is likely that a group (or individual) will go through the Workbook several times. The following would be a typical sequence:

1. Design Decisions. In the conceptual stage of the project, the Workbook is used to make decisions about which of the features on the Design Worksheets will be included in the design. Date the first column on the Worksheets and mark each feature to be included. Note any changes or additions directly on the Worksheet. The group may decide that some features are essential, some desirable if affordable, others unnecessary, etc. Symbols or a code can be devised to indicate such priorities.

The Design Notes on the pages facing the Worksheets will be helpful as the group discusses and decides on options or features. A useful strategy at the conceptual stage is to hold a round-table discussion with each user group represented (i.e., blind, visually impaired, hearing impaired, mobility impaired and so on). Keeping in mind the changes that can occur as residents age in place, the user group representatives can react to each entry as it is presented. The guidelines in this Workbook were developed with this kind of input.

2. Cost Decisions. A second run-through of the Worksheets will be necessary when the architect/development consultant presents a firm proposal with cost estimates. Some design elements may have to be reconsidered and trade-offs agreed to. Bear in mind that the extra benefits in one area may make other deficiencies tolerable. Date the second column and note changes for future reference.

3. Construction Check. During construction, one or two checks can be made on various parts of the project. Use the third column and note any changes on the Worksheets. These are informal checks; contractors and architects have the legal responsibility to ensure that specifications in the contract documents are adhered to.

4. Occupancy Check. Prior to the warranty inspection, when the project has been completed, a final check should be made to ensure that all details are as planned. Compare the features that were checked off in the earlier columns.

Making a Custom Workbook

Following the first round of discussions, the function of the Workbook changes from a decision-making aid to a checklist and record of the project. This requires that it be tailored to the needs of the individual project. Here's how to do it:

1. The Design Worksheets can be separated from the rest of the book or copied. Decide which pages will be necessary for your project, remove them and place them in a binder.

2. Determine how many times it will be necessary to refer to the Common Features section, and make copies of it. Insert each copy into the binder immediately following the Design Worksheet referring to the relevant feature. Enter both the Worksheet number and the section heading in the space provided. For example, the Design Worksheet 15 would be followed by Common Features Pages 15A, B, C and D, with the appropriate heading.

The group may want to customize the Workbook right at the start of the project development process to assist in all decision making. Each team member's copy makes a unique reference tool and record of the project.

Measurements

The Workbook gives all measurements in metric terms and provides a rough equivalent in imperial terms in brackets, as in this example:

2670	space to manoeuvre on approaching entrance doors is at least 1500 x 1500 mm (5 ft x 5 ft)	

The metric figures are given in millimetres and are accurate specifications; the imperial equivalent is merely for reference purposes.

Anthropometrics

This term means “people measurements”, which are essential in designing space and facilities for a specific population.

Like everyone else, elderly people come in all shapes and sizes; however, some are able to adapt less easily than others to facilities that are built for the elusive 'average' person.

Barrier-free design takes the wheelchair as a starting point, because an environment accessible to wheelchair users enhances accessibility for all. The following illustrations show some important clearances and space requirements of people who use wheelchairs. These measurements form the basis of many of the guidelines in the Design Worksheets.

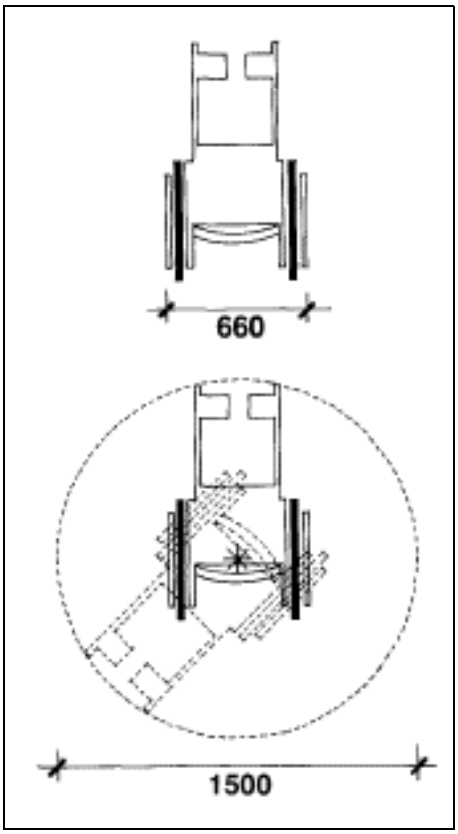


Figure 1: *The turning circle, right, is the amount of space required by a wheelchair user to turn 360 degrees, and is used throughout the Design Workbook to indicate where this space is required.*

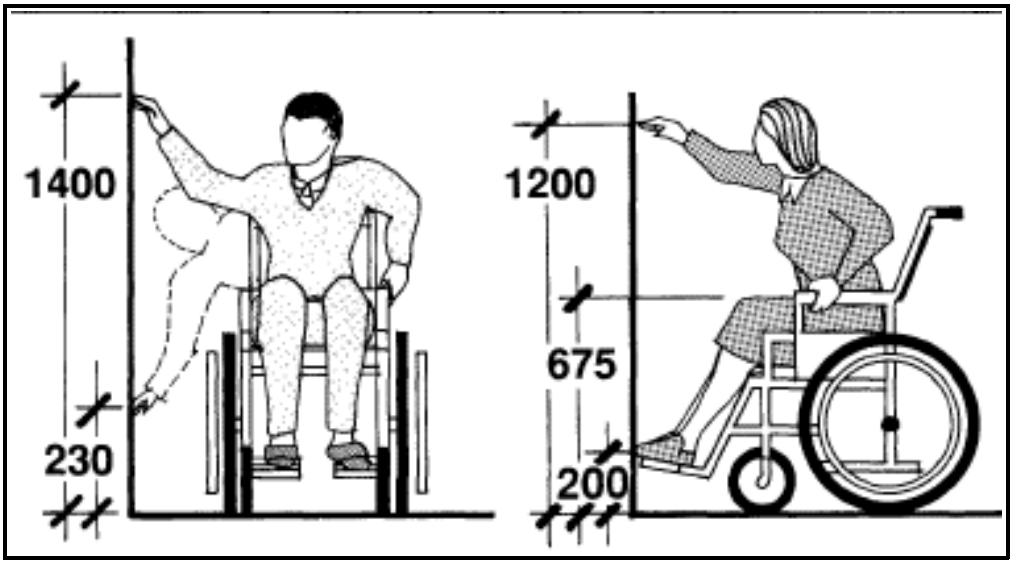


Figure 2: *Reaching from a wheelchair. These dimensions correspond to the average non-electrical wheelchair and a user with good upper-body mobility. Individuals vary greatly in strength, flexibility and size.*

Quality and Affordability

The need/demand study described in Chapter 2 will determine some of the living patterns of residents and help in forecasting frequency of use and stress factors that may affect the choice of equipment and materials. The decisions made by the project group and the architect or development consultant will have significant effects long after the project is completed.

The cost (and trouble) of maintaining or replacing an inadequate elevator, for example, may be greater than the initial cost of installing a unit of better quality designed for heavy-duty use.

Cost and design often seem at odds during the decision-making involved in a housing project. Keep in mind, however, that you usually get what you pay for, and that money invested in good quality building materials, hardware, machinery and so on is almost invariably money well spent.

Affordability, of course, is always a factor to be addressed during the design process. The income group(s) who will occupy the residence will be a factor in some of the cost decisions. However, it is useful to keep in mind the financial burden of high maintenance costs when making such trade-offs.

Further reading:

Barrier Free Design: Access to and use of buildings by physically disabled people. Public Works Canada, 1985.

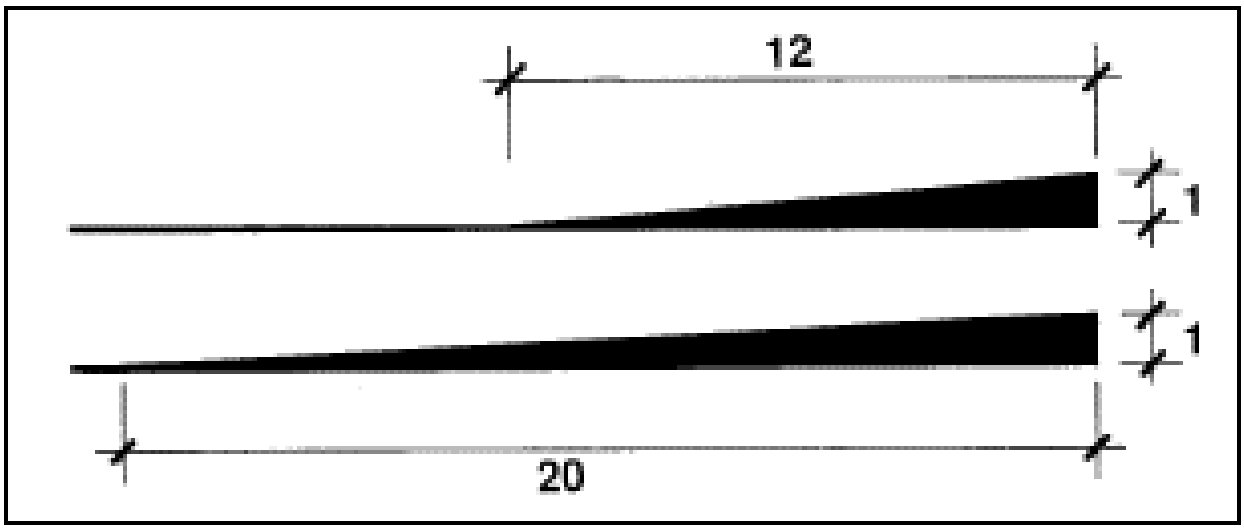
Barrier-Free Design: Canadian Standards Association. CAN/CSA-1365 I -M90. Toronto, 1990.

WALKWAYS

-Recommended surfaces for walkways include asphalt, concrete, patio stones, interlocking bricks (evenly laid and checked regularly), wood decking (avoid spaces between slats). Plantings should be chosen and maintained to keep walkways free of leaves, needles, berries, etc.

-Walkways can lead to nearby shopping areas, bus stops, parks and outdoor activity areas. Connect sidewalks and walkways with minimum changes of level and avoid steep slopes. Curbcuts (see Figure 13) will permit users of wheelchairs or walking aids to cross intersections, driveways and the like. Public transit should be within 2 blocks or 240 m (800 ft).

-Create paths through park-like areas with sitting places, lighting and litter containers. Use gates, plantings, changes in walkway textures, etc. to identify boundaries between public areas and residents' private grounds. If units have their own yards, fencing, hedges or grading can mark property borders or separate visually and aurally the outdoor spaces attached to dwelling units.
Figure 3: *A slope of 1:12 takes more energy and control to negotiate than the gentler 120.*



DEFINITIONS:

lux: a measure of light intensity at a given point; for example, the top step of a stairway. An accurate reading can be taken with a light meter.

gradient (or slope): a ratio used in measuring ramps, walkways. stairs and land contours. The unit of rise (height) is compared to the unit of length. A 1:20 gradient means that for every one unit of height, there is a length of 20 units. If the length is reduced to 12 units (1: 12) then the ramp will be steeper.

Legend (see Introduction)	Specifications	Date
	THE SITE ***WALKWAYS**	
2.31234568e+59	safe pedestrian routes are identified by a standard colour and texture	
	surfaces are firm, even and slip-resistant	
	edges of pathways are marked by curbs, textured borders or contrasting colours	
	pathways are at least 1500 mm (5 ft) wide so a wheel chair can tum around	
	snow clearance is assured and facilitated by design	
	site grades used by pedestrians are not greater than 1:20	
	grades in pedestrian routes (walkways, garden paths) are not more than 1: 12	
	1: 16 to 1: 12 grades are treated as ramps (see RAMPS below)	
	level landing 1500 mm (5 ft) long at top and bottom of each ramp	
	stairs conform to National Building Code (NBC) section 3.4	
	minimum 50 lux lighting on all pathways, ramps and stairs	
	300 lux at top and bottom of ramps and stairs and at all changes in level	
	exterior lighting is adequate for security (not too harsh, not too low, not too spotty, does not create glare)	

OUTDOOR AREAS

-Outdoor socializing areas connected visually with indoor spaces by windows or patio doors will let residents enjoy these spaces from both sides, as well as offer a measure of security.

-Present several interesting options for walks: long and short, public and private, attractive stops with seating (sheltered from wind and sun) and a good view. A jogging track... exercise stations... a skating rink... a cross-country ski trail....

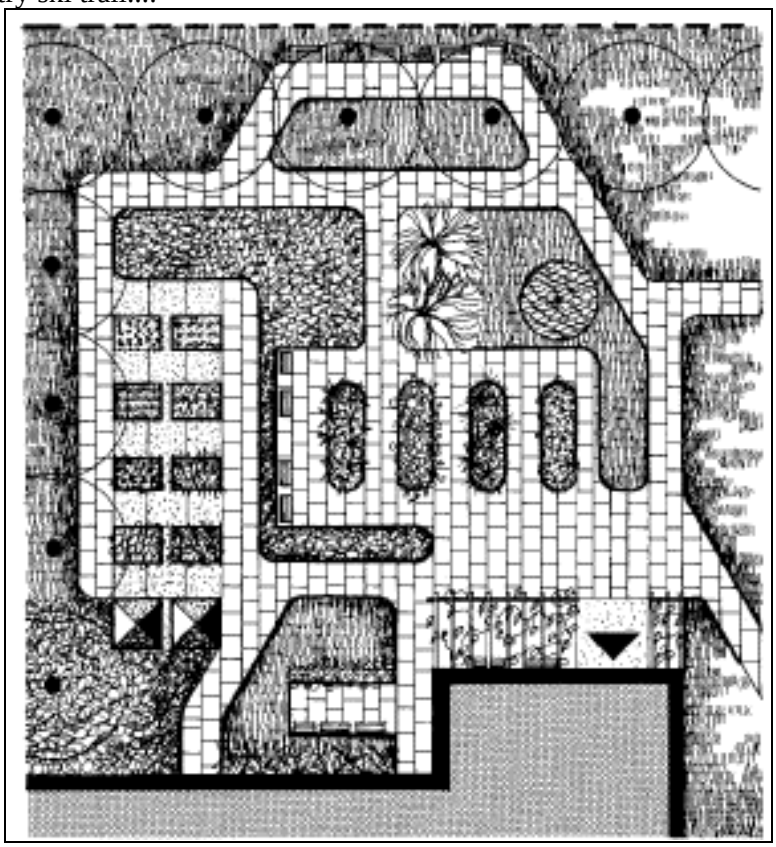


Figure 4: *A person setting out for a walk could choose between a long or short route to the vegetable gardens, or take a short turn around the patio with a stop at the fountain.*

-Gardens can be used to brighten up the grounds or for recreational purposes. Try individual garden plots, and provide storage, water supply and a toolshed nearby. Trees and shrubs, pools and fountains offer visual interest.

-Recreation areas and equipment: a putting green, a Tai Chi lawn, horseshoe pitch, shuffleboard, croquet, tables for board games, etc.

Legend (see Introduction)	Specifications	Date
6.66236789e+50	***OUTDOOR AREAS** Common use patio or balcony is accessible to wheel chair. Private rear garden is accessible by wheelchair from street as well as from dwelling unit. Private balcony is accessible to wheelchair user from dwelling unit (no high threshold). Trees, planters and outdoor equipment do not cause an obstruction for a blind person or one using wheelchair, walker, crutches, braces, cane, stroller, etc. Some planters are 600-900 mm (2-3 ft) high so as to be accessible from a seated position or standing without bending. Exterior hose connections 600-1200 mm (2-4 ft) above ground accessible from a paved area. Exterior electrical outlets accessible from wheelchair: 400-530 mm (16-21 in) from ground. Adequate wind protection is provided (hedges, fences, walls, etc.). Exterior lighting is adequate for security (as in WALK WAYS above). Area with visual privacy provided (hedges, walls, fences, trees, etc.).	

FURTHER READING:

Site planning and design for the elderly. Diane Y. Carstens. New York: Van Nostrand Reinhold, 1985.

National Building Code. National Research Council of Canada. 1990. Available from regional offices of NRC.

RAMPS

Ramps are preferred by many people and are essential for wheelchair users. They are not a replacement for stairs. A gentle slope, slip-resistant surface, safety rails and good lighting are essential elements of a ramp.

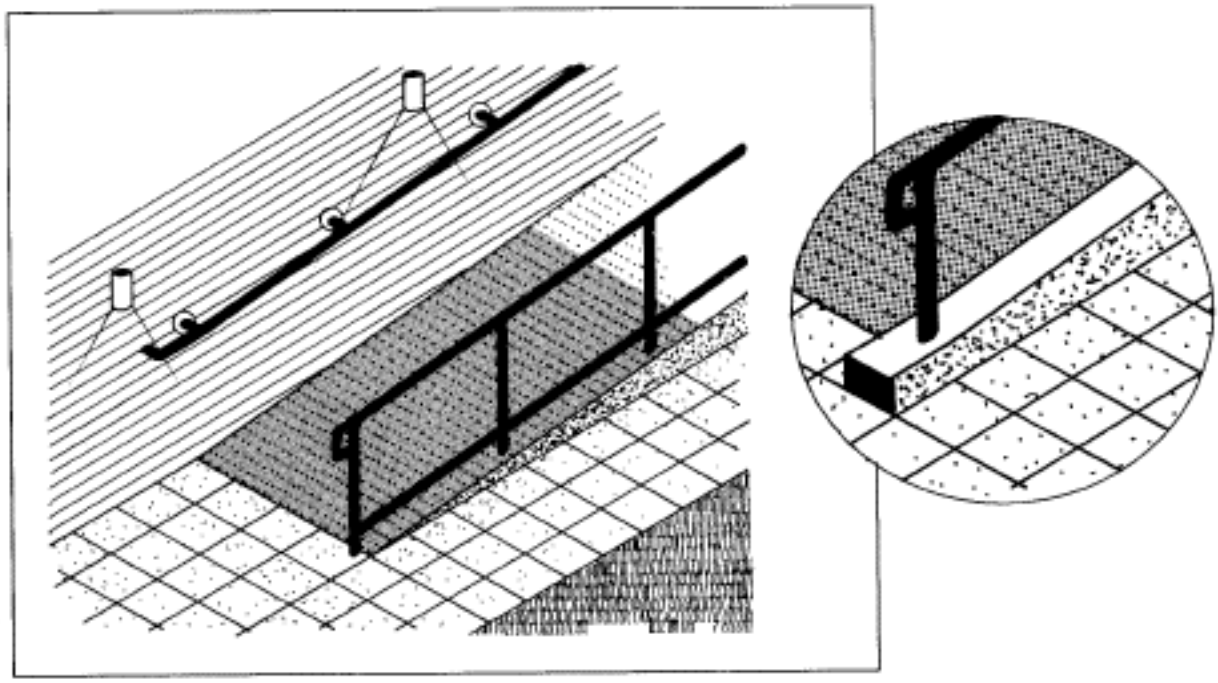


Figure 5. *This 1: 12 ramp is well lit throughout its length and features a slip-resistant surface which differs in texture from the connecting walkway. Handrails are installed on both sides and a safety rail runs along the outer edge at a height of 200 mm (8 in). The inset shows a concrete curb as a substitute for this feature. Note that the handrails extend beyond the end of the ramp and are curved to avoid hazardous protrusion into the path of users.*

FURTHER READING:

Low rise housing for older people. John Zeisel et al. Washington, DC: U.S. Department of Housing and Urban Development, 1977.

Midrise elevator housing for older people. John Zeisel et al. Washington, DC: U.S. Department of Housing and Urban Development, 1983.

Design guidelines for creating defensible space. Oscar Newman. Washington, DC: Law Enforcement Assistance Administration, 1976.

Legend (see Introduction)	**Specifications**	**Date**
6.78030230e+87	***RAMPS** ramp is indicated by international symbol of access colour contrast at changes in level tactile cueing in floor at top and bottom of stairs/ramps at least 50 lux lighting at floor level and 200 lux at top and bottom of ramp ramp slope is not more than 1:20 unless impractical, but never more than 1: 12 slip-resistant ramp surface maximum rise 750 mm (30 in) if ramp is 1: 12 maximum length 9000 mm (30 ft) if ramp exceeds 1:20 minimum ramp width 920 mm (3 ft) for 1 wheelchair minimum ramp width 1600 mm (5 ft 4 in) for 2 wheel chairs cross slope not more than 1:50 two wheels hit slope or landing at same time edges of free-standing ramps are curbed along outer edges or have a safety bar not more than 200 mm (8 in) above ramp surface handrails are provided where ramp exceeds 1: 16 and conform to NBC 3.7.3.4 and 9.8.7 wall behind handrail is smooth textured or shielded to prevent scraped knuckles handrails extend 300 mm (1 ft) beyond top and bottom of stairs/ramps and recurve down to 680 mm (27 in) so they can be detected by blind persons using the long-cane technique tactile cueing on handrail warns of end of handrail and ramp	

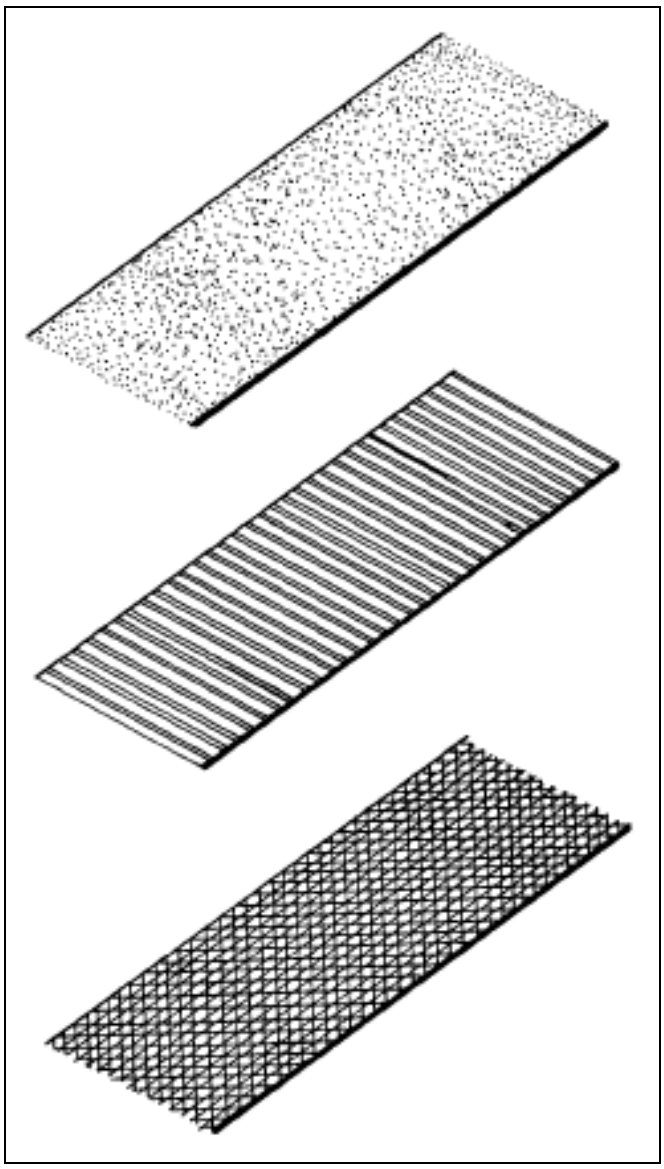


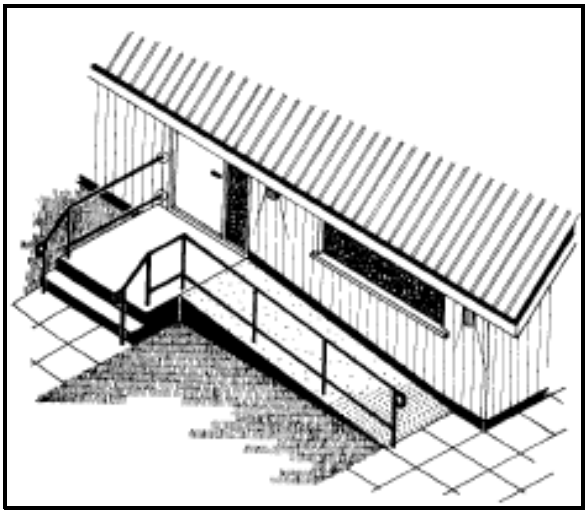
Figure 6: Ramps can be constructed of poured concrete, wood, or metal. In the snowy parts of Canada, winter maintenance means shovelling off the snow or using wood slats or metal mesh so the snow falls through.

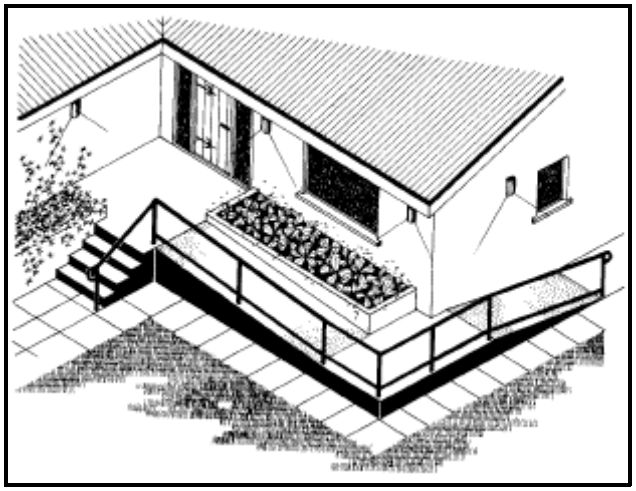
FOR THE SINGLE-FAMILY HOUSE:

-Locate a ramp where you can achieve the gentlest gradient for the amount of height and still integrate it into the design of the house. You might want to change the grading contour of your lot.

-Portable ramps are available from medical/ surgical supply shops.

A

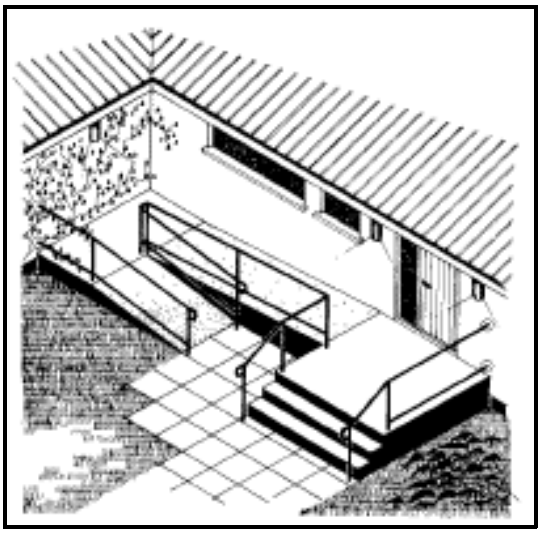




B

Figure 7. A. Straight ramp. The large landing is necessary for the wheelchair user to open the door. B. Switchback ramp with level landings at the tum and door level C. Ramp following house angles. Proper lighting, slip resistant surfaces and handrails are essential parts of these ramps.

C



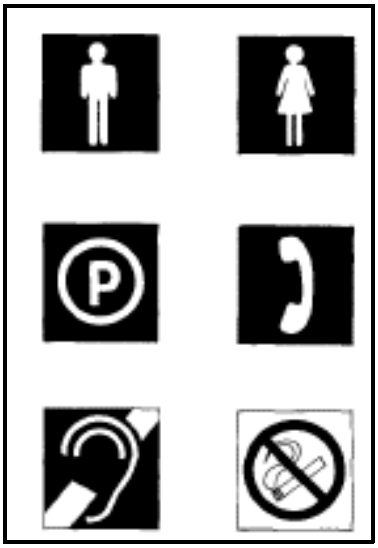
SIGNAGE

-For residents and visitors, supplementary information in signs - large print, tactile cues or audio information - is important.

DEFINITION

Tactile cue: information that is communicated through the sense of touch, such as raised lettering or a rough surface.

Figure 8: *These typefaces, below, are simple, clear and easier to read than fancy lettering, especially from a distance.*



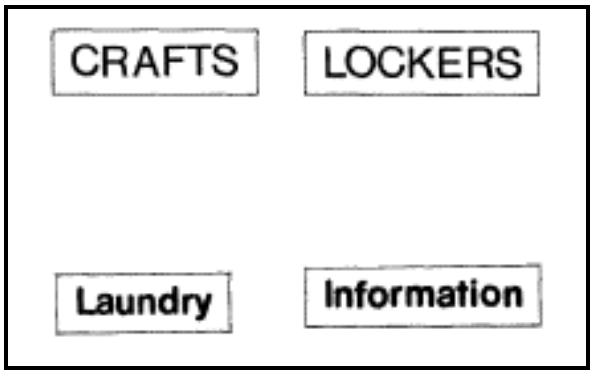


Figure 9: *Graphics, above, can communicate information simply and quickly.*

Figure 10: *Letters that are 100mm(4 in) high, such as this "L",: can be read from a distance of 10 m (33ft).1 ratio of 1: 100*

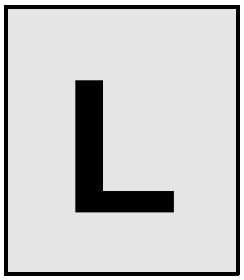


Figure 11: *The International Symbol of Access, left, is the official design recognized the world over to indicate facilities for disabled persons.*

Legend (see Introduction)	**Specifications**	**Date**
	SIGNAGE	
23 6 0	height of sign 1300-1600 mm (52-64 in) above the floor or ground	
3 9	letters and symbols on exterior signs are properly contrasted, preferably light on dark, low reflecting background, e.g., black, blue, red, brown (avoid yellow on black, yellow on green, green on blue, red on green)	
1 345678901	ratio of letter height to reading distance 1: 100 or greater with minimum letter height of 16 mm (5/8 in)	
1 345678901	average illumination is 500 lux or better on signs to be read at average distance of 4000 mm (13 ft)	
3 9	back lighting acceptable only when field is non-reflective, matte finish and characters are bold gothic or similar (in thickness) and greater than 10 mm per metre (½ in per 4 ft) of reading distance	
2	characters in sign are legible by touch, i.e. raised 1 mm (1/20 in) and height at least 16 mm (5/8 in)	
9	visual information is structured and incremental to avoid overload	
234567890	international symbol of access is used to indicate accessible facilities (not required if all facilities are accessible)	

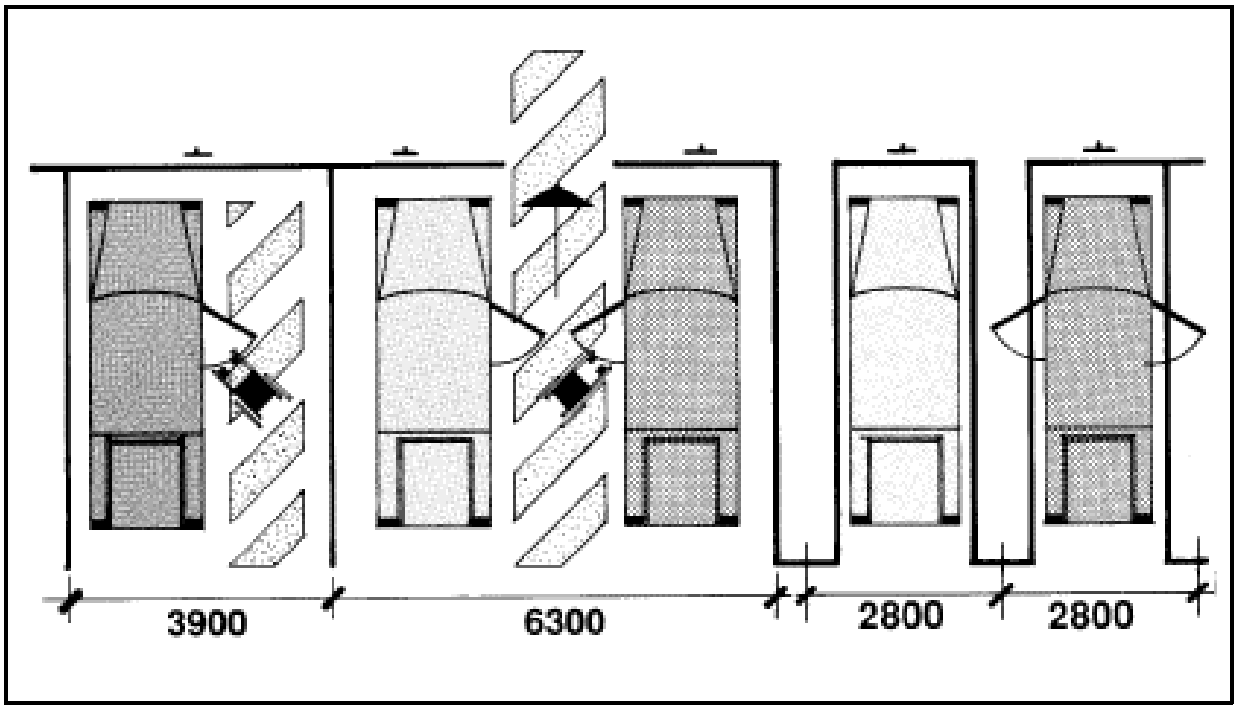
PARKING

Parking for residents, visitors and staff should be clearly marked. Assign numbered spaces. The number of parking spaces will be determined by the need/demand study and the lifestyles of residents.

-The route from parking areas to the main entrance should be as short as possible, with changes of level kept to a minimum.

-Parking which is visible from some units or public areas will help residents to feel secure about leaving their cars unattended. Good lighting and other security measures are essential.

-Provide an area for temporary parking near the front entrance for deliveries, unloading vehicles, picking up or dropping off passengers, etc. At least one space should be wide enough for wheelchair use.
Figure 12*: Standard parking spaces (right), a wider space for wheelchair users (left), and a space*



saving double arrangement with the extra width overlapping and indicated by painted lines. Notice the planned absence of curbs. Users shouldn't have to pass behind vehicles.

Legend (see Introduction)	**Specifications**	**Date**
6.78067807e+44	***PARKING** parking space close to entrance is designated for vehicles for disabled persons international symbol of access indicates location of designated parking parking for disabled persons is sheltered from rain, snow, ice designated parking spaces are 3900 mm (12 ft 9 In) wide wheelchair transfer space is on a level surface parking space has direct passage to selected entrance without crossing vehicular traffic curbcuts are provided where necessary signs indicate route to building entrance for disabled persons pedestrian walkway from parking to entrance is sheltered grades do not exceed 1:20 ramps conform to RAMPS above changes of level (steps) are avoided where possible sheltered drop-off area is provided for taxis or cars	

PARKING GARAGE

-Typical wheelchair van heights range from 1.8 to 2.7 m (6-9 ft). In a parking garage, some vans can make it through a 1.93 m (6 ft 4 in) opening, but most vans will require outdoor parking, properly sheltered.

FURTHER READING:

Zeisel deals extensively with parking provision and design in *Midrise Housing* (listed above), as does Newman (also above) with an emphasis on safety and security.

CURBCUTS

A curbcut is a small ramp built into a curb to eliminate the step from the sidewalk to the pavement. Locate them wherever wheelchair or walker users might need them.

-Use changes in texture, colour or material (concrete, asphalt, aggregate, bricks) at the curbcut to alert blind or visually-impaired people.

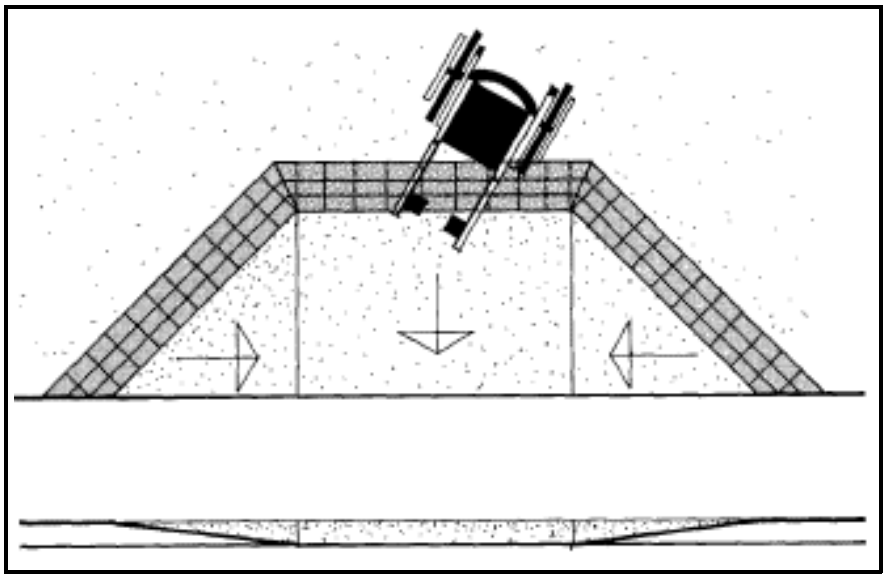


Figure 13: *The edges of the curbcut should be adequately flared to permit angled access and prevent twisted ankles.*

Legend (see Introduction)	**Specifications**	**Date**
6.78066679e+43	PARKING GARAGE automatic door opening device minimum height of door opening is 1930 mm (6 ft 4 in) as required by NRC Residential Standards. (Some wheelchair vans require greater height.) minimum ceiling height is 2000 mm (6 ft 6 in) as required by NBC 9.5.2.3. (Some wheelchair vans require a higher ceiling.) parking spaces are reserved for disabled persons (2 per first 50 spaces, 1 for the next 50- 100) designated parking spaces are identified by international symbol of access designated parking spaces are 3900 mm (12 ft 9 in) wide double lines between parking bays to avoid crowding of cars movement of wheelchairs behind parked vehicles is avoided lighting levels conform to COMMON FEATURES: LIGHTING route to elevator is clearly indicated (see SIGNAGE) garage elevator conforms to ELEVATORS (below)	

ENTRANCE

-Clearly distinguish the building's principal entrance from any others and avoid unneeded doors opening onto the street.

-An outside waiting area with sheltered seating will permit residents to watch the comings and goings in comfort.

-In a building with public areas (auditorium, meeting rooms, etc.), provide well-marked routes to differentiate these facilities from private residential sections.

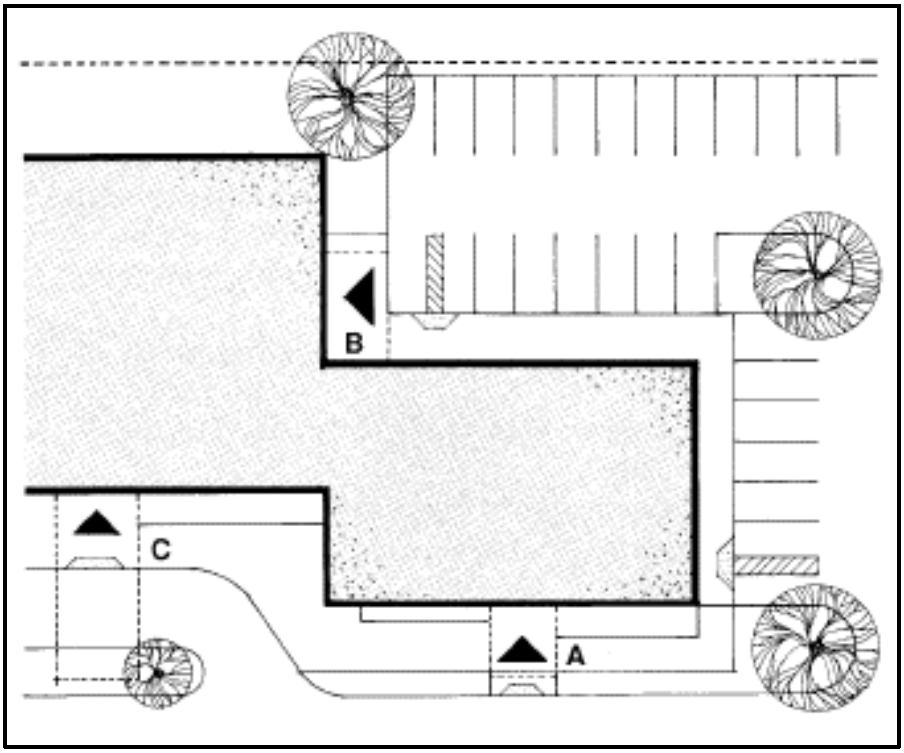


Figure 14*: An entrance for visitors bound for the public areas (A), one for residents coming from the parking lot (B), and a main entrance for all to use (C).*

Legend (see Introduction)	Specifications	Date
	***ENTRANCE TO THE BUILDING** COMMON FEATURES: FLOORING WALLS DOORS HARDWARE LIGHTING	
2.67836937e+70	snow clearance is assured and facilitated by design	
	clear identification of building or facility	
	international symbol of access indicating accessible entrance(s) to building if other than main entrance	
	signage conforms to SIGNAGE (above)	
	ramps or lifts/elevators at all changes in level	
	lighting level at least 200 lux at top and bottom of stairs, ramps and changes in elevation	
	space to manoeuvre on approaching entrance doors is at least 1500 x 1500 mm (5 ft x 5 ft)	
	entrance is sheltered from the elements	
	entrance doors are automatic or have electrical switch reachable by person in wheelchair	
	tactile cueing for photo-electric doors	
	minimum 2000 mm (6 ft 6 in) between hinged doors in series	
	space to manoeuvre wheelchair in entrance vestibule with minimum corridor width 1100 mm (3 ft 8 in)	
	shelving near door for groceries, packages, etc.	
	main directory (wall panel or console) can be read from a wheelchair	
	auditory as well as visual communication at or near directory	
	intercom controls not higher than 1200 mm (4 ft), preferably 1000 mm (3 ft 4 in)	

ENTRANCE

-Front door security can be ensured by locks, controlled access, an observer stationed at the door, closed-circuit observation, or informal surveillance by groups of residents. Doors, windows, secondary exits, balconies and porches should be solid and secure from intrusion.

FOR THE SINGLE-FAMILY HOUSE:

Many houses are inaccessible to people using wheelchairs or walking aids because of changes of level (steps) in the path from the driveway or sidewalk to the front door. Some possible solutions:

-Change the grading contours of the lot to provide a sloped approach to the entrance.

-Install a ramp (see RAMPS) or an exterior porch lift (see LIFTS).

-Modify or build another entrance that is more accessible. For example, it may be possible to enter from the garage.

Legend (see Introduction)	**Specifications**	**Date**
1.23456789e+42	ENTRANCE (cont.) directional orientation at all entrances indicating route to main lobby and directory international symbol of access indicating accessible routes inside the building (not required if all routes are accessible) floor plans legible by touch ***For Private Homes:** ramps or lifts/elevators at all changes in level in route to entrance lighting level at least 300 lux at top and bottom of stairs and ramps and changes in elevation space to manoeuvre on approaching entrance doors is at least 1500 x 1500 mm (5 ft x 5 ft) entrance is sheltered from the elements	

HORIZONTAL CIRCULATION

-An entry path passing through waiting areas can encourage social activity, but some public areas should be visually separate.

-In cases where some parts of the building are for public use, locate interior doors to prevent non-residents from having access to residential areas.

-If there is a management office, it should be apparent (but not dominant) from the front entrance, for visitors and security.

-Flooring, wall angles, ceiling heights, lighting and windows can provide both visual interest and orientation cues. Corridors can be broken into small sections to reduce long unrelieved stretches. Public areas for socializing may be included as part of corridors.

-Emergency systems must alert both deaf and blind people; bells, sirens or buzzers must be supplemented with flashing strobe lights.

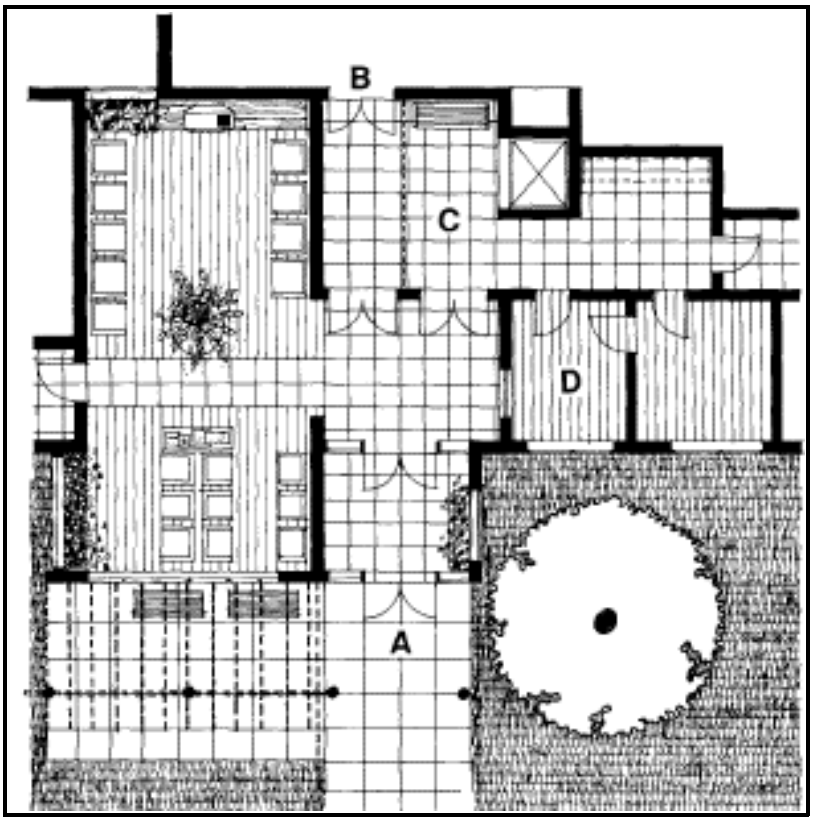


Figure 15: *This layout shows gathering areas near the front entrance (A), a recognizable route to public areas (B), restricted access to elevators, mail room and residential wing (C), and a convenient but unobtrusive office (D). An expanse of windows visually connects the sheltered seating area near the main entrance to the inside.*

Legend (see Introduction)	**Specifications**	**Date**
	INSIDE THE BUILDING **HORIZONTAL CIRCULATION** COMMON FEATURES: FLOORING WALLS WINDOWS DOORS HARDWARE LIGHTING AIR SAFETY	
2.39123457e+73	layout of entrance floor is obvious and logical signs conform to SIGNAGE above directional orientation available in lobby secondary directional orientation less than 30 m (100 ft) away from lobby legible signs for emergency communication light signals for emergency communication audible emergency communication glass doors and walls clearly indicated mirrored walls avoided	

CORRIDORS AND WHEELCHAIRS

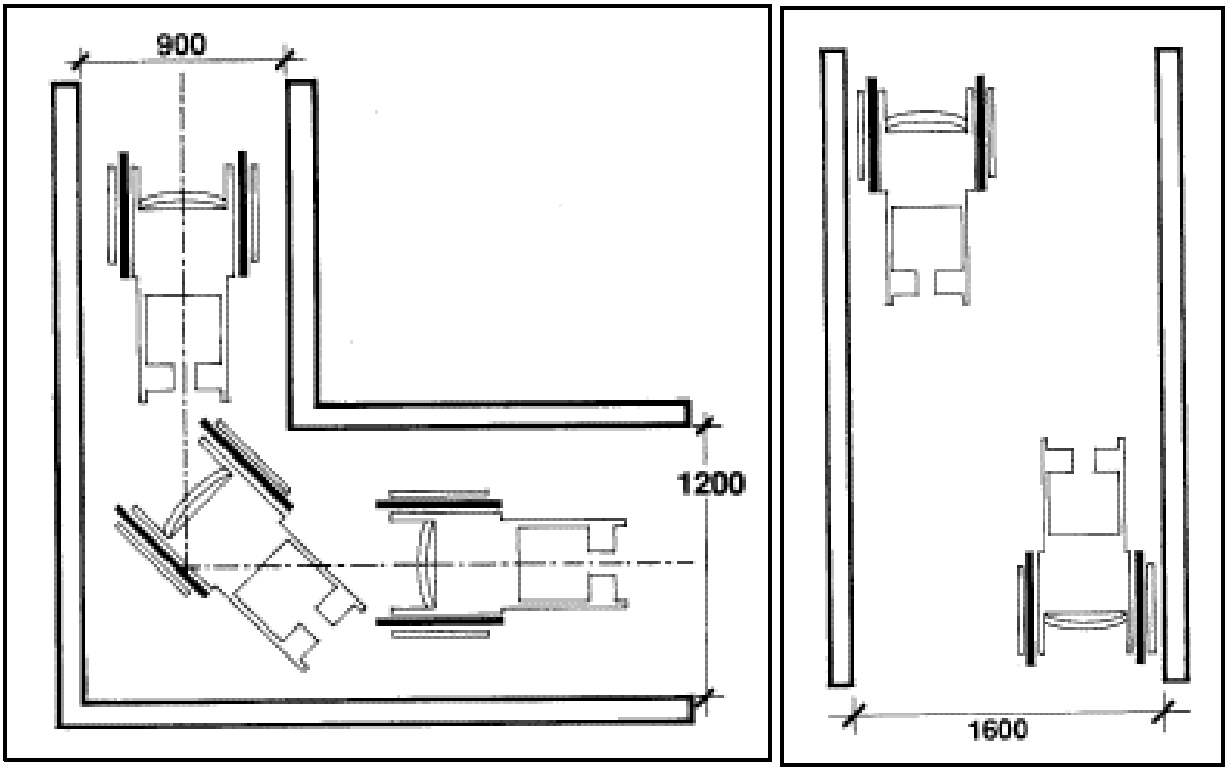


Figure 16: Although a minimum 900 *mm (35 in) is required for a wheelchair to turn a corner in the corridor, a width of 1200 mm (4 ft) is a more comfortable guideline to live with, also permitting access to stretchers and furniture. In public hallways, where wheelchairs may be expected to pass one another, the recommended width is 1600 mm (5 ft 4 in).*

-See Common Features: Doors and Doorways for more information on corridors and doorways.

Legend (see Introduction)	**Specifications**	**Date**
2.67066678e+18	**HORIZONTAL CIRCULATION (cont.)** corridors at least 1100 mm (44 in) wide corridor at least 1200 mm (4 ft) wide where wheelchair turns into side doorway or where facing door opens away from wheelchair user corridor at least 1500 mm (5 ft) wide where facing door opens toward wheelchair user corridor at least 1600 mm (64 in) wide where wheel chairs must pass one another railings provided along corridors resting stops less than 30 000 mm (100 ft) away from one another avoid unnecessary steps or connect levels by ramp and stairs clear demarcation of differences in level	

ELEVATORS

-Locate elevators in plain view of the entrance and where the entry trip does not bring people into residential corridors.

-The number of elevators will be determined by the need/demand study and the lifestyles of residents. Slow-speed elevators with slowly closing doors are recommended; high-speed elevators may also be installed in heavy-use buildings.

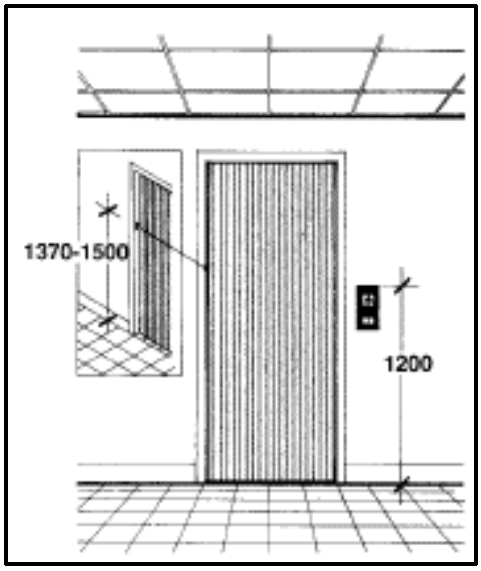
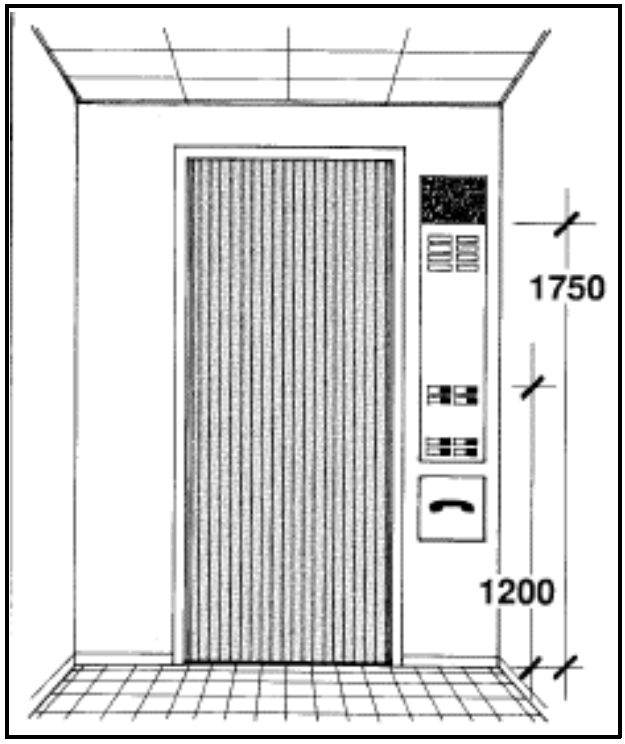


Figure 17. *Appropriate signals, signage and controls installed at the proper height make this elevator accessible to all users.*

-Ensure that the quality of the elevator mechanism is suitable for user demands. Because senior residents are often at home during the day, a standard apartment elevator may not be able to cope with the extra use. If meals are provided in a main dining room, for example, each resident will be using the elevator six times more per day than a typical apartment dweller.

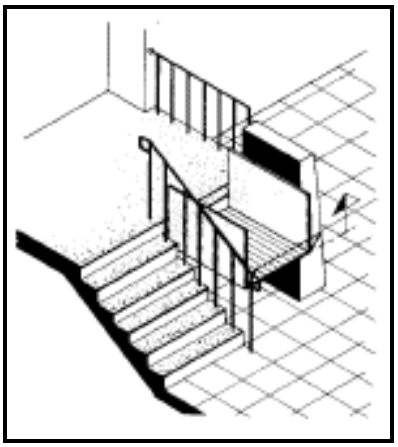


Legend (See Introduction)	Specifications	Date
	VERTICAL CIRCULATION ELEVATORS COMMON FEATURES: LIGHTING	
1.23456789e+79	meet requirements of passenger elevator licensing and of appendix E of Code CAN/CSA-1344-M90	
	accessible from wheelchair entrance	
	serve all floors including garage level	
	space in front of door 1600 x 1600 mm (64 x 64 in)	
	call buttons are located 1200 mm (4 ft) from the floor	
	call buttons at least 18 mm (3/4 in) wide	
	characters 16 mm (5/8 in) high and raised 1 mm (1/16 in) are located to the left of all elevator call and control buttons	
	markings are on contrasting background: light on dark	
	visible signal and audible signal at each elevator entrance to indicate which car is approaching and its direction of travel; audible signal once for up and twice for down	
	visual signals outside elevator or in cabin located not higher than 2 m (6 ft 6 in)	
	floor designation signs are on both doorjambs, numbers at least 40 mm (1 ½ in) high, raised 1 mm (1/16 in) at 1370-1500 mm (4 ft 6 in to 5 ft) above floor	
	levelling to 13 mm (½ in) tolerance	
	door opening at least 810 mm (32 in)	
	gap between cabin and building floor less than 15 mm (5/8 in)	
	automatic safety re-opening devices	
	cabin dimensions are 1300 x 1370 mm (4 ft 4 in x 4 ft 6 in) minimum; 1370 x 1725 mm (4 ft 6 in x 5 ft 9 in) to accommodate wheelchair user; 1300 x 2030 mm (4 ft 4 in x 6 ft 10 in) to accommodate stretcher	
	handrails in cabin at 800-1000 mm (32-40 in) above floor and conform to NBC 9.8.7 and 3.7.3.4	
	car control buttons are between 900-1370 mm (3 ft-4 ft 6 in) from the floor	

LIFTS FOR THE SINGLE-FAMILY HOUSE:

Several elevating devices are suitable for installation in a house. A stair glide is a small chair that carries a person up or down the stairs along a rail attached to the wall. A wheelchair stairlift is a large platform that carries a person in a wheelchair up or down the stairs. A vertical shaft lift is similar to a standard elevator, only smaller, and can provide access to several floors. A vertical platform lift or porch lift can provide a vertical lift, indoors or out, of up to 3000 mm (120 in) for a wheelchair user.

-A straight staircase is easier and less expensive to outfit with a lift. Locate a shaft lift in a comer or on a supporting wall.



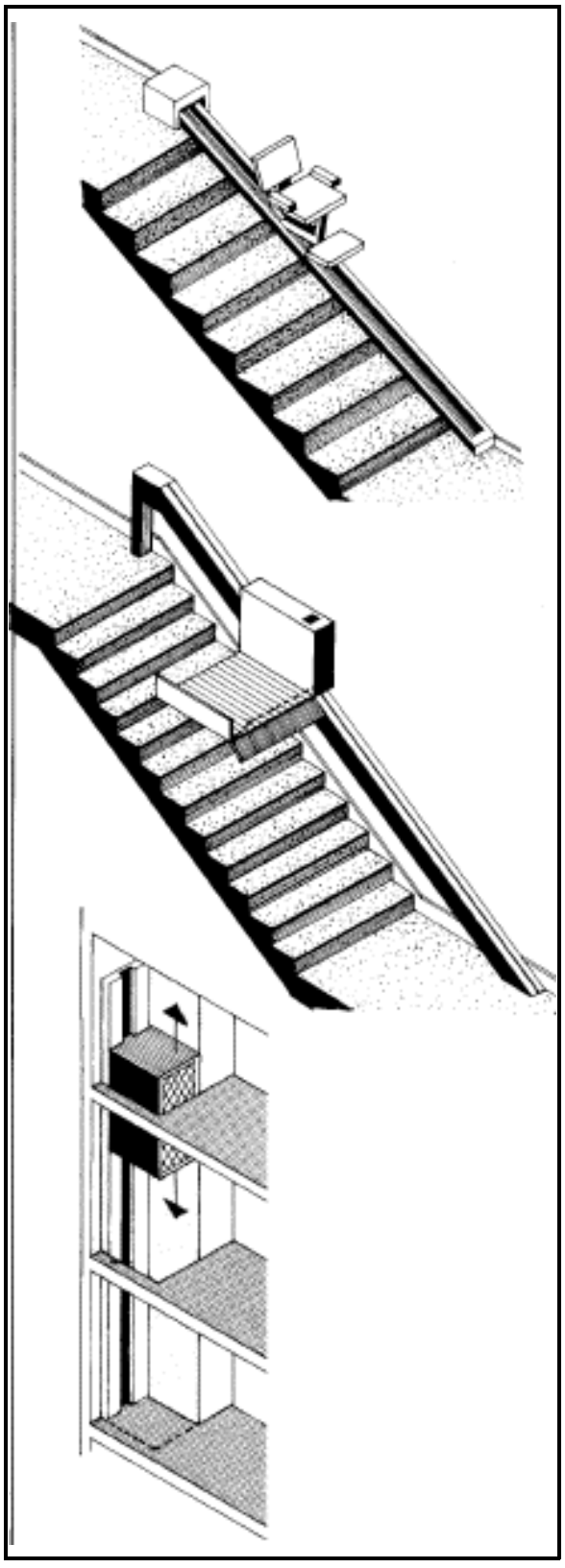


Figure 18: *Right, top: Stair glide. Middle: Wheelchair stairlift. Both are most easily installed in a straight staircase, although curved-staircase models are available at a higher cost. Bottom: Shaft lift, installed in a corner of the house for solid structural support, accessing three floors. Above: Porch lift in an exterior installation which should be sheltered from harsh weather.*

FURTHER READING:

Making your home accessible: A disabled consumer's guide. Carol Kushner, Patricia Falta and Andrew Aitkens. Consumer and Corporate Affairs Canada, 1983.

Legend (see Introduction)	Specifications	Date
1.34567890e+63	**ELEVATORS (cont.)** visual car position indicator in cabin audible position signal at least 20 db or elevator voice communicator (or both) visual floor level indicator compatible for visually and hearing impaired flip up seat in elevator elevator telephone accessible to wheelchair elevator telephone compatible with hearing aids directional orientation in elevator lobby at each level ***LIFTS (for Private Homes)** elevating devices in the home conform to national requirements found in Canadian Standard Association publication CAN 3-B355-M86 **ESCALATORS** tactile cueing in floor approaching escalator reachable, grabbable handrail lighting at floor level at least 50 lux at top and bottom of escalator solid slip-resistant tread access to and from escalators free of hazards	

STAIRS

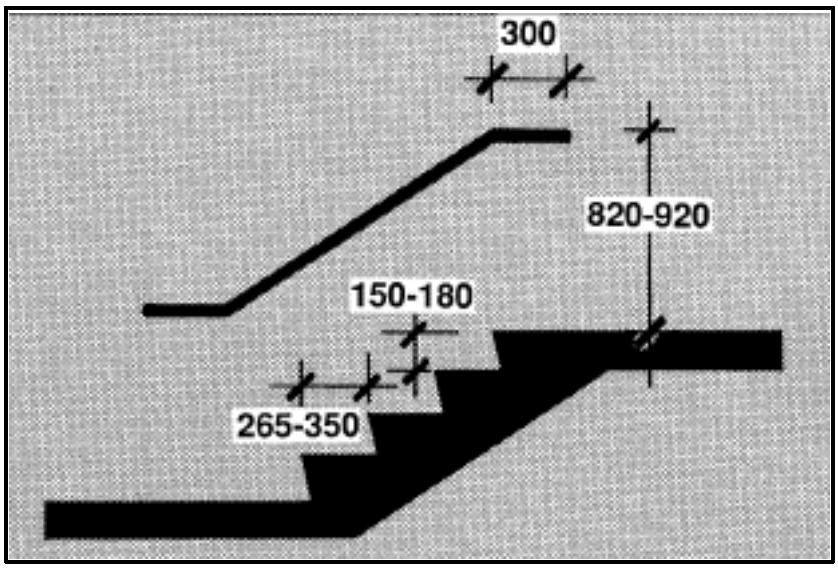


Figure 19: *These recommended dimensions ensure a comfortable stairway with a supporting handrail extending beyond the top and bottom.*

Figure 20: *The change in floor texture at the top of this staircase alerts blind and low vision users. The edges of the stairs are further defined by the strip of contrasting flooring.*

SIGNALS FOR VISUALLY IMPAIRED PEOPLE

People with low vision need strong contrast in colour, especially to pick out changes in level. A bright strip of carpeting or other flooring material at any change, combined with strong lighting, will signal that a step, ramp or flight of stairs is ahead.

Blind people may rely on a cane to detect an abrupt change of level. A strip of flooring with a different texture can also be used.

Tactile cueing is frequently used to alert blind people to possible danger. For example, a doorknob with a rough texture can indicate an electrical utility room or other hazardous area. A strip of rough texture or a cut-out notch on a handrail can warn of the approaching end of a hall or staircase.

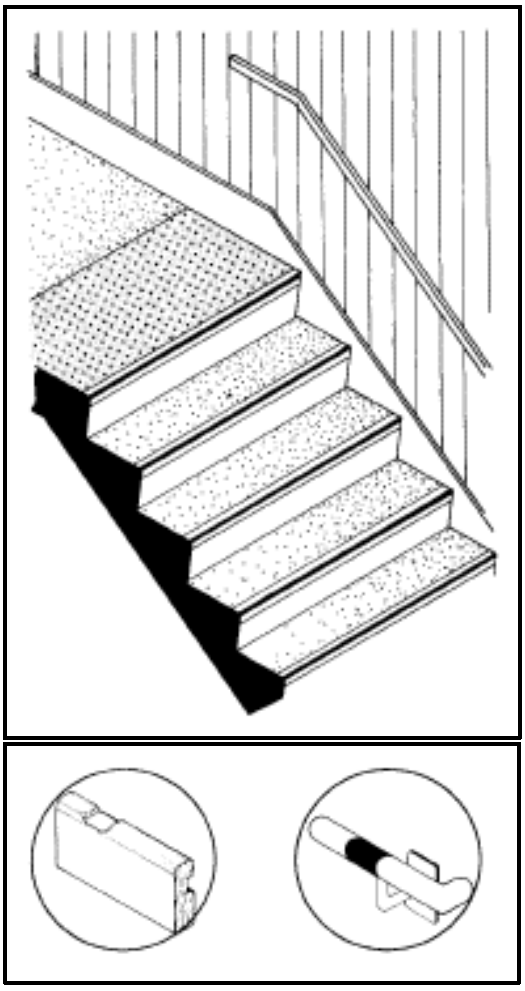


Figure 21*: Blind and low-vision users will notice the notch or textured strip indicating the end of a stair or corridor.*

Legend (see Introduction)	Specifications	Date
	***STAIRS**	
12345 78901	stairs conform to NBC Sec 3.4	
1 345 78901	stairs have minimum 50 lux illumination	
12345 78901	handrails are 820 to 920 mm (32-36 in) high	
12345 78901	handrails continue through or around landings in a long staircase	
12345 78901	handrails extend 300 mm (1 ft) beyond top and bottom risers; freestanding rails are recurved down to 680 mm (27 in) for detection by blind people using the long-cane technique	
12345 78901	risers between 150-180 mm (6-7 in)	
12345 78901	risers are closed	
12345 78901	treads between 265-350 mm (10 ½-14 in)	
12345 78901	slip-resistant finish or skid-resistant strips	
3 9	edges clearly marked with contrasting colour	
12345 78901	nosings are 15-38 mm (½-1 ½ in) and are bevelled	
12345 78901	winding stairs are avoided	
12345 78901	resting stops or landings are provided on long flights of stairs	
	***INTERIOR RAMPS**	
12345678901	interior ramps conform to RAMPS (above) except for shelter from weather requirements	

INFORMATION

-Locate notice boards in places where residents or others pass by. Make sure they are at an accessible height for posting and reading by all residents.

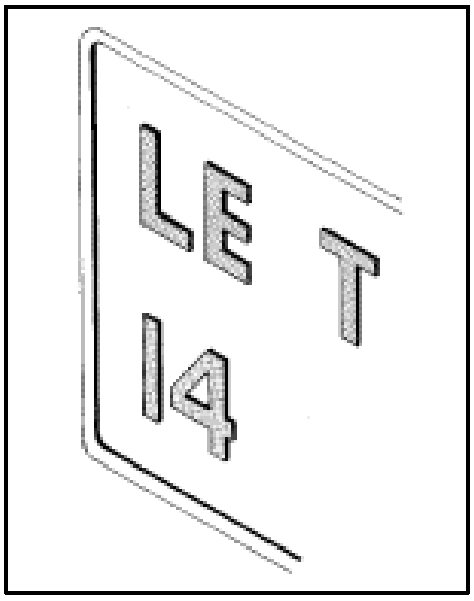


Figure 22*: Raised lettering on signs can provide blind users with a key to orientation.*

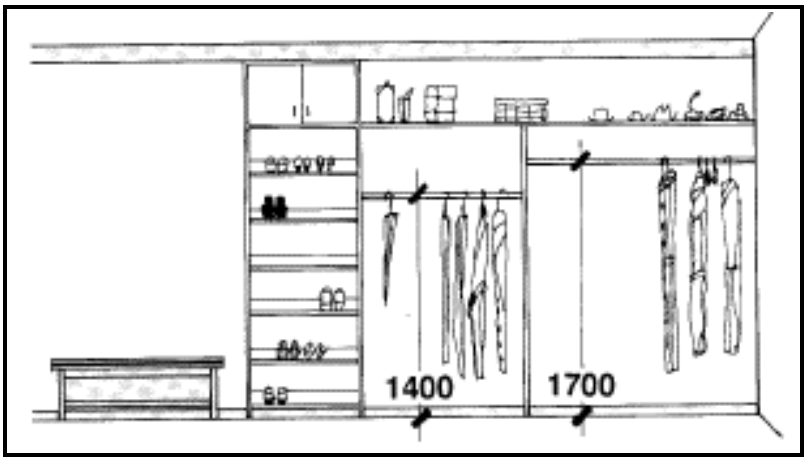
OFFICE

A resident manager, building maintenance and personal care staff are options to consider when conceptualizing the project and its daily operations. The size of the building and the number of units will influence this decision, as will the lifestyle and health patterns of residents. Aging in place is likely to occur, and the changing needs of residents can result in greater care requirements. If space is provided in the early stages for the support services to meet such eventualities, the transition will be simplified.

CLOAKROOMS

Provide a bench where people can sit down to put on and remove their boots and a convenient place to store them.

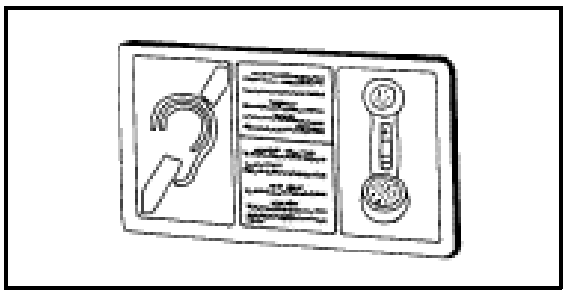
Figure 23: *In this cloakroom, shelving and coatrack are accessible to the wheelchair user and others. A standard round rod is easier to use than slotted, reverse or fixed-hanger types. Note the bench for people to remove or put on boots.*

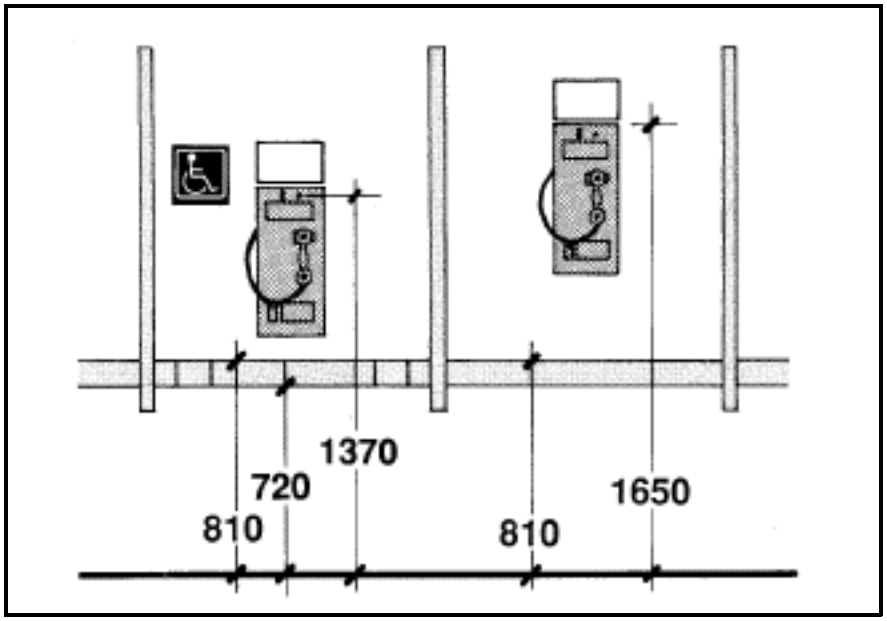


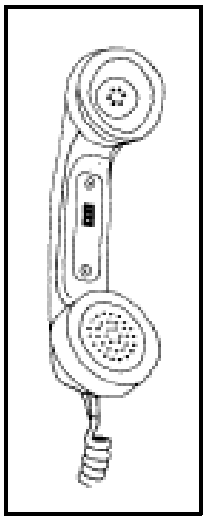
Legend (see Introduction)	Specifications	Date
6.07807023e+42	**COMMON AREAS** **INFORMATION/ORIENTATION** COMMON FEATURES: LIGHTING information counter or desk less than 840 mm (34 in) high seats are available within 3000 mm (10 ft) of information office some bench or two seater type seating information personnel trained to respond to the needs of disabled persons signs conform to SIGNAGE (above) main directory (wall panel or console) legible from a wheelchair braille information at entrance and reception information available in large print micro reader is available if fine print used information on tape available at reception information available in symbols/graphics floor plans legible by touch international symbol of access indicates accessible routes inside the building (not required if all routes are accessible) **CLOAKROOMS** racks, hanging rods, coat hooks, shelves, etc, are reachable from wheelchair; 1400 mm (56 in) maximum height	

TELEPHONES

***Figure 24**: Guarantee access to the telephone for everyone. The wheelchair user needs a lower telephone, while the hearing-impaired user may require a volume control or a connection to a Telephone Device for the Deaf (TDD). The sheaf is necessary for using the telephone directory and for the TDD user to set up the equipment*







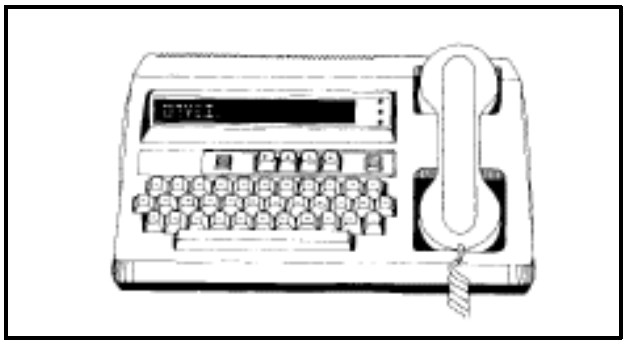


***Figure 25**: The Telecommunications Device for the Deaf, left, functions like a small computer, translating electronic signals carried over the telephone wire into readable text.*

The amplifying handset, above, has a dial or rocker panel to adjust the volume.

Legend (see Introduction)	Specifications	Date
6.06267606e+24	**DRINKING FOUNTAINS** drinking fountains 900 mm (36 in) maximum height 680 mm (27 in) knee space 750 mm (30 in) wide under fountain hand-operated fountain, front or side spout 750-900 mm (30-36 in) above floor **TELEPHONES** telephone accessible to wheelchair and hearing-impaired users, identified by proper symbols partitions in telephone booth are at least 800 mm (32 in) apart for wheelchair user coin slot, dial, handset less than 1370 mm (54 in) from the floor handset cord at least 1000 mm (33 in) long flip up seat at telephone telephone shelf for directory, Telephone Device for the Deaf (TDD) visual ear or TDD/TTY available for public use volume control or T-switch-compatible telephone provided nearby electrical or electronic installations that might interfere with T-switch reception are avoided (e.g., transformer coils, unshielded wiring, dimmer switches, ballasts for fluorescent lighting)	

GATHERING AREAS

-Windows in gathering areas should provide a good view of outside scenes and activities.

-Appropriate furnishings, such as seating, tables, lamps, magazine racks, etc., may be located in these areas. Arrange furniture in small, conversational groupings, close together so residents can see and hear each other better. Seating should be firm and easy to get in and out of; all furnishings should be strong and stable enough to provide adequate support.

Traffic patterns may be planned so they encourage social groupings.

Figure 15 shows a good example of a gathering area.

MAIL AREA

-The mail area should be visually separate from public areas for privacy and security. Locate a nearby public space with seating.

-Mailboxes should be installed from knee to eye height for easy access. Clear numbering and a recognizable pattern will help people to find their box. Mailbox locks should be easy to operate.

-A shelf nearby will allow residents to put down parcels while checking for mail.

Legend (see Introduction)	Specifications	Date
	GATHERING AREAS COMMON FEATURES: FLOORING WALLS WINDOWS DOORS LIGHTING AIR SAFETY	
1.23456789e+60	disruptive through circulation avoided	
	obstacles in pedestrian path avoided where possible or identified by tactile cueing	
	furniture identifiable by long cane technique	
	furniture has no hazardous protrusions	
	backrests on chairs can be used for pedestrian support without tipping the chair	
	some chairs with no arms or only one arm and seat 450 mm (18 in) from floor for wheelchair transfer	
	some chairs have back support	
	some chairs have arm rests	
	grab rails or supportive furniture in common rooms	
	foot space 500 mm (20 in) high under coffee tables	
	non-glare furniture finishes	
	counters are below eye level of seated person, i.e. 1000 mm (40 in)	
	smoking permitted only in designated areas	
	background music, white noise or other non-essential noises that interfere with voice communication are eliminated or reduced to a minimum	
	washrooms (accessible) are in close proximity	

MEETING/ACTIVITY ROOMS

-Auditorium, library, television lounge, chapel, craft room, or just a small meeting room with table and chairs - all should be accessible to the wheelchair user. Use movable seating.

-Ensure that there is adequate lighting and an appropriate position for a sign language interpreter.

THE PERSONAL FM SYSTEM

Hearing aid users can participate more fully in meetings, lectures, religious services and other activities through the use of an FM or similar system. A microphone picks up the voice of the speaker or other sounds which are then transmitted by the central unit to small individual receivers worn or carried by hearing aid users, who simply flip the T-switch on their aids to hear the signal.

Music and drama, even sports activities can be enhanced through this system, which has a range of 70- 80 m (200-250 ft).

An induction loop system is similar to the FM system except that the signal is transmitted through a wire loop installed in the floor or ceiling or spread out on the floor circling a section of seats (portable models). The signal can be received by those seated close to the loop.

-More information on facilities for hearing impaired people is available from the Canadian Hearing Society.

THE T-SWITCH

Most hearing aids are equipped with a "T" (for telephone) position on the on-off switch; when activated, the aid receives signals from the flux coil in a telephone or other system and amplifies them for the user. Telephones without flux coils are inaccessible to hearing aid users.

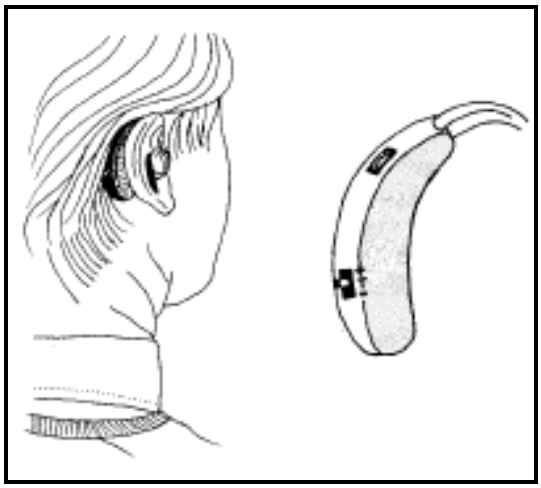
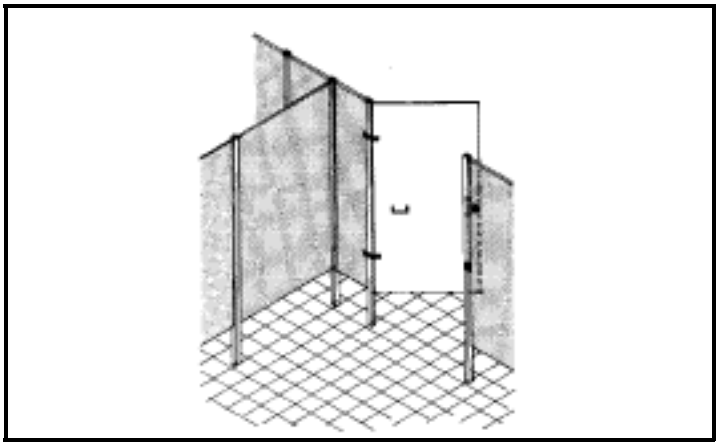


Figure 26: The T-switch.

Legend (see Introduction)	**Specifications**	**Date**
6.51234568e+34	**MEETING/ACTIVITY ROOMS** COMMON FEATURES: FLOORING WALLS WINDOWS DOORS HARDWARE LIGHTING AIR SAFETY space to manoeuvre and park wheelchair in meeting/ activity room induction loop, infra-red or FM transmitter and receiver system in larger meeting rooms emergency horizontal evacuation areas of refuge provided in 1 hour fire and smoke proof zones emergency directional information available washrooms (accessible) in close proximity	

PUBLIC WASHROOMS

Figure 27 (below): Wheelchair users enter the cubicle and close the door by pulling on the inside D-shaped handle, since they would not be able to reach the latch.



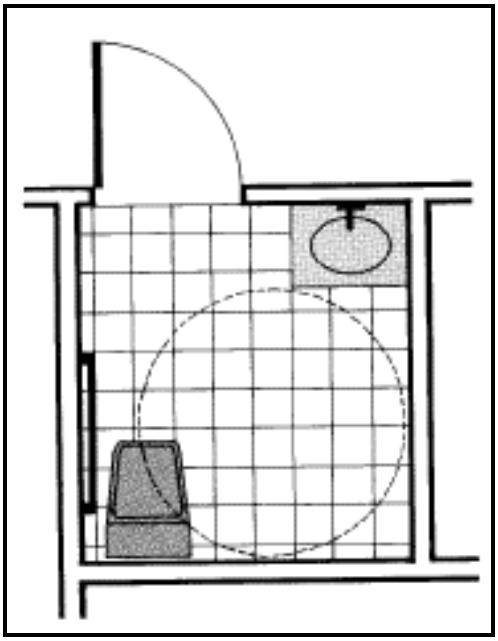
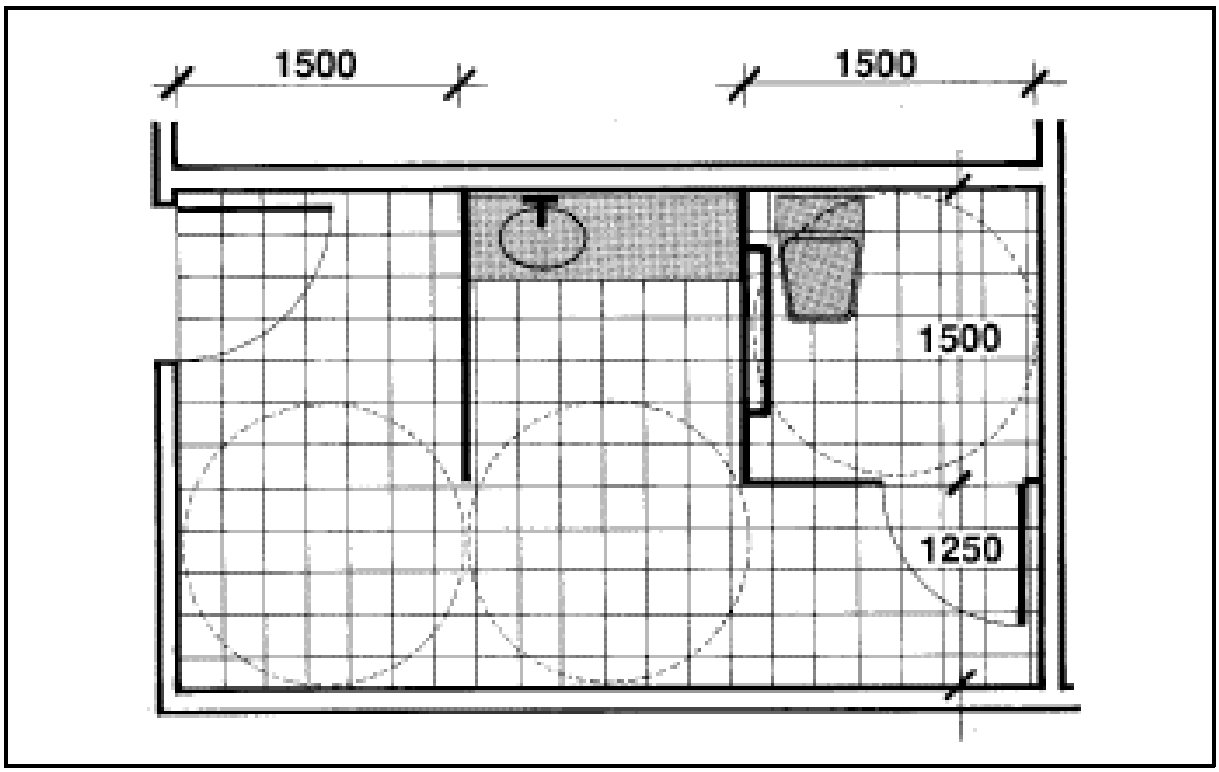


Figure 28: The turning circles outlined in these accessible public washroom layouts show the space requirements for manoeuvring a wheelchair. The design above, right, could be used by either sex; the layout below could be expanded by adding standard cubicles, urinals, etc.



Legend (see Introduction)	**Specifications**	**Date**
6676666666606	**PUBLIC WASHROOMS** COMMON FEATURES: FLOORING WALLS DOORS HARDWARE LIGHTING AIR modesty vestibules at least 2000 mm (6 ft 6 in) long if doors are in series at least 300 mm (1 ft) beside out swinging doors at least 600 mm (2 ft) beside in swinging door vestibule at least 940 mm (38 in) wide if doors are sliding or automatic swing vestibule at least 1200 mm (4 ft) wide if doors swing out from vestibule wheelchair has access to at least one toilet and one washbasin and can turn around to leave the room stall door swings out and is 810 mm (32 in) wide; can be reduced to 760 mm (30 in) if wheelchair access is straight on easily grabbable door pull on outside face of door horizontal D-type door pull on inside face of door near hinge side coat hook not higher than 1400 mm (56 in) accessible toilet stall 1500 x 1500 mm (5 x 5 ft)	

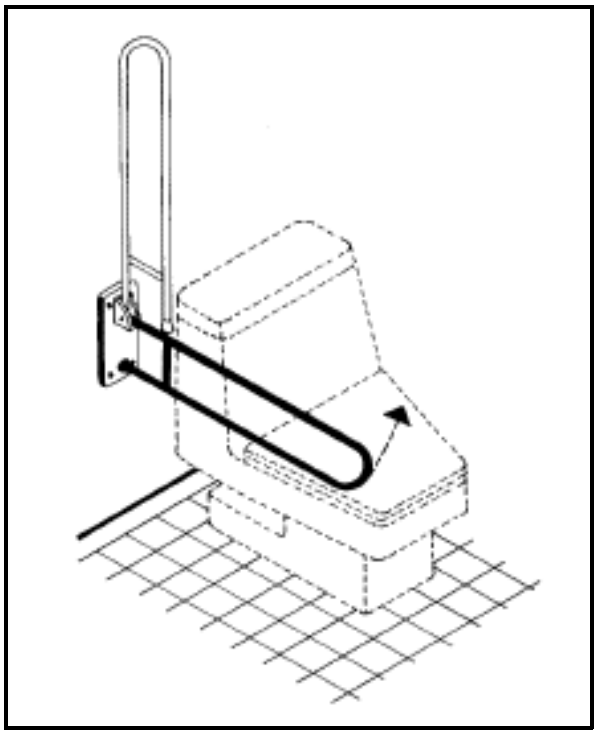


***Figure 29**: When flip-up grab bars such as this design are installed on both sides of a toilet, the user has the option of using either one, both or none at all. A call signal device should be located close to the toilet in case the user needs help.*

More grab bar installations are shown in Figure 32, p. 64.

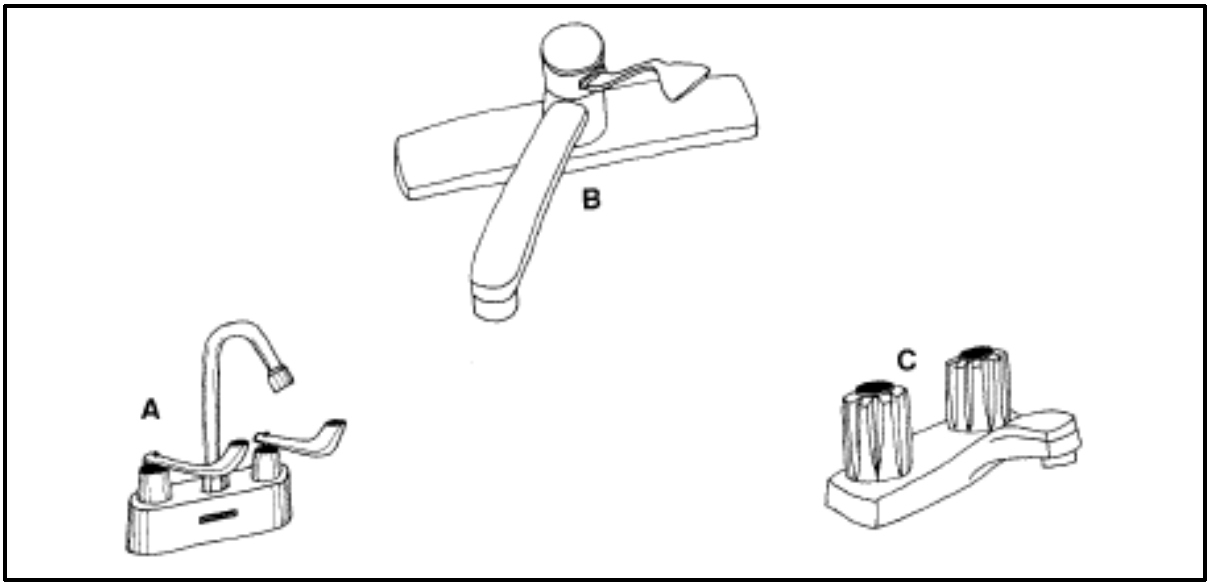


***Figure 30**: A. Although this faucet set is 100% accessible, it looks institutional B. The single-arm control faucet permits the user to control both pressure and temperature with simple movements. C. This all-too-common tap design is hard to grasp, hard to turn and impossible to control with soapy wet hands. Avoid it.*

Legend (see Introduction)	***Specifications***	***Date***
6.78067807e+48	**PUBLIC WASHROOMS (cont.)** flip-up, horizontal or L-shaped grab bar(s) at toilet (not a sloping bar) horizontal bar is 900 mm (36 in) long and 300 mm (1 ft) from back wall, installed between 750-850 mm (30-34 in) from floor L-shaped bar has horizontal length of at least 900 mm (3 ft), vertical length of at least 450 mm (18 in) centre line of toilet 450 mm (18 in) from side wall carrying the grab bar top of toilet seat 450 mm (18 in) above floor (seat adaptors may be used when necessary) toilet paper is within easy reach accessible hand-operated flushing controls back support is provided where tank-type toilets are not used at least one urinal 450 mm (18 in) above floor, or floor mounted with no step washbasin not higher than 860 mm (34 in), preferably 800 mm (32 in) knee space 680 mm (27 in) high, 200 mm (8 in) deep under washbasin pipes are insulated or baffled for knee protection faucets are reachable and easily operated by disabled persons at least one mirror with bottom edge not more than 1000 mm (40 in) above floor washroom accessories are not more than 1200 mm (4 ft)above floor and do not create an undetectable hazard to blind room has a device to signal for assistance	

DINING FACILITIES

It may seem easy to plan a dining room in your project design; it's another matter to run it. Food service is a complicated business, and professional consultants should be called in to advise.

Food service options:

-full-service dining room
-caterer-managed food service
-cafeteria
-servery
-dispensing machines
- in-room tray service

If it is provided, a dining room with table service and good food can be an important focus of resident life. Intimate dining arrangements can be created by breaking up large spaces. Guests and families can be entertained at meals. Bar service is another option.

Legend (see Introduction)	**Specifications**	**Date**
6.06606678e+26	**DINING AREA/SERVERY** COMMON FEATURES: FLOORING WALLS WINDOWS DOORS HARDWARE LIGHTING AIR cutlery and food displays visible and within reach of person in wheelchair; height maximum 1200 mm (4 ft) space to manoeuvre wheelchair at end of aisles table heights 750 mm (30 in) or less at least 680 mm (27 in) knee space under tables 750 mm (30 in) wide or more **DISPENSING MACHINES** operating parts of dispensing machines not higher than 1200 mm (4 ft) food display and dispensers visible and reachable from wheelchair, i.e. maximum height 1200 mm (4 ft) **SHOP** COMMON FEATURES: FLOORING WALLS DOORS HARDWARE LIGHTING AIR staff trained to respond to needs of disabled persons minimum aisle width 1100 mm (44 in) and space to manoeuvre wheelchair at end of aisles counters 840 mm (33 in) or lower self-serve displays not higher than 1400 mm (56 in)	

LAUNDRY

-A front-loading machine is easier to use. Those who can't bend or stoop easily might prefer a top-loading machine, or they can use a front-loading machine by pulling up a chair and loading or unloading from a seated position.

-If laundry facilities are provided in each unit, they can be installed in or close to the kitchen, bathroom, or in an ensuite storage room. In multi-unit dwellings, laundry facilities should be within each unit or shared on the same floor.

-Space should be provided for an ironing board and a table for sorting and folding.

STORAGE

-Storage room should be available for folding chairs and tables, audio-visual equipment, etc.

-Adjustable shelving permits storage of odd-sized articles and the best use of the most accessible space.

-Storage lockers should be secure and locked.

Legend (see Introduction)	Specifications	Date
6.66060606e+20	***LAUNDRY** COMMON FEATURES: FLOORING WALLS WINDOWS HARDWARE DOORS LIGHTING AIR if appliances are built into a closet, the open doors do not interfere with passage of wheelchair at least 1500 mm (5 ft) space in front of appliance front-loading washer front-loading dryer coin slots and control mechanisms reachable from wheelchair or by a short person at least one table 750 mm (30 in) high or lower **STORAGE AND LOCKERS** COMMON FEATURES: DOORS LIGHTING corridors leading to common storage rooms at least 1100 mm (44 in) wide corridors at least 1200 mm (50 in) wide where door opens into corridor and approached from latch side corridors at least 1500 mm (60 in) wide where door opens into corridor and approached from hinge side aisles in individual Storage rooms at least 940 mm (38 in) wide room to manoeuvre wheelchair at end of aisles: 1500 mm (5 ft) turning circle or a T-intersection	

GARBAGE

-Garbage storage and chutes should be convenient to units so refuse does not have to be carried long distances or up/down from one floor to another.

-Garbage chute handle should be large and open so it is easy to grasp and operate; it should not require undue strength to pull it open.

-Garbage room door closers should not be excessively difficult to open.

EXERCISE ROOM, POOL, WHIRLPOOL, SAUNA

-Access to rooms containing these facilities should follow the criteria for other rooms in the building.

-An exercise room equipped with stationary bicycles, weight machines and free weights, floor mats, slant boards and a jogging/ walking track can encourage a fit and healthy lifestyle. Aerobics and Tai Chi for seniors are increasingly popular.

-Wheelchair users can get into the pool by either ramp or lift (portable models are available).

-A long and narrow pool is suitable for those who like to swim lengths. A uniform depth may be preferred. Both are less expensive than a standard pool design.

-Whirlpools are available in several sizes for use by individuals (standard bathtub dimensions) or large groups (10-12 people).

Legend (see Introduction)	Specifications	Date
6.12345679e+86	**GARBAGE CHUTE** COMMON FEATURES: FLOORING WALLS HARDWARE DOORS floor space at least 1100 x 1600 mm (44 in x 64 in) hold-open device on door to room side-hinged garbage chute door door closer pressure not greater than 22 N **POOL** COMMON FEATURES: SAFETY slip-resistant floors in all pool facilities waterproof transfer chair for wheelchair shower use accessible faucets operated by single hand and thermostatically controlled valve on shower water supply wheelchair ramp to bottom of shallow end of pool and/or portable or fixed wheelchair lift to transfer swimmers to and from pool and wheelchair **SAUNAS** slip-resistant floors in all sauna areas sauna room door at least 810 mm wide and opens outward door opening pressure 10 N or less handrail on at least one wall 750-900 mm above floor at least one bench 450 mm (18 in) above floor preventive measures taken to avoid burns on wet sauna equipment room has a device to signal for assistance	

ENTRANCE AND VESTIBULE

An entrance provides a transition between the exterior (a common hallway or the outdoors) and the interior of the dwelling, where greetings and farewells take place and people put on or remove outerwear and store it.

-The doorbell or knocker should be visible and accessible. In addition to a standard deadbolt lock, residents may feel more secure with a chain lock.

-In a dwelling with a front door opening to the outside, a vestibule provides a climate lock to keep warm air in, cold air out.

-Light switches should be located as close to the inside main entrance door as possible.

-The vestibule should be large enough to allow one individual to help another on or off with outerwear.

-Sliding closet doors are recommended. Extra storage space near the entrance may be required for wheelchairs or other equipment.

Legend (see Introduction)	Specifications	Date
	DWELLING UNIT	
	***ENTRANCE AND VESTIBULE** COMMON FEATURES: FLOORING WALLS DOORS HARDWARE LIGHTING	
1.23456789e+53	perceptible personal identification at front door conforms to SIGNAGE (through use of form, shape, textures, colour, graphics, names, numbers, or combinations of these). Number should be visible from street, i.e. at least 75 mm (3 in) high	
	lighting over identification sign at least 200 lux	
	identification numbers (and other symbols) and doorbell are located beside door on latch side and 1300-1500 mm (52-60 in) above floor	
	peephole in door (may be lower than standard)	
	sidelight or glass viewing panel (may be security hazard)	
	landing outside front door at least 1500 x 1500 mm (5 ft x 5 ft) and level with floor of entrance vestibule	
	space to manoeuvre wheelchair in entrance vestibule: minimum corridor width 1100 mm (44 in)	
	hanging rod and/or coat hooks not higher than 1400 mm (56 in) in vestibule or foyer	
	space to sit and put on outer footwear	
	shelving or space for table near door for groceries, purses, etc.	

HALLS AND STAIRS

-Halls and doorways should be wide enough for a wheelchair, stretcher or furniture to be moved to all parts of the dwelling (see HORIZONTAL CIRCULATION). Pay particular attention to corners and angles to ensure easy access.

-Light switches should be located at top and bottom of staircases and at both ends of a hallway so people can turn the light on or off from either location.

-See LIFTS for information on home elevating devices.

LIVING ROOM

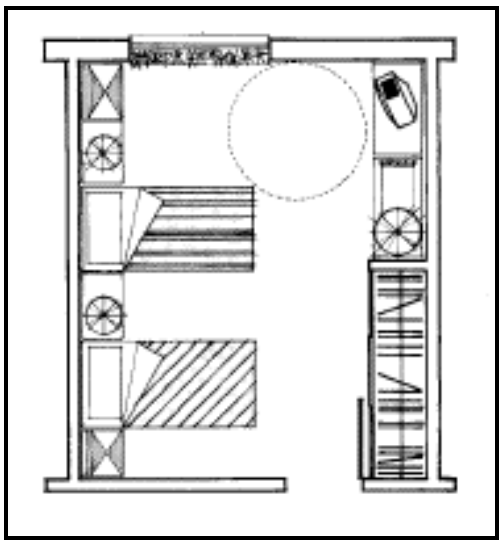
The living room will be used for entertaining friends and family, as well as watching television, listening to music, reading and other individual activities. Residents will arrange furniture and use space in their own unique ways, and the design should permit this.

-Sunken living rooms are not recommended.

Legend (see Introduction)	**Specifications**	**Date**
	***HALLS, CORRIDORS, STAIRS** COMMON FEATURES: FLOORING WALLS DOORS HARDWARE LIGHTING	
367906606	lighting level at least 200 lux at top and bottom of stairs, ramps and other changes in elevation	
	***LIVING ROOMS** (sitting room, den, family room, etc.) COMMON FEATURES: FLOORING WALLS WINDOWS DOORS HARDWARE LIGHTING AIR	
	space for 1 wheelchair in room without interfering with circulation	
	controls for TV, hi-fi and audio equipment not more than 1200 mm (4 ft) above floor	
	cordless or long cord on telephone: 4 m (13 ft)	

BEDROOMS

-In a one-bedroom unit, the bedroom should be large enough for two twin beds and other required furniture (dresser, night table, chair) while allowing a wheelchair user the space needed to approach and transfer to the bed. The resident should be able to reach both sides of the bed to make it. Cable and telephone outlets should be provided, and the bathroom should be nearby.



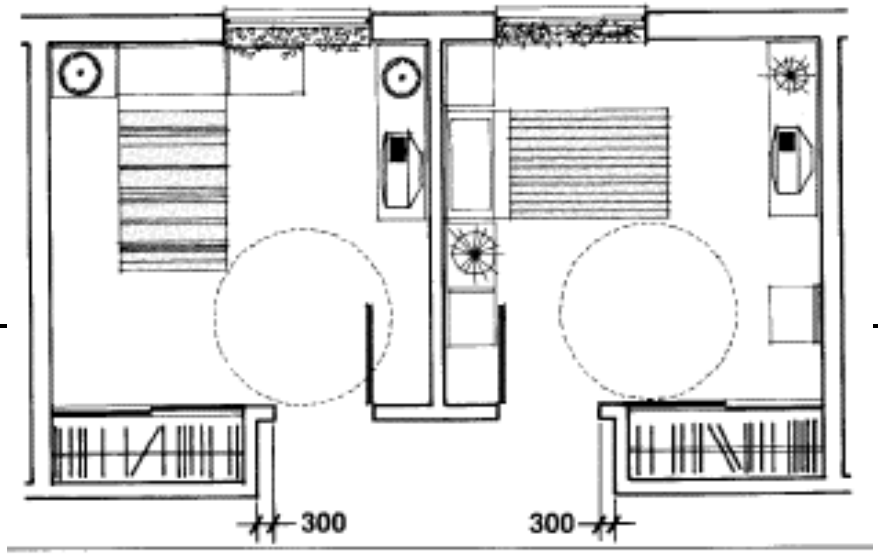
-In a double unit, the second bedroom should be large enough and properly equipped to provide an equal standard of accommodation to both residents.

-If a switch is provided by the bed, residents can control overhead lighting when they get out of bed in the middle of the night.

-The window should be low enough to see out and enjoy an attractive view during the day from the bed or a seated position. Windows in the bedroom should open to permit fresh air ventilation.

-Some provision for out-of-town family or visitors may be planned, such as a guest suite in the building or an extra room in the dwelling unit.

Figure 31: Examples of good bedroom layouts. The turning circle indicates that these rooms can also accommodate a wheelchair user.



Legend (see Introduction)	**Specifications**	**Date**

6.66045268e+16	***BEDROOMS** COMMON FEATURES: FLOORING WALLS WINDOWS DOORS HARDWARE LIGHTING AIR SAFETY person in wheelchair can enter (but not necessarily use) all bedrooms and move forward and backward in a passage at least 700 mm (28 in) wide at least one bedroom accessible to wheelchair user Accessible bedroom has: controls for TV, hi-fi and audio equipment not more than 1200 mm (4 ft) above floor visual alarm system that responds to the frequency of smoke and fire alarms emergency call system within reach of pillow to call superintendent, neighbour or relative or a telephone alert system; both monitored 24 hours cordless or long cord (4 m/13 ft) telephone at least 1200 mm (4 ft), preferably 1500 mm (5 ft) space between bed and closet hanging rod and coat hooks not more than 1400 mm (56 in) above floor shelving and drawers accessible to wheelchair	

BATHROOM

-Door locks in bathrooms must have an emergency release.

-Light should be strong enough that a person behind the shower curtain can see (suggest a light-coloured shower curtain). Avoid lighting fixtures that would be reflected in mirrors, causing glare and disorientation.

-Specify a backing of plywood behind the wallboard in bathrooms so grab bars can be installed when and where required by residents. Since it is impossible to place a grab bar near the toilet that will satisfy the needs of every user, it might be wise to delay installation of this important feature until the resident has moved in. If towel racks are installed where they might be used as grab bars, they should be strong enough and securely installed so they can support a person's weight. Wall-mounted soap dishes should not have handles, so they will not be used for support.

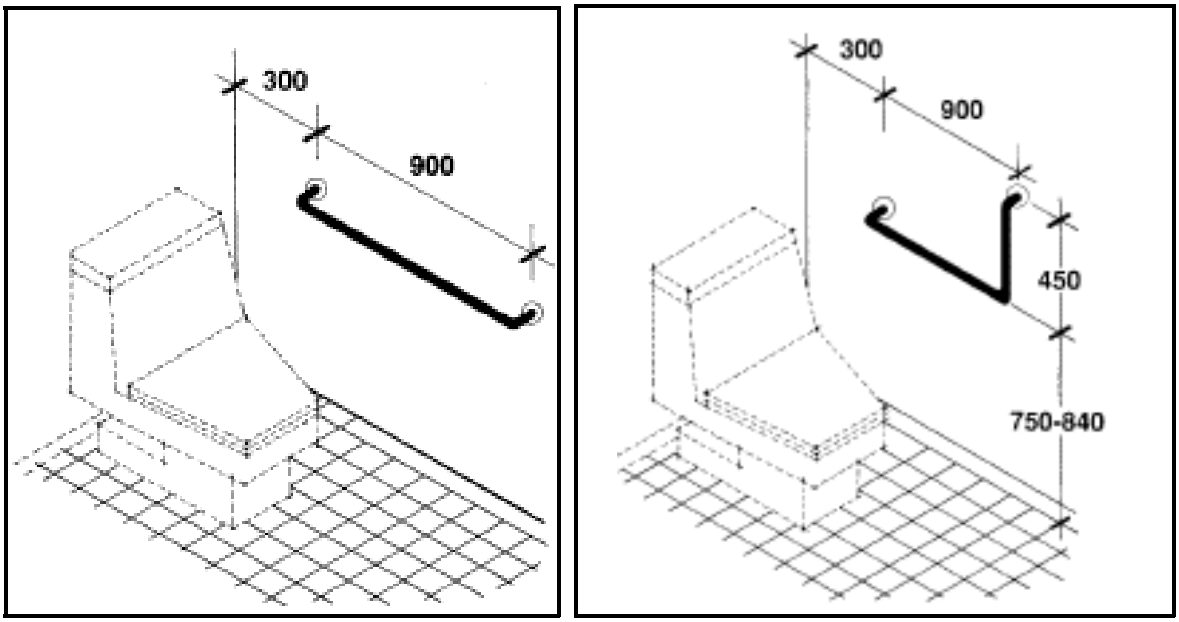


Figure 32*: These are the most common grab bar installations, but height and length can vary considerably with the needs of the user.*

Legend (see Introduction)	Specifications	Date
3.78012368e+45	***BATHROOM** COMMON FEATURES: FLOORING WALLS WINDOWS DOORS HARDWARE LIGHTING AIR SAFETY door swings out of room sliding door preferred reachable outlet for plugging in razor, hair dryer, etc. bottom edge of mirror not more than 1000 mm (40 in) above floor knee space at least 680x750x200 mm (27x30x8 in) under washbasin pipe insulation or baffle for knee protection faucets are reachable and easily operated washroom accessories not more than 1200 mm (4 ft) above floor and do not create a hazard to blind people flip up grab bars both sides of toilet, or horizontal bar 900 mm (36 in) long 300 mm (12 in) from back wall, or L-shaped grab bar; not a sloping grab bar centre line of toilet 450 mm (18 in) from side wall carrying the grab bar top of toilet seat 450 mm (18 in) above floor (seat adaptor may be used, or a high toilet or a standard toilet on a small pedestal) back support provided where tank type toilets are not used toilet paper accessible from toilet, preferably not at back accessible hand-operated flushing controls	

-If an alarm system exists, it should be accessible from both tub and toilet and equipped with a locator light. Telephones in the bathroom are not uncommon; a jack in the bathroom could supplement or replac an alarm system. Residents may choose to use a cordless telephone in the bathroom.

-Temperature gauge and pressure balancer may be installed to avoid scalding. An alternative is central control of water temperature throughout the building.

-Extra floor space may be needed for storing bathing equipment such as a bath seat or hydraulic lift.

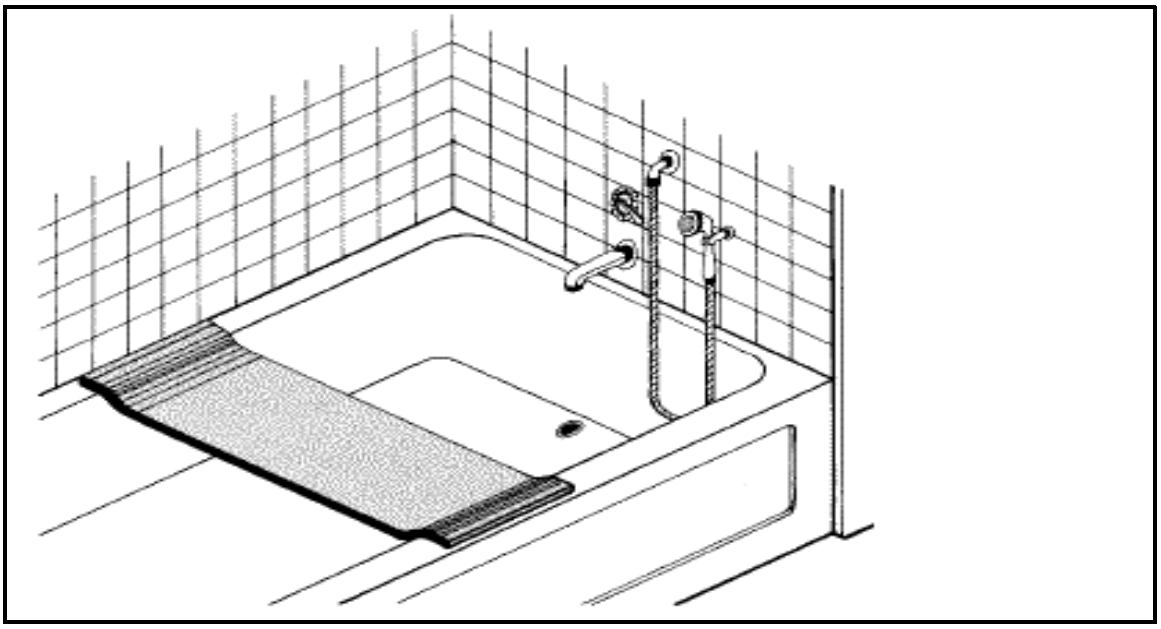


Figure 33: *One of many bath seat designs available. Together with a hand shower, bathing can be safe and comfortable.*

-An accessible shower for wheelchair users can be installed in buildings where thorough waterproofing is possible (such as poured concrete construction). A wheeled shower chair is rolled over sloping thresholds that contain the water. A flip-up seat can be installed to permit use by others who may need to sit whil showering.

An alternative to a roll-in shower is the waterproof bathroom, where most of the walls and floor are tiled and shower fixtures are installed in a corner. Splashing water is contained by a curtain and flows to a central drain; electrical outlets are carefully placed to avoid hazard.

Bathing preferences should be a part of the need/demand study. A mix of bathroom types (tub/shower) in the building should satisfy most users.

Legend (see Introduction)	**Specifications**	**Date**
1.23456789e+53	BATHROOM (cont.) horizontal grab bar on wall alongside tub, 750 mm (30 in) above bathroom floor vertical grab bar on same wall at least 600 mm (2 ft) long (may be part of L-shaped bar) vertical grab bar above edge of tub at faucet end bathtub/shower faucets accessible from wheelchair thermostatically controlled faucets at tub and shower operated by one hand slip-resistant bathtub floor hand-held shower head is on flexible hose extending from wall at tub top or just above it and with clamps or rod and clamps for positioning at different heights, e.g. 850, 1400, 1800, 2000 mm (34, 56, 72, 80 in) room has a device to signal for assistance	

KITCHEN

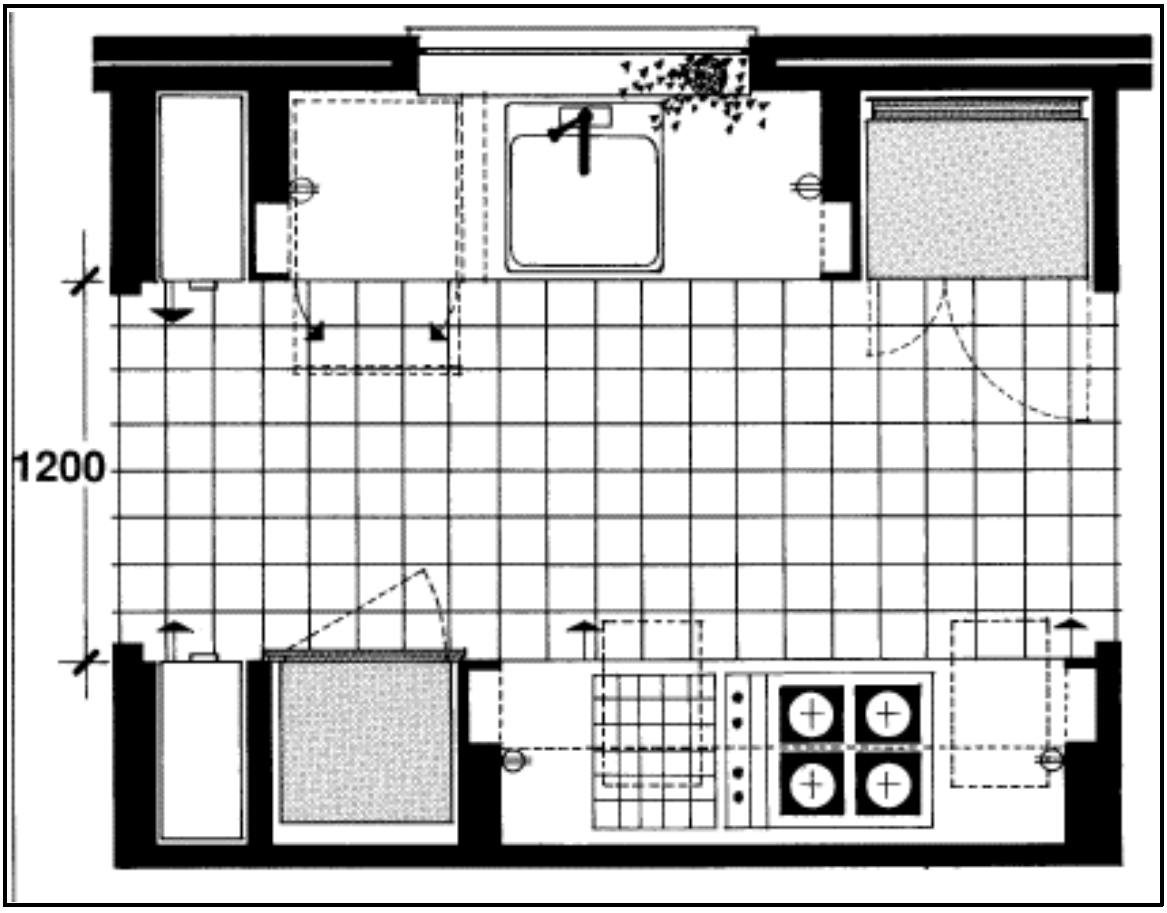
In addition to standard food preparation facilities, kitchens could contain an area for informal eating and entertaining which can be adapted to other uses (hobbies, using the telephone, etc.). Laundry facilities may be included as well. A telephone outlet should be provided in the kitchen, and garbage storage should be nearby.

-the kitchen should be located close to the dining room and to the main entrance for ease of carrying groceries or answering the door.

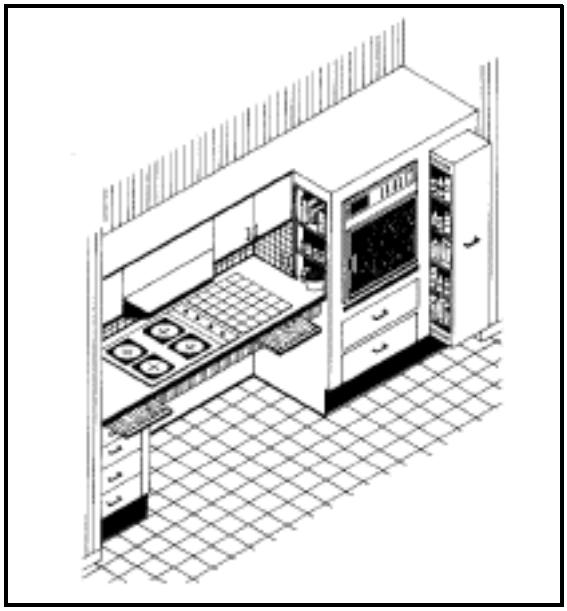
-The lifestyles of potential residents will affect design tradeoffs involving family-size and apartment-size appliances, counter and cupboard space, etc. Space for a dishwasher should be available and plumbing/electrical outlets roughed in.

-Kitchen layout should provide short travelling distances between work stations. Avoid the straight-line kitchen. Galley kitchens should be wide enough to allow a wheelchair to turnm (part of the turning circle can be under open counters) but no wider, so that counters are within easy reach.

***Figure 34**: This kitchen plan incorporates many accessible features into an attractive, efficient workspace. See next page for more detailed drawings.*



Legend (see Introduction)	**Specifications**	**Date**
	***KITCHEN** COMMON FEATURES: FLOORING WALLS WINDOWS DOORS HARDWARE LIGHTING AIR SAFETY	
67806606060	door swings both ways adequate space to manoeuvre wheelchair 1200 mm(4 ft) between counters in galley kitchen, if space under the counters; if not, 1500 mm (4 ft 8 in) are needed counter or table height not more than 900 mm (3 ft) high at least one counter space or pull out cutting board 810-860 mm (32-34 in) high with knee space under it 680 mm (27 in) high wall cupboards 355 mm (14 in) above counters	



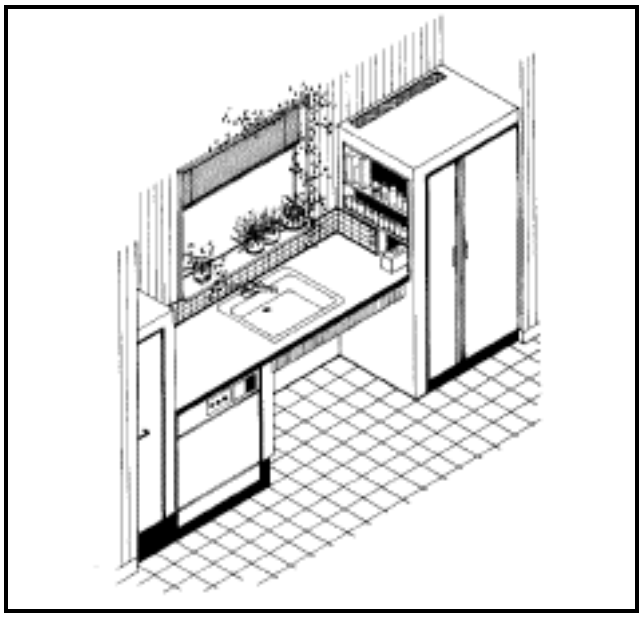


Figure35. *These illustrations show details of the kitchen floor plan on the preceding page.*

-An arrangement of cook-top (in a roll-under counter) and wall-oven (with door hinges on the side and a pull-out shelf underneath) may be more suitable than a standard stove for a resident in a wheelchair. The stove should have front or side (not rear) controls; provide heat proof counters or inserts nearby.

-Some section of counter should be installed at a lower height and left open underneath to permit a wheelchair to roll under or for storage of wheeled carts. Pull-out shelves in counters allow residents to work from a seated position. Shelving should be adjustable to allow for various shapes and sizes of kitchen equipment and supplies. Cupboard latches should be easy to open; magnetic or hinge closing mechanisms are recommended.

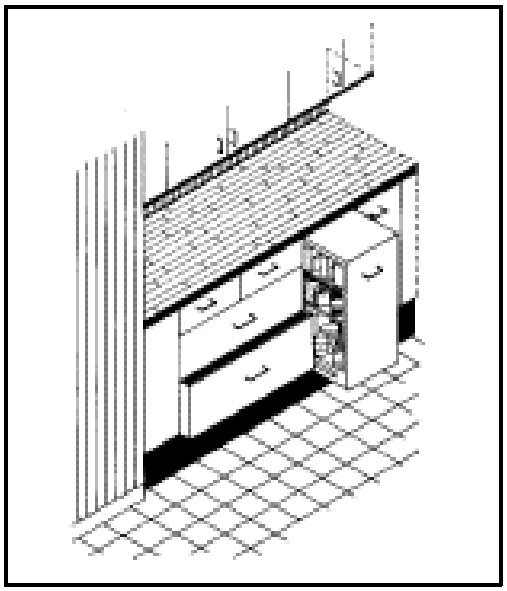


Figure 36: *Pull-out shelving is accessible from both sides. The deep drawers provide more accessible storage than shelving in the same space.*

Legend (see Introduction)	Specifications	Date
6.06706786e+42	**KITCHEN (cont.)** cupboard and pantry shelving reachable from seated position; lower shelf not higher than 1200 mm (4 ft) pull out storage units under counter grabbable handles on drawers and cupboard doors, preferably D-type racks, hanging rods, pot hooks, spice shelves reachable from seated position, 1400 mm (56 in) maximum height 150 mm (6 in) toe space at counter, height 230 mm (9 in) counter receptacles at front or side, not at back (reachable from wheelchair) adequate task lighting over counters and stove flat surface at least 300 mm (1 ft) wide on either side of cooking range and at same level as burners accessible stove controls, i.e. front, side or top but not back of stove exhaust fan controls operable by disabled person refrigerator and freezer shelving accessible from seated position (adjustable shelving recommended) knee space at sink, minimum 680x750x200 mm(27x30x8in) knee protection or insulation on pipes under sink electrical or electronic devices operable by disabled person	

DINING ROOM

Depending on the space available, the dining room can be a separate room of its own or an extension of the living room.

-The dining room should be close to the living room and the kitchen, but it should be possible to close off the kitchen if desired. For example, shutters may be used on a pass-through hatch. If the dining room is an extension of the living room, the design should allow the resident to make the room feel separate and more intimate.

-It should be possible to control the lighting level.

STORAGE/UTILITY

Storage areas in the unit should be close to the areas where the stored items are used. Doors and shelving should permit safe and efficient use of space appropriate to the items stored. The unit should have enough storage space for suitcases, winter clothing and other accessories.

-Doors should permit access to the full length of closets and storage areas. Sliding or bifold doors are preferred.

-Shelving located within knee to eye range is the most accessible. Adjustable shelving, not too deep, is preferable. Extra shelving can be mounted on doors.

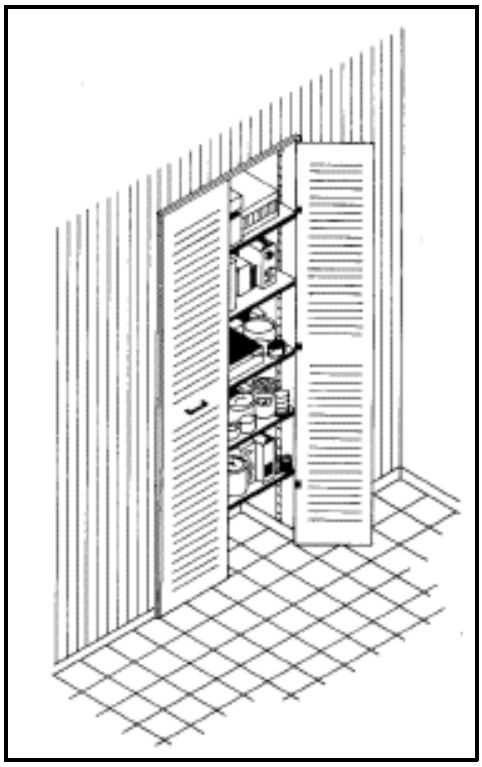


Figure 37. *Narrow doors and shallow, adjustable shelving make this pantry adaptable to any user.*

storage

REFERENCE

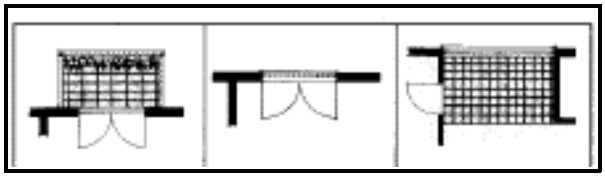
Housing the Elderly. Canada Mortgage and Housing Corporation. Available from regional offices of CMHC.

Legend (see Introduction)	**Specifications**	**Date**
	***DINING ROOM** COMMON FEATURES: FLOORING WALLS WINDOWS DOORS HARDWARE LIGHTING AIR	
666060	space for 1 wheelchair at table without interfering with circulation knee space at table at least 680 mm (27 in) high and 750 mm (30 in) wide	
	***STORAGE/UTILITY** COMMON FEATURES: DOORS HARDWARE LIGHTING SAFETY	
	storage shelving within range of 200-1400 mm (8-56 in) above floor circuit breakers no higher than 1200 mm (4 ft) above floor	

BALCONY

For apartment dwellers, the balcony offers an important opportunity for enjoyment of the outdoors. It should, above all, be accessible; also safe, private, sheltered from extreme weather, offer an attractive and interesting view from within the unit, and be large enough for outdoor furniture, plants, etc. Doors should be light and easy to open and close, yet secure.

If engineering problems are going to make it impossible to construct accessible balconies, alternative approaches are the sunroom (solarium or Florida room) or French balcony, as shown below.



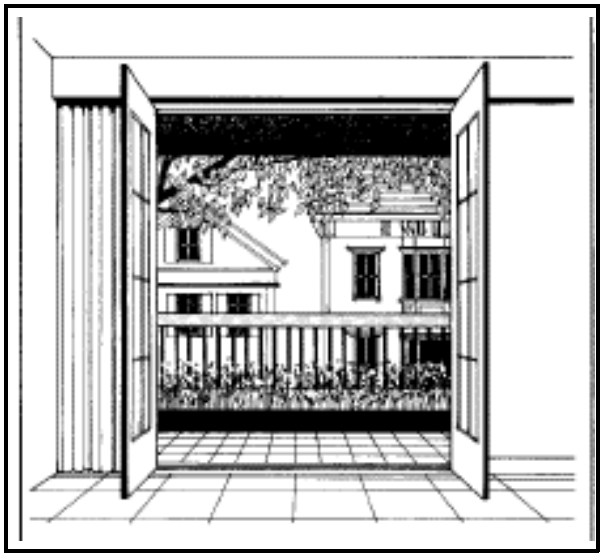
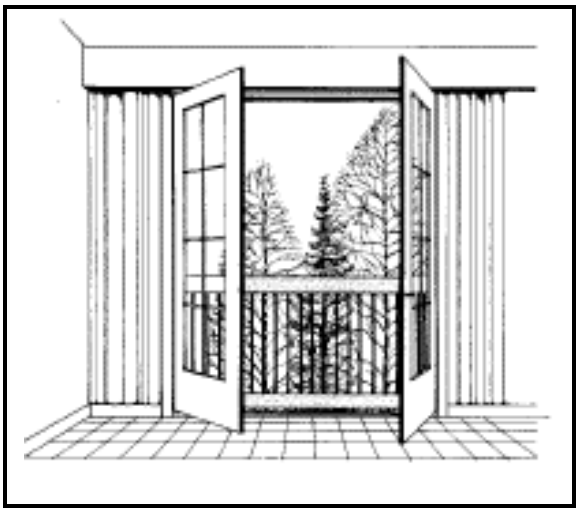
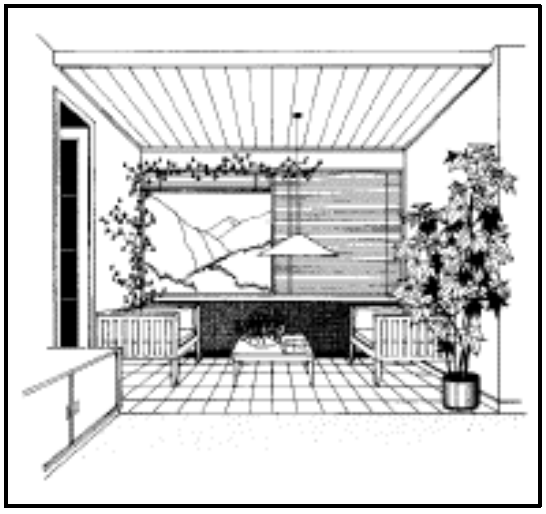


Figure 38: *Three balconies and their floor plans. The French balcony and solarium are generally less expensive to construct and offer year-round use.*





Legend (see Introduction)	**Specifications**	**Date**
	BALCONY	
6	private balcony is accessible to wheelchair user from dwelling unit (no high threshold)	

FLOORING

-Flooring should be low maintenance,
-Floor coverings should not disorient people particularly in heavy traffic areas such as with confusing patterns, abrupt changes or kitchen and bathroom. Lack of visual cues for changing levels.

WALLS
-Finishes should be soil-resistant and easy to clean. Avoid glare-producing white walls opposite large expanses of windows.
-Adequate soundproofing reduces noise from within and outside the unit.
-Colour and pattern have strong effects on people.
-Locate studs for easy installation of railings or grab bars. Walls should be easy to nail into to allow personalized picture-hanging; on hard surfaces, provide a picture-rail.

REFERENCE

A survey of colour preferences of people over 65. C. Grant Marshall. University of Manitoba: Department of Interior Design, Faculty of Architecture, 1980.

WINDOWS

-Handles on opening/closing/locking mechanisms should be large so they can be grasped with minimal dexterity and to allow greater leverage. Control should be by simple push/ pull movements, not turning or twisting. Moving parts should be easy to maintain and lubricate, and designed to avoid freezing or collecting ice and snow in cold weather.

-Siting should provide a good level of natural light and the best views possible. Units in lower floors may require special security devices such as bars, locks or alarms.

LIGHTING

-Dimmer switches should be installed to provide a range of light levels for different activities. Proper metal shielding will prevent interference with hearing aids.

-Avoid glare-producing direct lighting. Mirrors should be placed carefully with this in mind.

-Switches to control wall outlets for individual lamps should be located so residents can turn on the lights from the door.

-Choose lighting fixtures that can be lowered or are easy to reach to replace a bulb.

Legend (see Introduction)	Specifications	Date
3.90123457e+131	***FLOORING** non-glare floor surfaces slip-resistant floor surfaces carpeting is securely attached, with pile less than 13 mm (½ in) and firm underpad or no underpad floor mats or throw rugs/carpets do not slip or bunch up under wheels or walking feet ***WALLS** non-glare finish on walls non abrasive wall surfaces wall surfaces do not reflect sound excessively no wall projections greater than 100 mm (4 in) within a range of 685-1800 mm (27-72 in) above floor ***WINDOWS** window sill height 760 mm (30 in) or less window-operating device reachable from wheelchair window controls usable by person with limited dexterity control of unwanted light is possible (drapes, screens, blinds, shutters) sound absorption materials to cover glass control of sound transmission through glass by using proper selection of glass and glazing materials ***LIGHTING** at least 50 lux illumination at floor level lighting is even and well-diffused to eliminate spottiness or shadows ballasts for fluorescent lights are of a type that does not cause interference with hearing aids supplementary task lighting is available where needed	

DOORS AND DOORWAYS

-Door swings should be designed to permit maximum space in the room, such as an outward swing in the bathroom. Sliding, accordion or bifold doors are possible alternatives. Good quality fittings will last longer and require less maintenance.

-A kickplate may be needed to protect the door when a foot must be used to open it (when carrying packages, serving food, using crutches or a wheelchair). In public areas, some doors, frames and comers may have to be protected from wheelchair damage.

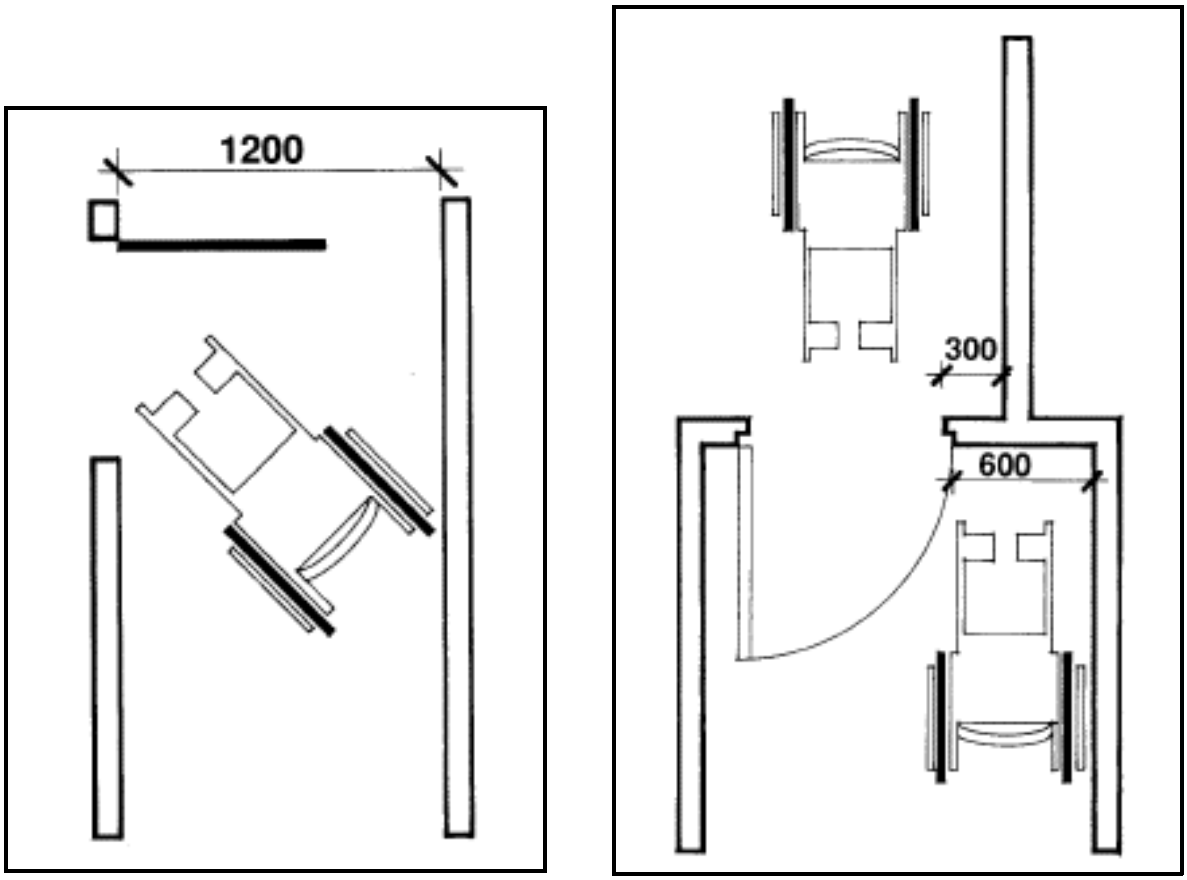


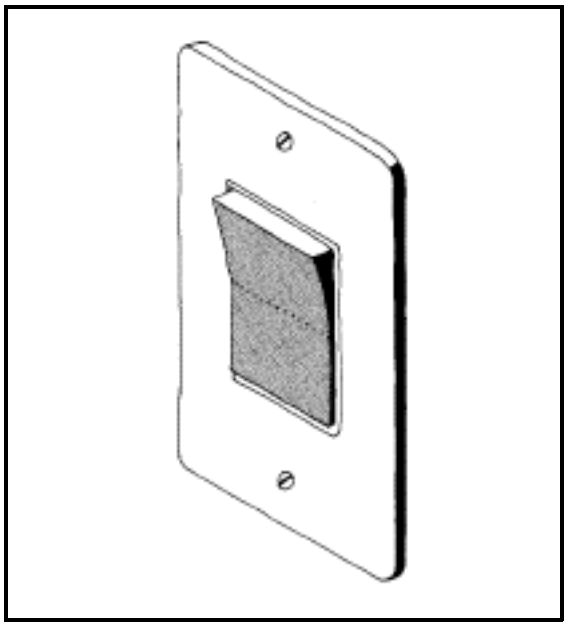
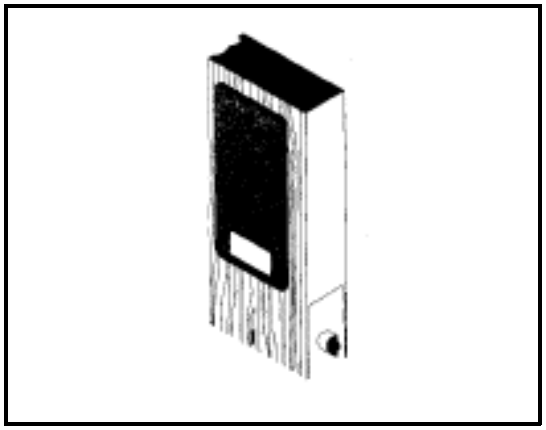
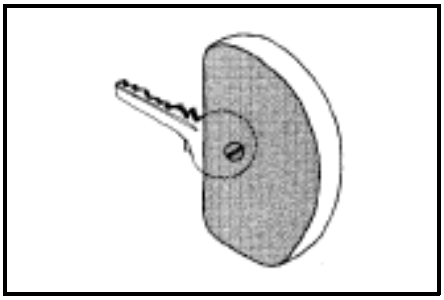
Figure 39: *(left) Wheelchair users need corridors 1200 mm (4 ft) to turn into a doorway measuring 810mm(32in). (right) Where a door opens toward the wheelchair user, a 600 mm (2 ft) space should be provided at the latch side of the door. If the door opens away from the wheelchair user, only 300 mm (1 ft) is required. In both cases shown here, the clear opening of the doorway can be 760 mm (30 in) wide since access is straight on, but 810 mm (32 in) is recommended.*

DEFINITION

Newton (N): a unit measure of force; in this case, the amount of effort required to open a door.

Legend (see Introduction)	Specifications	Date
	***DOORS AND DOORWAYS**	
6	space beside a door swinging toward wheelchair user is minimum 450 mm (18 in), preferably 600 mm (24 in)	
6	space beside door swinging away from wheelchair user is 300 mm (1 ft)	
2 67 0	minimum 810 mm (32 in) clear doorway opening; may be reduced to 760 mm (30 in) if access is straight on	
67	door handles 760-900 mm (30-36 in) from floor	
678 0	easily operated hardware on manual doors	
67890	lever door handles	
678 0	door closer requires maximum pressure of 34 N for exterior doors, 22 N for interior doors, 10 N for interior doors operated by frail elderly	
678 0	delayed action door closer provides adequate time to pass through	
2 67890	threshold is not more than 13 mm (½ in) high	
	***AIR**	
12345678901	resident can control air temperature and humidity level in own unit	
12345678901	insulation and vapour barriers are used to reduce draughts	
12345678901	air circulation, exchange and adequate ventilation are assured, quiet, easily maintained and adjusted	
1	dust-generating building materials and finishes are avoided	
1	dust-generating fabrics are avoided	
1	common use spaces are dust-free (i.e. vacuumed regularly)	
1	properly maintained filters in air handling systems	

HARDWARE AND ELECTRICAL

-Install large rocker switches so they can be controlled easily. Some models glow in the dark.	-Locks and latches should have large, easily manipulated knobs or levers. Keys may require an adaptor to make them larger, or push-button or card-access locks can be installed.
 ***Figure 40:*** *(above) Rocker-panel light switch* ***Figure 41:*** *(right) A simple home-made key adapter.*	***Figure 43:*** *A push-button lock.*  
	Figure 44: *(below) A lever door handle, curved to prevent catching on clothing. Available with or without locking mechanism and in many designs.*

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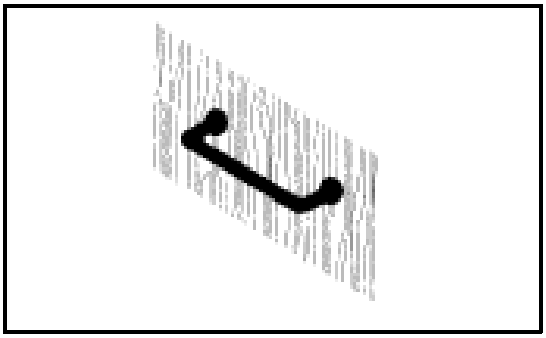
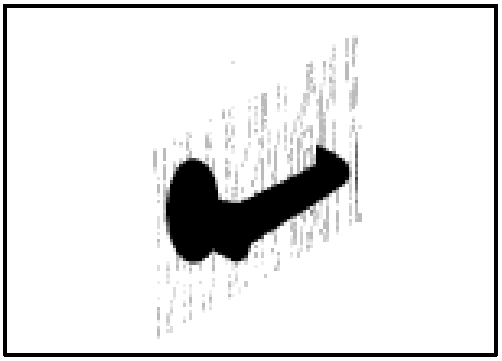
<td> 

Figure 42. (above) Cupboard and drawer handles should be large enough for the user to grasp them with minimum dexterity.</td>
<td>  </td>
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<td>-Hinges should swing easily and be strong enough to take an individual's weight in case of a need for support.</td>
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<td>-Telephone and cable outlets should be prewired in several rooms.</td>
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Legend (see Introduction)	**Specifications**	**Date**
	***HARDWARE AND ELECTRICAL**	
6 0	**light switches 835-1065 mm (33-42 in) above floor**	
6 0	**controls (temperature and ventilation controls, fire alarms, locks, windows, intercom) all within reach of wheelchair user, maximum 1200 mm (4 ft)**	
67 0	**wall receptacles 400-530 mm (16-21 in) above floor**	
5	**avoid dimmer switches, transformers, coils or unshielded wiring that cause electro-magnetic interference in audio systems or hearing aids**	
8 0	**faucets are easy to grasp and control with lever action, not rotation**	
8 0	**lever door handles have curved or angled end to avoid snagging clothing**	

SAFETY AND SECURITY

-Review carefully the fire alarm system. Research is now being conducted into the tradeoffs between alerting residents and the psychological and physical effects of sudden and very loud noises.

-Evacuation routes and procedures should be posted, explained and practised.

-In private homes, programs such as Neighbourhood Watch can enhance security.

ALARMS

Hearing-impaired and deaf persons may need a flashing strobe light connected to the audio alarm system. In the home, a sound-detecting alarm can be installed which responds to the telephone, doorbell or a baby's cry and then flashes a lamp or activates a remote vibrating unit worn on the person.

Residents should have continuously monitored fire and personal alarm systems. Call switches should be located at an accessible height in public areas, public washrooms, etc., as well as in dwelling units.

The telephone is also a good alarm system, especially with cordless, portable telephones readily available and easy to use.

Also available in most cities are personal alarm systems which consist of a switch worn on the person and an automatic telephone dialing system that dials a central monitoring agency, which in tum calls a relative or friend, ambulance, police, etc. as specified in the agreement.

With all alarm systems, it is essential that someone be on the other end to respond to an emergency.

Figure 45. An alarm system designed for home use by a hearing-impaired or deaf person. Sounds are translated by the control unit into the visual signal of a flashing lamp.

Legend (see Introduction)	Specifications	Date
	***SAFETY AND SECURITY**	
12345678901	**CSA-approved safety equipment installed as necessary (e.g., smoke alarms, fire alarms, alarm pulls, hose bib in public-use corridors, personal fire extinguisher in dwelling unit)**	
2345 9	**emergency signals are both audible (bell, siren, buzzer) and visible (strobe light)**	
345 9	**flashing lights automatically activated in emergencies**	
678901	**intercom or emergency alert system available to communicate with manager/office**	
45	**TDD/TTY (Visual Ear, etc.) available for emergency communication with deaf and hearing impaired**	
6 0	**emergency controls and equipment no higher than 1200 mm (4 ft)**	
678 0	**emergency evacuation chairs available to firefighters**