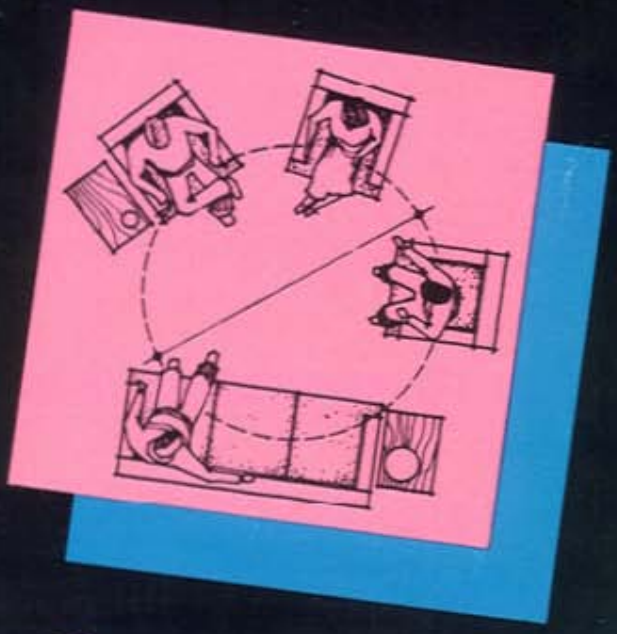
Canada Mortgage and Housing Corporation
Société canadienne d'hypothèques et de logement

INTERNAL SPACES OF THE DWELLING

Advisory Document



Canada

NHA 5791 05 85

Canada Mortgage and Housing Corporation, the Federal Government's housing agency, is responsible for administering the National Housing Act.

This legislation is designed to aid in the improvement of housing and living conditions in Canada. As a result, the Corporation has interests in all aspects of housing and urban growth and development.

Under Part V of this Act, the Government of Canada provides funds to CMHC to conduct research into the social, economic and technical aspects of housing and related fields, and to undertake the publishing and distribution of the results of this research. CMHC therefore has a statutory responsibility to make widely available, information which may be useful in the improvement of housing and living conditions.

This publication is one of the many items of information published by CMHC with the assistance of federal funds.

CMHC
Canada's Housing Agency

INTERNAL SPACES OF THE DWELLING

Advisory Document

Aussi disponible en français sous
le titre de *Aménagement des
espaces intérieurs*

Canada Mortgage
and Housing Corporation

Société canadienne
d'hypothèques et de logement

©Canada Mortgage and Housing
Corporation, 1984

ISBN 0-660-11650-2
Cat. No. NH17-25/1984E

Printed in Canada

Contents

Tables

Foreword

Canada Mortgage and Housing Corporation (CMHC), the agency responsible for administering the National Housing Act, establishes recommended standards for the planning and design of housing in Canada. These standards are generally of an advisory nature for the Corporation's insured lending functions, and mandatory for social housing programs. Those persons seeking National Housing Act assistance or benefits should consult their local CMHC office to confirm the status of their project.

CMHC publishes advisory documents to promote sound planning and design. The present publication is one of this series. It examines the factors that determine and affect the use and design of the dwelling's internal spaces and recommends minimum space sizes and dimensions that respond to people's everyday living patterns. These recommendations assume that the dwelling's occupants are normal able-bodied persons and that their activity patterns are consistent with the norms of present-day Canadian culture. Designers of dwellings for special user groups (such as the elderly or handicapped people) or for cultural activities should consult specific sources for information.

Acknowledgments

Canada Mortgage and Housing Corporation wishes to acknowledge that the research and preparation of this publication was carried out by the consulting firm of Pierre Teasdale, Architect, Montreal.

All phases of the project were supervised by John Archer, Research Division, Policy Development and Research Sector, Canada Mortgage and Housing Corporation.

Introduction

This publication sets out recommendations for the design of dwellings that are responsive to the needs of their occupants. It is based on research into residents' social and psychological needs — called "user needs research". This is a field of inquiry that has increased dramatically over the past ten years; a great deal of literature is now available and this was reviewed and analyzed in the preparation of this advisory document. For the most part, the review concentrated on studies carried out in Canada, but it also examined the findings of research studies conducted in the United States, Britain, Sweden, Denmark, Belgium and West Germany. Approximately 4 000 quotations were extracted and indexed according to four sets of key words corresponding to the following design variables:

- type of *Unit Space/Room*
- type of *User*
- type of *Behaviour/Activity/Movement*
- type of *Problem* encountered in using space.

Internal Spaces of the Dwelling is based on fifty case studies of different dwelling types in Canada. A scale drawing was made that incorporates detailed furniture layout plans of each dwelling. An analysis of these plans provided additional insight into the types and numbers of pieces of furniture found in different kinds of rooms. All rooms were photographed. Residents were interviewed; they were asked who used the various rooms, what went on in these rooms, and what problems were encountered in their use. This intelligence enabled the writers to identify "Problem/Appreciation" sources precisely and spontaneously.

Four approaches to developing design recommendations were considered in the preparation of this advisory document.

Unit Spaces
This approach uses as models, currently accepted building elements (living rooms, dining rooms, bedrooms, and so on) and abstracts from these important and desired performance requirements.

User Categories
This approach identifies specific occupant groups in each dwelling (parents, children, infants, and so on) and formulates performance requirements for spaces to meet the needs of each group.

User Activities
This method starts with user activities (food preparation, maintenance, child care, and so on) and specifies certain dynamic criteria for spaces to allow these activities to take place with the minimum amount of disruption.

Problem or Stress Locii
A fourth approach considers problems, stresses or external forces, and then identifies design criteria to help avoid the problem (for example, avoiding glass that may easily be shattered) or to minimize the stress caused by incompatible activities (for example, avoiding the juxtaposition of rooms that might create friction between adults and teenagers).

Eventually, the *Unit Spaces Approach* was adopted for the advisory document for two reasons. Most of the literature covered in the review adopted this approach, and it appeared to offer the designer an easier way of designing and evaluating dwellings.

Every effort has been made to bring together two views that are somewhat at variance: 1) the literature clearly demonstrates that individuals and households have widely divergent preferences for the design of space, but 2) there are common attitudes and shared preferences among certain groups of users. In order to reconcile these two insights, the advisory document is based on carefully considered variations in room size, the relationship between rooms, the usable floor area, generous openings between spaces and, most particularly, the fact that rooms are sometimes designed so specifically for one purpose that it is impossible to use

them for others. Essentially, it recommends that the dwelling be designed in such a way that there is a minimum predetermination of the patterns of use and also that the design features do not inhibit the choices of use. That decision rests with the occupant. The Unit Spaces Approach also recognizes that:

- the dwelling's raison d'être may change over the course of the first occupant's life
- dwellings inevitably outlast their original occupants
- occupants often do not use their dwellings in the manner that the designer anticipated.

Nevertheless, dwellings should not be entirely adaptable. Certain portions require more flexibility, other portions require more permanence. External orientation and structural and mechanical systems are difficult or costly to change and therefore affect space functions for relatively long periods of time. If their location and design are chosen carefully, the long-term adaptability of the dwelling can be significantly improved. An important step in the preparation of plans for dwellings is to ask the question, "How easily can this dwelling evolve with changing occupants and the passage of time?"

Most of the eight chapters have been organized according to the following sequence, which attempts to reflect the order in which information is required in the design of a space:

1. Information is required about the *Space Function*, (that is, about the activities going on in the space).
2. Information is required about the minimum *Sizes* and number of pieces of *Furniture* required to support the above activities.
3. Information is required about the minimum *Clearances* required for the performance of these activities, and for the use and access to furnishings.
4. Based on the above information and taking into consideration household size and dwelling type, corresponding minimum *Space Size and Number* requirements may be established.
5. Information is required about the minimum *Storage Space*.
6. At this stage, the ideal *Space Configuration* may be sought.
7. Finally the ideal *Space Location* (i.e., the ideal relationship of the space with respect to the exterior and the other spaces within the dwelling) may be determined.

A typical section comprises a series of subsections, each containing a design guideline. This guideline states a design issue, problem or user requirement that is commonly encountered. It is followed by a *Recommendation* of one or more conditions to be achieved. Sometimes, to illustrate how the issue might be resolved, a design suggestion is incorporated in the recommendation.

A number of subsections do not contain statements of issues, recommendations or design suggestions, but simply state an *Observation* derived from user-needs research. In other subsections a series of tables are presented to demonstrate the advantages and disadvantages of different ways of resolving issues. Observations and tables are usually found where research findings indicate that the preferences of residents are varied.

It is the hope of CMHC that by using this advisory document:

- designers will be better equipped to translate user requirements into appropriate building forms
- promoters will be better informed and will be able to make reliable statements about the family types that their dwellings might be better fitted to accommodate
- housing regulation officials will be better equipped to control the quality of housing proposals
- most people will be better informed when they have to decide which type of dwelling is most suitable to them.

1 Entrances, Vestibules, Halls and Corridors

A certain number of definitions are required at the outset of this chapter (Figure 1):

Entrance: a place for entering the dwelling, or an opening in a wall that can be closed off by a door. A doorway.

Primary Entrance: often referred to as the "front door"; a formal dwelling doorway where the dwelling's address is displayed.

Secondary Entrance: often referred to as the "back door"; a dwelling doorway that is usually related to the dwelling's service functions (kitchen, utility space).

Tertiary Entrance: a doorway that is used only in certain weather conditions; a sliding door giving onto a balcony from a dining room, living room or bedroom.

Vestibule: a small hall enclosed by an outer and an inner door intended to modify cooling or warming effects caused when the entrance door is opened. Some dwellings have a hall as well as a vestibule.

Hall: an entrance foyer within a dwelling unit; a transition space between the entrance and the other spaces within the dwelling.

Corridor: a space in a dwelling primarily intended to provide a passageway between rooms.

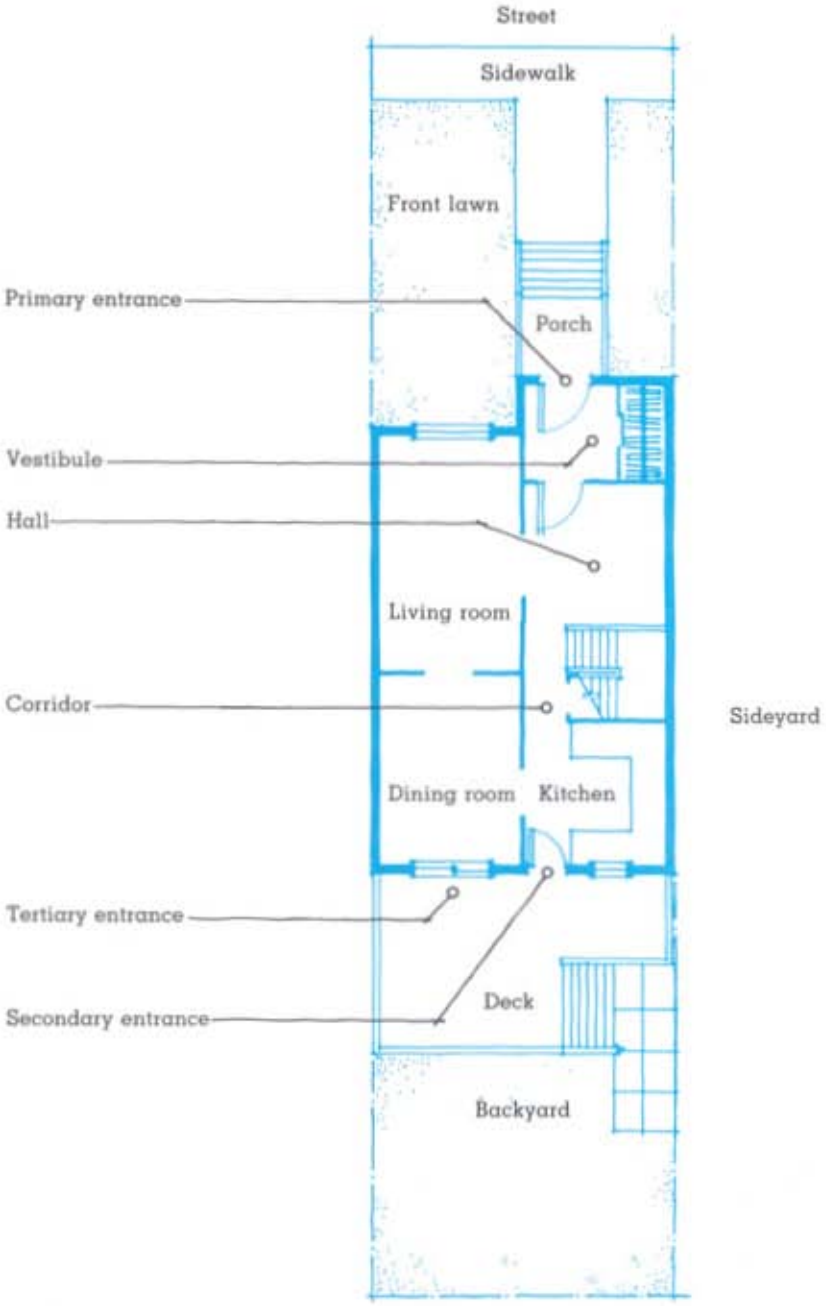


Figure 1
Plan illustrating definitions of entrances, vestibules, halls and corridors

Not to scale

Space Function

Primary and secondary activities that typically take place in vestibules, halls and corridors are:

Vestibules and Halls

Primary Activities	Secondary Activities
Access and egress	Storing baby carriages/ strollers
Removing and storing clothes/boots	Storing tricycles/ wheeled toys
Dropping off parcels	Storing skis and skates
Receiving visitors	Telephoning
Helping on/off with coats	Sitting at a desk
Picking up mail	

Corridors

Primary Activity	Secondary Activity
Circulation	Children's play
	Sitting and working at a desk
	Telephoning
	Laundering in an alcove adjacent to a corridor

Furniture Requirements

Minimum furniture allowances are required if occupants are to carry out some of the above activities in the vestibule. These are listed below, together with their horizontal dimensions.

The only primary activities requiring furniture support in vestibules are "sitting to remove boots" and "dropping-off parcels". These activities may be accommodated by a chair and a shelf, or by a bench wide enough to allow a person to sit and set down a few parcels.

Recommendations

- 1 chair 450 x 450 mm

plus

- 1 shelf 450 x 600 mm

or

- 1 bench 450 x 900 mm

Clearances

Clearances should be provided in vestibules, halls and corridors for access, movement and circulation. They should allow larger items of furniture to be moved about the house (upright pianos, king size beds, chesterfields and so on). In some cases, greater clearances are required to satisfy the needs of elderly people, wheelchair users and invalids.

Recommendations

Recommendations for clearances within vestibules, halls and corridors are shown in Figures 2 to 5. Ceiling height should be 2 100 mm.

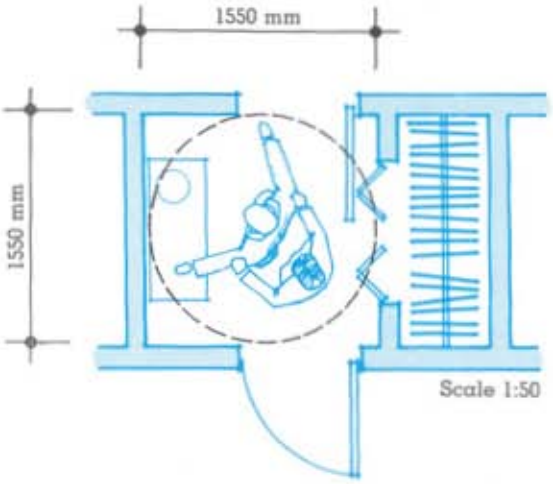


Figure 2
Removing clothes and boots, and helping someone put on a coat in a vestibule or hall: recommended clearances 1550 mm

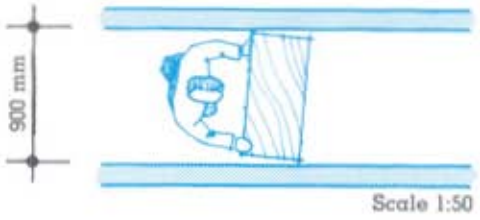


Figure 3
Circulating and moving large items of furniture in a corridor: recommended clearance 900 mm

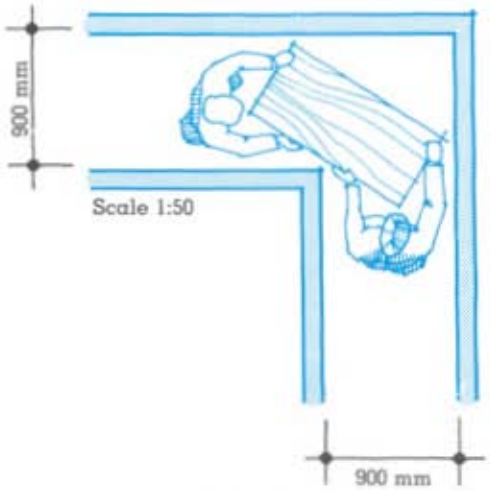


Figure 4
Circulating and moving large items of furniture in a corridor corner: recommended clearance 900 mm

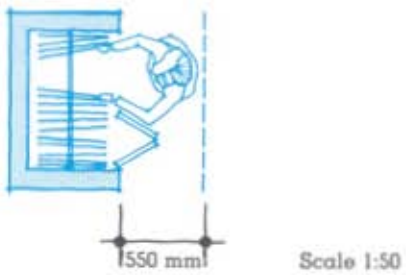


Figure 5
Storing coats in a closet: recommended clearance 550 mm

Space Size and Number/Entrances, Vestibules and Halls

In the case of spaces such as the dining room, the living room and bedrooms, it is necessary to relate room area and number of rooms to household size. The area and number requirements for entrances, vestibules and halls, however, are related more to users, dwelling, site and characteristics other than household size. Design recommendations can be made on the basis of these characteristics, establishing a minimum vestibule and hall size that may be used in lieu of the minimum requirements for Furniture and Clearances.

Recommendations

1. A clear distinction should be made between the principal (front) entrance and the secondary (back) entrance.

2. Certain types of dwellings, such as the row house with street access and back garden, should have a direct access from the dwelling to each area.

3. Direct access should be provided to adjacent public spaces outdoors and amenity or circulation links leading to such spaces.

4. Primary and secondary entrances should not open onto formal areas of the dwelling where floors, walls and furniture will be sensitive to dirt and water. For example, muddy shoes and other dirty apparel should be removed in the kitchen rather than in the dwelling's principal living room.

5. Fire safety should be kept in mind when the number of entrances are determined. In general, there should be at least two separate escape routes or exits from each living space.

6. In many parts of Canada, both primary and secondary entrances should be provided with vestibules to control the entry of snow, rain, mud, dust, insects and noise, and to protect the interior when temperature and humidity differences with the exterior are pronounced.

   Where a vestibule cannot be provided at both primary and secondary entrances, it should be located at the dwelling entrance that is likely to be used most frequently.

7. Dwellings should contain a receiving space or hall for dealing with visitors whom residents wish neither to leave on the step nor invite into the more private areas of their dwelling.

8. Minimum vestibule/hall size. A vestibule that will accommodate one bench, and be roomy enough to allow people to take off or put on their outdoor clothing, should have a minimum size of 2.40 m^2 (Figure 2).

   In colder regions of Canada, larger vestibules are recommended. These vestibules besides being "climate locks", function 1) as storage spaces for bulky winter clothing and 2), as areas large enough for welcoming and saying goodbye to guests without having to open the outer door.

Coat Closets

Each dwelling should have built-in storage space for hats, gloves, coats, boots and umbrellas at the primary entrance (see Table 1).

Additional coat storage space should be provided at the secondary entrance. This tends to be the usual place for hanging up work clothes and children's play clothes.

Recommendations

1. The space allocated for coat storage at the primary and secondary entrances should be proportional to the size of the household and to the number of bedrooms within the dwelling (Table 1). Walk-in closets should have at least 2 100 mm head room over the required area.

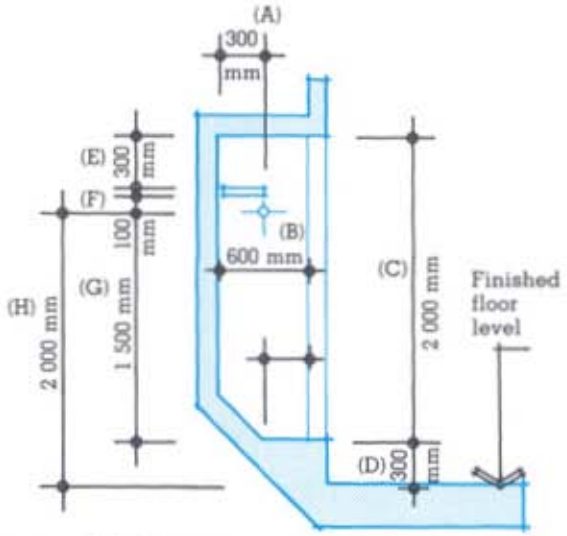
2. At least one entrance coat closet within each dwelling should have an area of 0.55 m^2. The minimum dimension within the required area should be 600 mm (see Figure 6). In dwellings designed for more than two persons, an additional area of 0.10 m^2 should be added for each additional occupant.

3. The coat storage space at secondary entrances should have a free floor space area of at least 0.12 m^2 and a minimum dimension of 400 mm. In dwellings designed for more than two persons, an additional area of 0.06 m^2 should be added for each person over two years of age.

   The space allocated for children's play clothes and for working clothes at the secondary entrance may be left open; hooks can be used instead of clothes rods.

Table 1. Coat Closet Requirements at Primary and Secondary Entrances

Coat Closet Requirements		*Primary Entrances*		*Secondary Entrances*	
Household Size *Number of persons*	Dwelling Type *Number of bedrooms*	Minimum Floor Area m^2	Smaller Dimension *mm*	Minimum Floor Area m^2	Smaller Dimension *mm*
1-2	0	0.55	600	0.12	400
1-2	1	0.55	600	0.12	400
3-4	2	0.75	600	0.24	400
5-6	3	0.95	600	0.36	400
7-8	4	1.15	600	0.48	400



Note: at least 50 per cent of the floor area should be horizontal

Drawing not to scale

A = minimum shelf depth 300 mm
B = minimum closet depth 600 mm
C = minimum height of closet above closet floor area 2 000 mm
D = maximum height of closet floor above room floor level 300 mm
E = minimum clearance above shelf 300 mm
F = minimum distance between shelf and rod 100 mm
G = minimum clear hanging space 1 500 mm
H = maximum height of rod above finished floor level 2 000 mm

Figure 6
Vertical cross-section through typical coat or clothes closet, showing recommended minimum and maximum dimensions

Space Configuration/ Vestibules and Halls

The layout of vestibules and halls should be governed by climate, security, privacy and storage requirements.

Climate

In dwellings at grade, the exterior areas immediately adjacent to entrances should be designed to protect those entrances from bad weather.

Recommendations

1. Protection can be provided by canopies or by recessing the entrance. If the protected area is large enough, it will provide a sheltered space where young children may play and where callers may wait, and a place where a package can be set down while the door is being unlocked.

2. Vestibules should have a floor construction and finish capable of withstanding water, snow and salt without leaking or deterioration. The floor should be one that is easy to clean.

Figure 7
The entrance should be shielded from the living room by a screen or a closet

Security

The entrance's layout and design should allow occupants to see or hear callers before they open the door to receive them.

Recommendations
Callers can be inspected before the door is opened if the following items are provided:

- glazed side lights
- an overlook from adjacent space
- exterior lighting
- an intercom connection to the lobby, with remote vestibule door- locking devices in apartment buildings.

In most instances, occupants prefer to be able to inspect callers without being seen or heard themselves.

Privacy

Recommendation
The vestibule should protect the privacy of the living areas (Figure 7).

Storage

Recommendations

1. Vestibules are transition spaces and require adjacent coat closets so that clothes and other objects can be dropped off or picked up when occupants or guests are leaving or entering the dwelling.

2. Vestibules in family housing should have more than a minimum floor area for storing large articles such as prams and tricycles. (See General Exterior Bulk Storage Space).

Space Configuration/ Corridors

Privacy, efficiency and flexibility should be borne in mind when corridors are laid out.

Privacy

Recommendations

1. Residents should be able to move from the primary or secondary entrance to the bedrooms without passing through the principal living area.

2. Residents should be able to move from the primary entrance to the principal living room without entering the kitchen, dining or bedroom areas.

3. Residents should be able to move from bedrooms to bathrooms without entering any other room. They should not be visible from the principal living room or the primary entrance.

Efficiency

Recommendation

The total dwelling area given over to circulation space alone should be kept to a minimum.

Flexibility

Widening the corridor to more than the minimum can provide flexibility. Furniture and secondary activities can be located in the corridors (bookshelves, desks, pianos, children's vehicles and toys, for instance). This is particularly important in family dwellings without basements. (Figure 8).

Corridors may also provide additional play space for children, offering usable floor area and often long routes, ideal for larger wheeled toys such as indoor wagons and kiddicars.

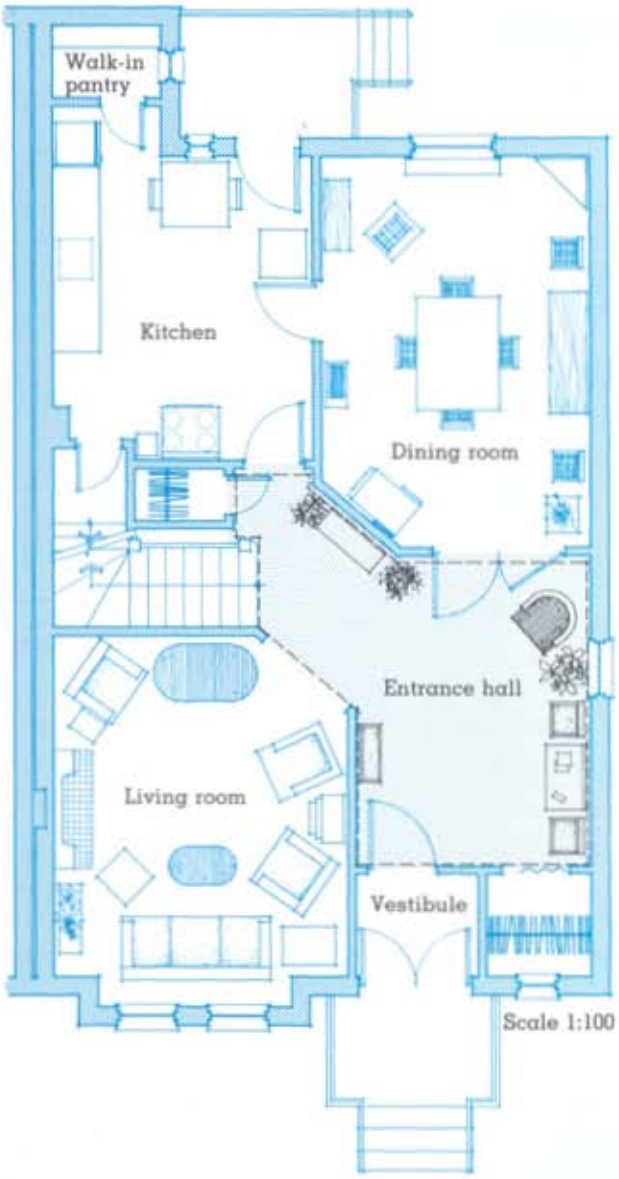


Figure 8
This late 19th-century dwelling shows that generously provided circulation space can be used to locate furnishings needed every day thus freeing up space in the main living room

Entrance Locations

Entrances should be located with regard for privacy, room organization identity, security and maintenance.

Privacy

Most people prefer not to have entrances that open directly into the principal living room or the dwelling's private spaces (Figure 9).

Recommendations

1. There should be no entrance that leads directly into the principal living room. When entry traffic must pass through or by the living room, it should intrude as little as possible.

2. Primary entrances should open directly on a separated vestibule so that living areas are kept as private as possible.

3. Secondary entrances should be located to allow residents or visitors to go from the kitchen and other informal parts of the dwelling (for example, the family room) without disturbing activities in the more formal parts of the dwelling.

Room Organization

The location of tertiary entrances is a matter of preference. There may be some correlation between preferences and the presence of young children in the dwelling.

Recommendation

In general, tertiary entrances should be located where furniture is not likely to be placed (Figures 10 and 11), as well as where doors' swings are not likely to reduce the usable floor space or interfere with the drapery.

Figure 9
The occupants of this dwelling built a low wall to reduce the intrusion of the dwelling entrance into the living area

Identity

Observation

Housing studies have demonstrated that residents preferred to have a private entrance to their dwelling (that is, an entrance that is not shared by other residents).

Security

Control over access to the dwelling is essential for security.

Recommendation

Entrances should enable residents to oversee approaches to their dwelling.

Maintenance

Muddy shoes and wheeled toys can easily soil carpets and damage floors.

Recommendation

Entrances used regularly (the primary and secondary entrances) should open onto transition areas (vestibules and halls) and not onto maintenance-sensitive areas, such as living rooms or dining rooms (Figures 12 and 13).

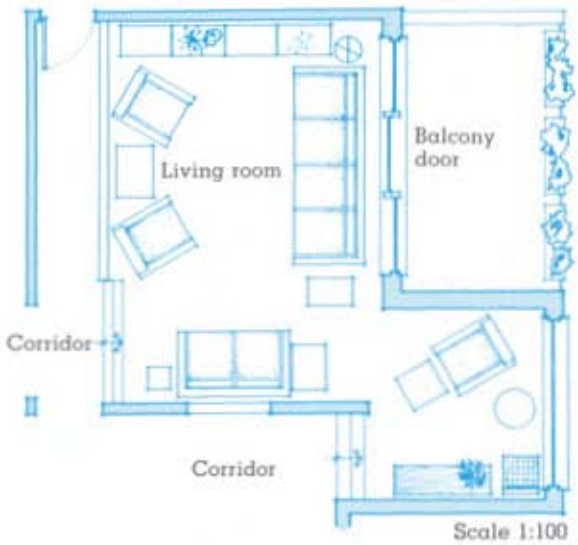


Figure 10
The balcony door in this living room interferes with the placement of furniture

Figure 11
The balcony door in this living room has been located where furniture is unlikely to be placed

Figure 12
Direct entry into the main living area causes housekeeping problems

Figure 13
The patio door in the living area of this row house is the only access to the rear yard. Since it is used frequently, it creates housekeeping problems for the occupants

2 Principal Living Rooms

Space Function

Primary and secondary activities that usually take place in living rooms or spaces are:

Primary Activities	Secondary Activities
Entertainment	Dancing
Watching television	Hobbies and crafts
Listening to music	Eating
Reading	Parlour games
Writing	Mending and sewing
Studying	Playing music
Relaxing	Giving parties
Resting	Projecting slides or films
Children's play	Operating home computer

Furniture Requirements

If occupants are to be able to carry out their normal activities in the living room, the size and configuration of the space must accommodate both the furniture and its use. Passive activities, such as listening to music and watching television, will not require as much space for movement in front of furniture as will less sedentary activities like entertaining or playing.

The following minimum furniture provisions are recommended (see Figure 14):

1. One- and two-person households:
   - 1 chesterfield 2 100 x 900 mm
   - 1 armchair 800 x 900 mm
   - 1 desk (or other piece of furniture of equivalent size) 1 000 x 450 mm
   - 1 chair 450 x 450 mm
   - 1 television set 800 x 500 mm
   - 1 coffee table 1 050 x 500 mm
   - 2 end tables 450 x 650 mm
   - 1 small bookcase 750 x 450 mm

2. Three- and four-person households require the above plus:
   - 1 armchair 800 x 900 mm
   - 1 occasional chair 650 x 700 mm
   - 1 medium-size bookcase instead of the bookcase described above 1 200 x 450 mm

3. Five- and six-person households require all the above plus:
   - 1 end table 450 x 650 mm
   - 1 large-size bookcase, instead of a medium-size bookcase 1 500 x 450 mm

4. Seven- and eight-person households require all the above plus:
   - 1 armchair 800 x 900 mm

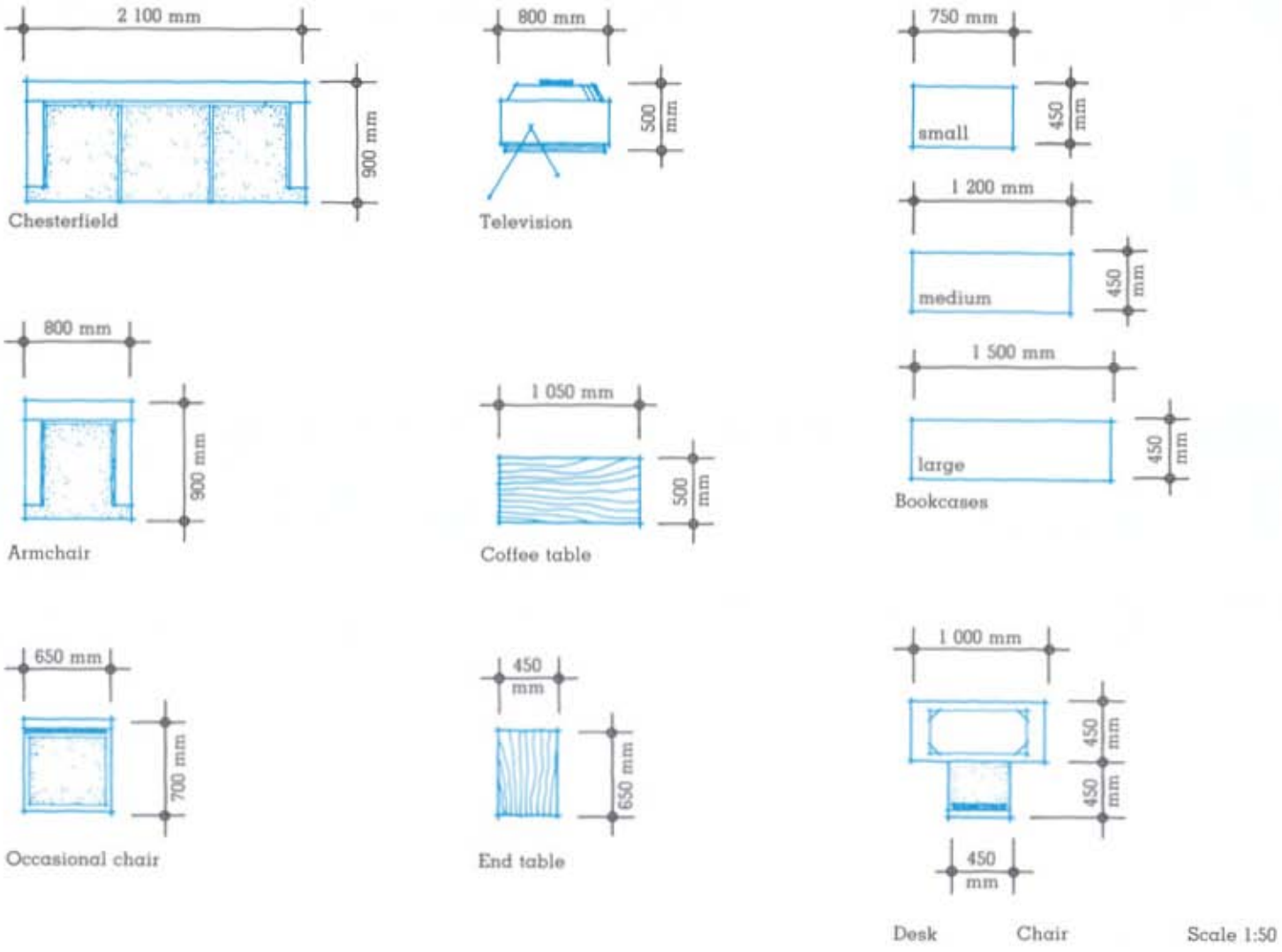


Figure 14
Typical living room furniture

Clearances

Clearances should be provided in front of and sometimes around furniture in the living room for activities to take place efficiently and in comfort. In some cases, greater clearances are required to satisfy the needs of elderly people, wheelchair users and invalids.

Recommendations

1. Recommendations for clearances around furniture are shown in Figures 15 to 17.

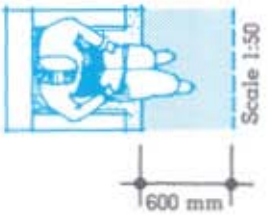


Figure 15
Recommended clearance in front of seat: 600 mm

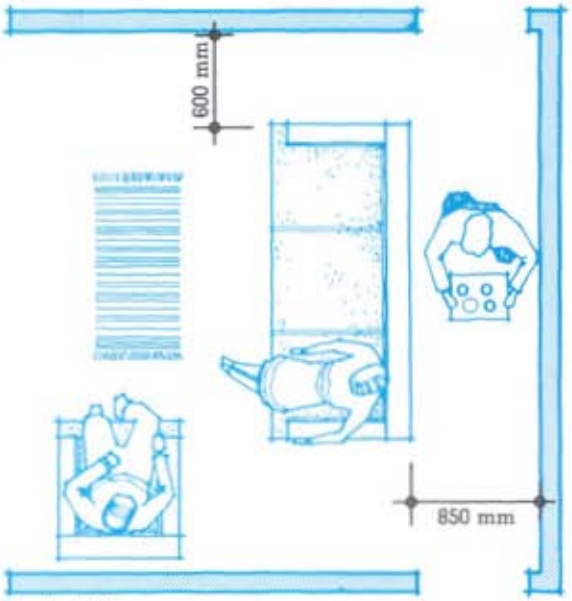


Figure 16
Recommended clearances for general access: 850 mm; limited access: 600 mm

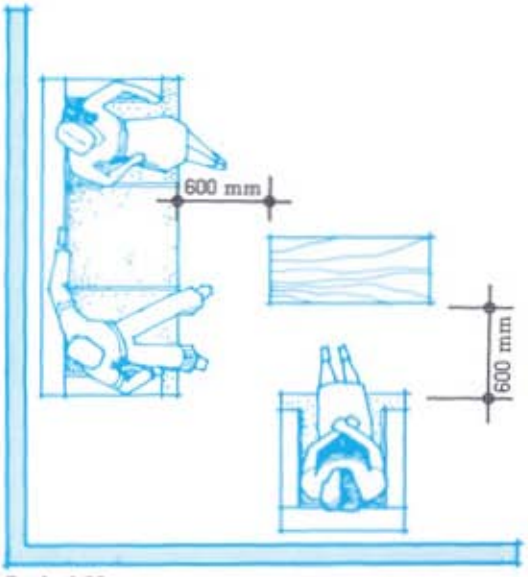


Figure 17
Limited access between a table and other furniture: recommended clearance 600 mm

2. Social interaction and recreational activities, watching television, for instance, need special attention when furniture arrangements are planned. See Figures 18 and 19.

3. In households of three and more, an open area of 3 to 4 m^2 should be available for children's play and games in the living room. The space should be square if possible, but at least 1 500 mm to 1 600 mm deep.

4. Ceiling height should be 2 300 mm over at least 75 per cent of the floor area, with a minimum of 2 100 mm at any point.

5. Typical plans illustrating the minimum dimensions to meet primary activities are shown in Figures 20 and 21.

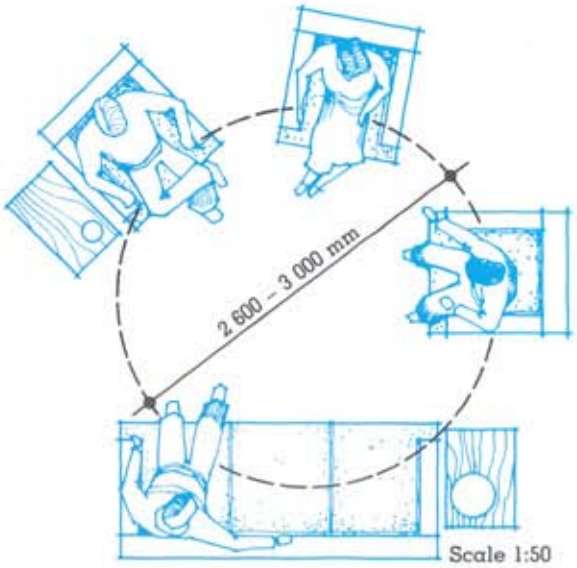


Figure 18
Grouping of seats for social interaction: recommended clearance 2 600 – 3 000 mm

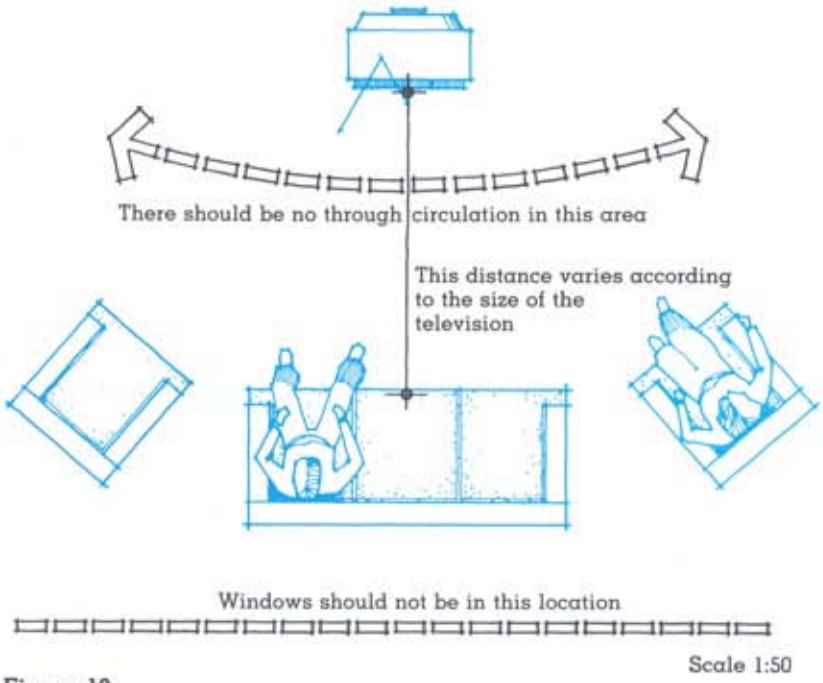


Figure 19
Space for television viewing. The television set should be placed where the screen will not reflect light and where it can be seen from the main seating group

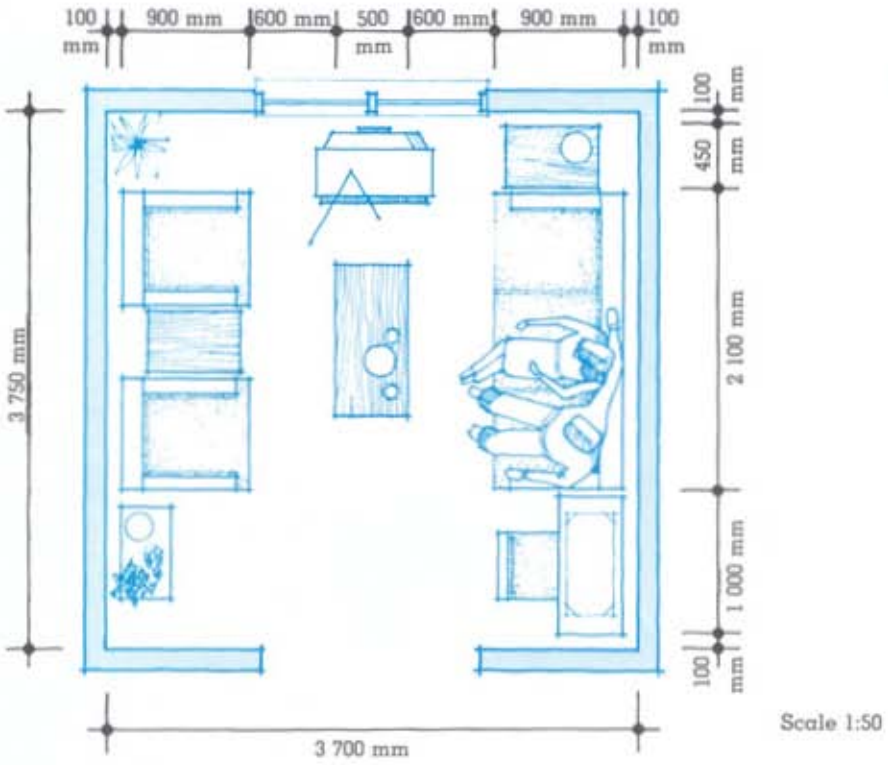


Figure 20
Two-person household. Recommended net area 13.87 m^2

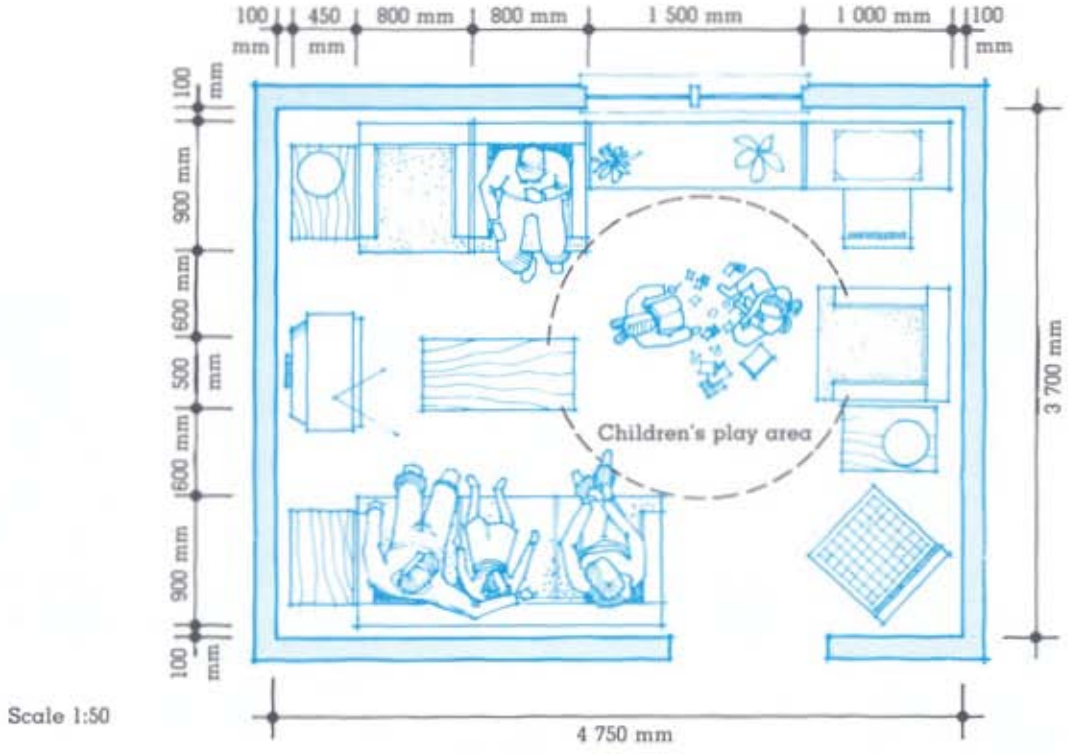


Figure 21
Six-person household. Recommended net area 17.57 m^2

Space Size and Number

Families of the same size but different composition sometimes have divergent requirements. For example, large families with young children may prefer a single large living room to separate living and family rooms. Families with teenagers often want two separate living areas so that different activities can take place without conflict.

Family lifestyle affects requirements. If the living room is considered a formal place (Figure 22), children's activities are best accommodated in other space within the dwelling. A family that entertains frequently will probably want a family room or den where children may play while the adults are entertaining in the living room.

Given the range of variation, it is not appropriate to establish rigid space standards for principal living rooms. The recommendations listed below provide the adaptability needed to suit a range of differences, and may be used instead of those listed under Furniture and Clearances (see Table 2).

Figure 22
The plastic covers protecting the furniture in this living room show how strongly some occupants feel about preserving a formal area in their dwelling

Table 2. Minimum Sizes for Living Rooms

Household Size *Number of Persons*	Dwelling Type *Number of Bedrooms*	Living Room Use	Minimum Floor Area m^2	Smaller Dimension *mm*
1-2	0 and 1	P*	13	3 200
1-2	0	P&S**	15	3 200
1-2	1	P&S	16	3 200
3-4	2	P	15	3 200
3-4	2	P&S	18	3 200
5-6	3	P	17	3 700
5-6	3	P&S	20	3 700
7-8	4	P	22	3 700
7-8	4	P&S	29	3 700

* P = Primary activities taking place in living room.
** S = Secondary activity taking place in living room. An average additional floor area of 3.0 m^2/per room is allocated to support secondary activities that may take place in living rooms.

Recommendations

1. The space allocated for family social and recreational activities and for secondary activities taking place in living rooms or spaces should be proportional to the size of the household and the number of bedrooms within the dwelling (Figure 23).

2. Based on the Minimum Living Area required in a dwelling for the social and recreational activities of one or two persons, at least one living space should have an area of 13 m^2. The minimum dimension within the required area should be 3 200 mm.

3. In dwellings designed for more than two persons, an additional area of 1 m^2 should be provided for each extra person.

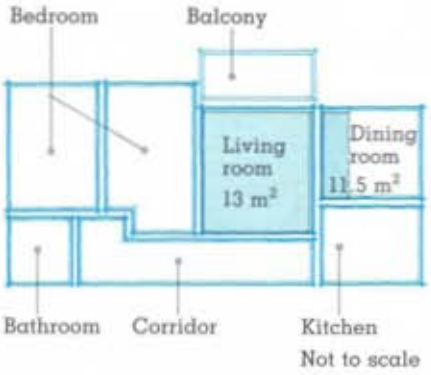


Figure 24
This illustration shows how the minimum living area (15 m^2) of a 3-4 person household could be provided in a living room (13 m^2) with the remaining area increasing the size of the dining room (9.5 m^{2*} + 2 m^2)

4. In dwellings designed for four or more persons, the area additional to the 13 m^2 should be provided in two separate living rooms or spaces. In smaller dwellings (see Figure 24) this second living space can be achieved by increasing the size of the kitchen or dining area.** In large dwellings (see Figure 25) a family room*** or second living area should be provided.

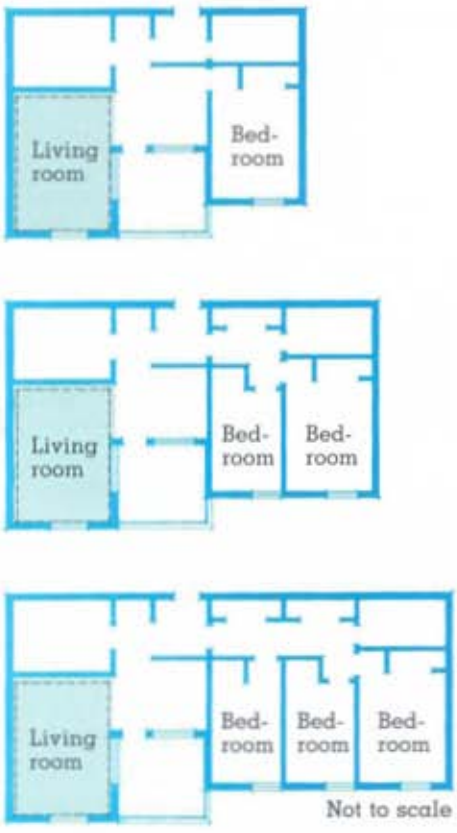
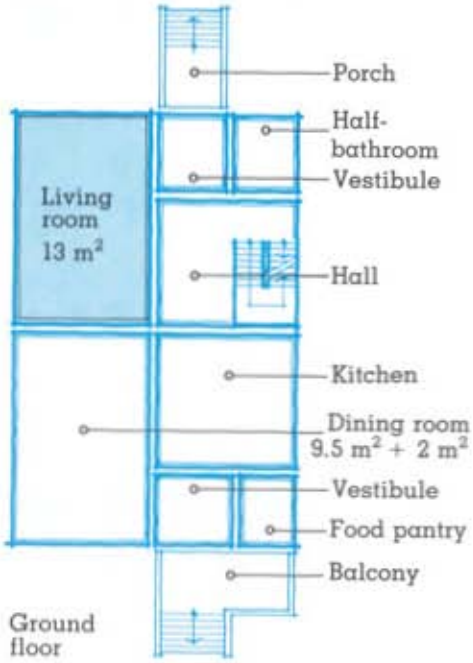


Figure 23
Too often, uniform-sized living rooms are found in dwellings, regardless of the number of bedrooms

* Minimum dining area in a 3-4 person dwelling.

** In calculating the Minimum Living Area, the Minimum Kitchen Area and the Minimum Dining Area should be excluded.

*** When the additional area required (above the 13 m^2) is provided in a separate family room, the minimum floor area of this additional living space should be 8.5 m^2 and the minimum dimension within the required area should be 2 200 mm (the same requirements that have been established for minimum single occupancy bedrooms); all other requirements concerning living rooms or spaces should also apply to additional living spaces.



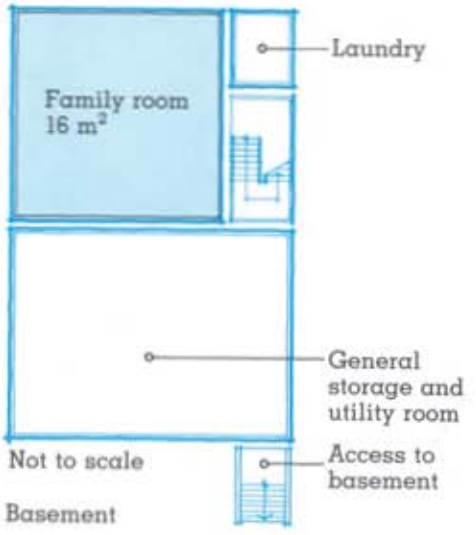


Figure 25
This illustration shows how the minimum living area (29 m^2) of a 7-8 person household could be provided in a living room (13 m^2) plus a family room (16 m^2)

Space Configuration

Changing Needs

Flexibility and adaptability are important to the layouts of living rooms, as the family size increases or decreases and as the family's lifestyle changes. Unfortunately, the layout of the living room is often difficult to modify. For example, there may be only one corner in which a television set can be located or only one wall against which a large piece of furniture can be placed (Figure 26). Square living rooms tend to provide more opportunity to vary furniture arrangements than rectangular living rooms.

Recommendations

1. Living rooms should be designed so that at least two, and preferably more, different furniture arrangements can be made with typical pieces and sizes of furniture.

2. All living rooms should have at least one wall of not less than 3 000 mm in length, uninterrupted by openings below 900 mm above the floor.

Figure 26
Retaining the corners in living rooms, even by providing short walls where none are required, will make the room more flexible for furniture arrangement

Activities

Living rooms used for several activities should have their seating arrangements grouped together in one area to facilitate secondary activities (such as an area where card playing can take place, another where television can be watched, and so on).

When living rooms are reserved for formal uses, informal activities are better accommodated in other areas: separate family rooms or larger-than-average kitchens or dining rooms.

Recommendation

If living rooms are to be used for more than one purpose, furniture should be so arranged to provide a clearly defined space for each function (Figures 27 and 28).

Traffic

Through traffic disrupts conversation, television viewing, and other activities that usually take place in the living room. In addition, traffic tends to increase housekeeping and cleaning requirements.

Recommendations

1. Interior living-room access and egress points should be located to avoid circulation through the living room. When through circulation is unavoidable, it should be confined to an area along the walls. Diagonal through circulation should be avoided.

2. The space occupied by through circulation should be excluded from room area calculations ('B' in Figures 29 and 30).

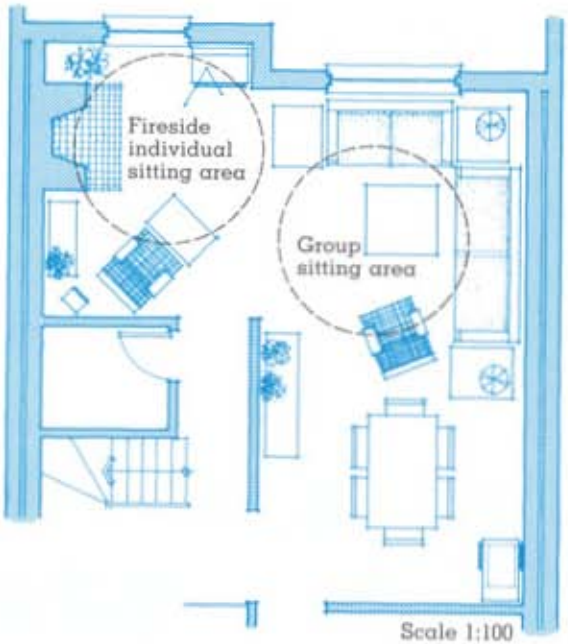
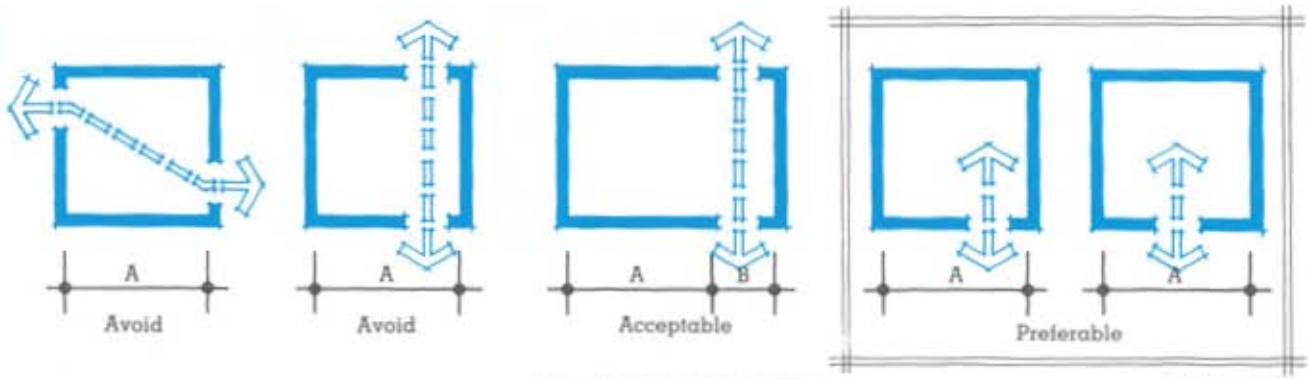


Figure 27
Plan showing two well-defined zones in the main living area: a group sitting area and a fireside sitting area

Figure 28
This photograph shows the fireside sitting area identified in Figure 27



A = Minimum living area
B = Area to be excluded from minimum room area calculation

Not to scale

Figure 29
Circulation space is to be excluded from room-area calculations. Traffic through the living area should be avoided

Window Height

Low window sills can hamper furniture placement. On the other hand, at least one window should be low enough for people to see through it when they are sitting in the living room.

Recommendations

1. Living room windows should be high enough (approximately 900 mm) to allow chesterfields, (Figure 31) armchairs, and other pieces of furniture to be placed beneath them.
2. One living room window should be low enough to allow a person sitting in the living room to see through the window.

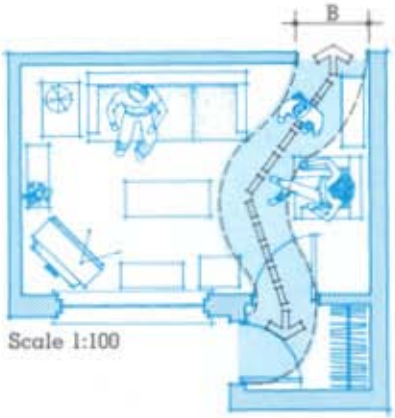


Figure 30
The area shaded "B" is circulation space and should not be included in the living area calculation

Figure 31
The sill on this window is high enough for furniture to be placed in front of it

Usable Floor and Wall Space

Living rooms should provide as much uninterrupted floor and wall space as possible for furniture arrangement (Figure 32). The space occupied by inswinging doors, the space required to be able to see out of windows, and the space taken by heating registers cannot be considered to be usable floor or wall space.

Recommendation

The location of living room doors, windows and heating registers should be based on estimated furniture location alternatives; whenever possible, they should be located in areas of clear access space.

Fireplace

When a fireplace is included in the living room, it usually becomes a focal point and should be placed so that furniture can be grouped around it (Figure 33). Fireplaces on exterior walls are not recommended.

Recommendation

The fireplace should be placed away from traffic routes and should have approximately 1 000 mm of wall length on either side of it so that furniture can be grouped around it.

Figure 32
This living area provides little opportunity to vary furniture layout because each wall is interrupted by an opening

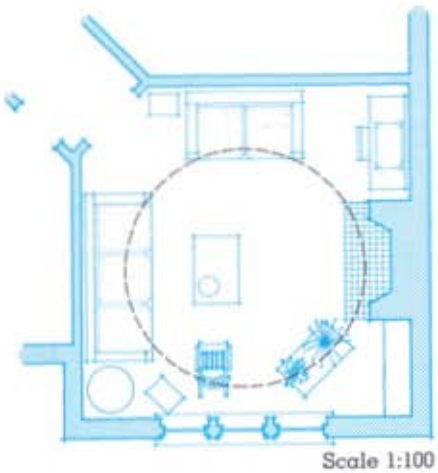


Figure 33
Furniture can be easily grouped around this fireplace

Space Location

The location of each space allocated for social and recreational activities and for secondary activities should be determined primarily by the following requirements.

Privacy

Generally, occupants like to maintain their privacy from visitors and sometimes from other members of the family.

Close friends and relatives are generally welcome in the more informal areas of the dwelling. For this reason, the family room does not require the same degree of privacy between the kitchen and sleeping areas and the dwelling's entrance as does the more formal living room.

Recommendations

1. Living rooms and family rooms should be separated from sleeping areas by other spaces so that people who are sleeping will not be disturbed by noisy activites.

2. In dwellings with more than one floor, stairways should not lead directly from the living room or family room to the bedrooms.

3. The living room should be located in the "public" sector of the dwelling, that is, near the primary entrance, providing access without making occupants and visitors go through any of the more "private spaces".

4. It should not be possible to see into the kitchen or sleeping areas from the living room, the hall serving the living room, or from the primary dwelling entry.

Relationship of the Living Room to Other Spaces

Research findings are varied regarding the merits of separate living areas, combined living/dining areas, or combined living/dining/kitchen areas. The most frequently mentioned advantages and disadvantages of these various options are listed in Tables 3 to 7.

Because individuals differ in their preferences for living/dining/kitchen arrangements (see Tables 3 to 7), the living room or space may be a room in itself or just part of a room.

Recommendation

The layout of the spaces should enable them to be used in different ways at certain times of the day, on different occasions, and even at different stages in the family's development.

The arrangement illustrated in Figures 34 and 35 is a living/dining/kitchen design that uses movable walls. This layout and the variations upon it enable the occupant to use the space in several ways. A more economical, though slightly less flexible, arrangement would be to separate these rooms with walls containing openings of approximately 1 500 mm, that could be closed with double doors.

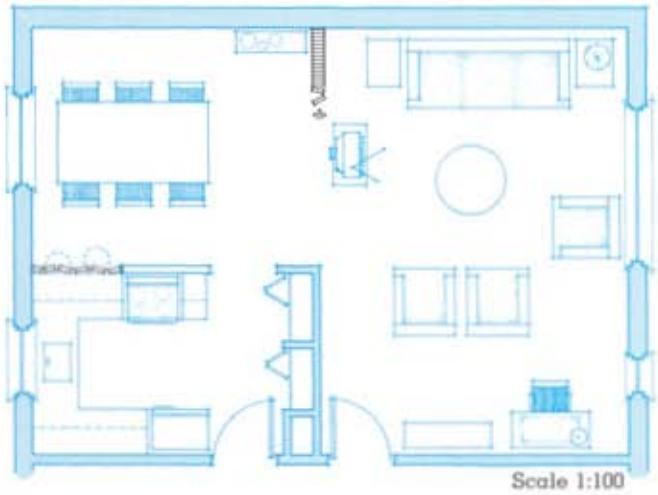


Figure 34
The moveable wall between the dining area and the living room can be opened to provide a combined living dining room. It can also be used to close off the kitchen

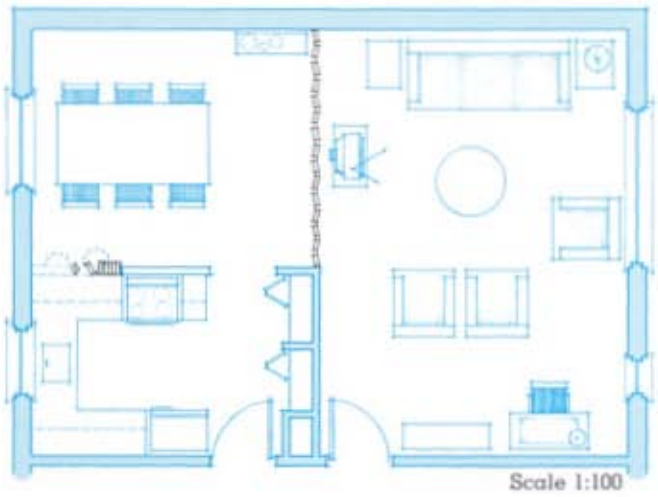


Figure 35
Alternatively, the wall can be closed to provide a kitchen/dining area that is separate from the living room

Table 3. Separate Living Room

Advantages	*Disadvantages*
Isolates cooking odours.	The room cannot be combined with other space.
Eating activities are separated from the more formal living activities.	The room may be underused if it is too isolated from the rest of the dwelling.
It is easier to present a tidy well-organized, and "formal" living room to visitors.	When space is limited, a separate living room tends to look smaller than a living room combined with other spaces.
It is easier to control children's access to this room.	
The living room can be used for one function while the dining room is being used for another.	
Most people prefer separate living and dining spaces, irrespective of the higher cost, when the dining and kitchen areas are combined.	
The room can be more easily converted to other functions, such as a study or a temporary guest room.	

Table 4. Living Room in Combination with Dining Room

Advantages	*Disadvantages*
Cooking odours are not present.	There is less privacy in the living room.
It is easier to entertain large groups.	It is difficult to present an organized and formal living room to visitors, particularly in households with small children.
When space is limited, both living and dining areas appear to be more spacious.	Living and dining spaces cannot be used for separate functions.
	If there is no additional eating place in the kitchen, this combined space tends to become more informal, or mealtimes sometimes tend towards an undesired formality.

Table 5. Living Room in Combination With Dining Room and Kitchen

Advantages	*Disadvantages*
Allows people working in kitchen to remain in contact with guests who are in the dining or living room (when entertainment is informal).	Guests can see what is going on in the kitchen (a disadvantage when the entertaining is formal).
It is easier to entertain large groups of people.	Living room privacy is reduced.
When space is limited, the living, dining and kitchen areas appear more spacious.	Food odours may reach the living room.
The surveillance of children is easier because the three rooms are linked visually as well as acoustically.	It is more difficult to present an organized and "formal" living room to visitors, particularly in households with young children.
	The living and dining rooms cannot be used for separate functions.

Table 6. Family Room in the Basement
(This is the usual location of the family room in detached one- and two-family dwellings. See Figure 36)

Advantages	*Disadvantages*
Good separation (acoustical, visual and physical) permits almost any activity to be conducted without disturbing the rest of the dwelling.	Spaces in basements tend to have poor natural lighting and ventilation.
Teenagers who like to have their own territory in which to entertain and who like to listen to loud music prefer the basement.	The family room is too far away from the rest of the dwelling to allow adequate supervision of the play of small children.
The room may be used for untidy activities.	The room is underused at certain times because it is cut off from other dwelling activities.
The room may have a direct entrance to the outdoors; this is appreciated by teenagers and by residents who need direct entry to the basement.	

Relationship of the Family Room to Other Spaces

As in the case of living/dining/kitchen relationships, people have different preferences for separate or combined family rooms. Less research has been done on family rooms than on living rooms. However, the three options shown in Tables 6 to 8 appear to be the most current.

Figure 36
This basement has been turned into a family room

Figure 37
This verandah has been turned into a family room

Table 7. Family Room adjacent to the Kitchen/Dining Area (separate living room)
(This option can be found in all types of dwellings. See Figure 37)

Advantages	*Disadvantages*
People working in the kitchen can stay in contact with the rest of the family or with friends in the family room.	This location does not allow as full a range of activities as the basement, which can accommodate very noisy or untidy activites.
Surveillance of small children is easy.	Since there is less privacy than in a basement family room, it is less appealing to teenagers.
The room is usually better lit than when it is located in the basement.	
It is easier to entertain large groups.	

Table 8. Family Room in space originally planned to be a Bedroom
(This room is often the location of the family room in apartment dwellings. Figure 38)

Advantages	*Disadvantages*
It provides a second location for family living activities.	The space available is usually small compared with typical family rooms.
	Its location in the private and sleeping sector of the dwelling restricts the potential number of uses and users of that space.

Figure 38
This small bedroom has been turned into a family room

Relationship of Living Room to Sun, View and Exterior

There are several different and sometimes conflicting objectives concerning the orientation of the principal living room window.

Observations

1. Because, in most households, the living room tends to be used least in the morning, some researchers recommend that it be orientated to the southwest to receive sunlight later in the day.

2. Living rooms are usually orientated to the private rear yard, away from the street, so that residents have a more tranquil aspect from the window.

3. Because of the formal nature of the living room, many residents prefer it to be placed at the front of the dwelling, adjacent to the primary entrance.

4. Preferences are mixed about the need for access to adjacent exterior activity spaces from living spaces (living or dining rooms) or from food preparation spaces (kitchens). Some residents like to be able to extend their living spaces to adjacent gardens, patios and balconies; others dislike traffic through the living room, which contains their most expensive furniture.

3 Dining Rooms

Space Function

Primary and secondary activities that usually take place in dining rooms or spaces are:

Primary Activities	Secondary Activities
Setting the table	Children's play
Serving food	Reading
Eating	Writing
Cleaning up after meals	Studying and homework
Storing dishes	Entertainment
	Board games
	Pattern cutting and sewing
	Watching television
	Ironing clothes

Furniture Requirements

Typical pieces of furniture are listed below, together with their horizontal dimensions. (See also Figure 39.)

Tables with seating on two sides are generally larger than those specified for seating on four sides. However, seating on two sides will usually require less total room space.

Dining Room Furniture Requirements

1. One- and two-person households

	Seating on two sides	*Seating on four sides*	*Round table*
• 1 table	800 x 1 200 mm	900 x 900 mm	900 mm diam.
• 4 chairs[1]	450 x 450 mm	450 x 450 mm	450 x 450 mm
• 1 small buffet	450 x 900 mm	450 x 900 mm	450 x 900 mm

2. Three- and four-person households

	Seating on two sides	*Seating on four sides*	*Round table*
• 1 table	800 x 1 800 mm	900 x 1 200 mm	1 200 mm diam.
• 6 chairs	450 x 450 mm	450 x 450 mm	450 x 1 200 mm
• 1 medium-size buffet	450 x 1 200 mm	450 x 1 200 mm	450 x 1 200 mm

3. Five- and six-person households

	Seating on two sides	*Seating on four sides*	*Round table*
• 1 table	800 x 2 400 mm	1 000 x 1 800 mm	1 500 mm diam.
• 8 chairs	450 x 450 mm	1 200 x 1 200 mm	450 x 450 mm
• 1 large buffet	450 x 1 500 mm	450 x 1 500 mm	450 x 1 500 mm

4. Seven- and eight-person households

	Seating on two sides	*Seating on four sides*
• 1 table	1 000 x 2 400 mm	1 200 x 1 800 mm
• 10 chairs	450 x 450 mm	450 x 450 mm
• 1 large buffet	450 x 1 500 mm	450 x 1 500 mm

5. In dwellings where the dining space is not provided within or in combination[2] with the kitchen space, that kitchen space should accommodate at least the following furniture or its equivalent, with comfortable clearances:
   - a square table of 800 x 800 mm or a round table of 800 mm diameter
   - two chairs of 450 x 450 mm each.

[1] In all dwelling types, dining space has been allowed for each member of the household, plus seats and table spaces for two guests.

[2] Two or more areas are considered to be a combination room if the dividing wall occupies less than 60 per cent of the separating plane.

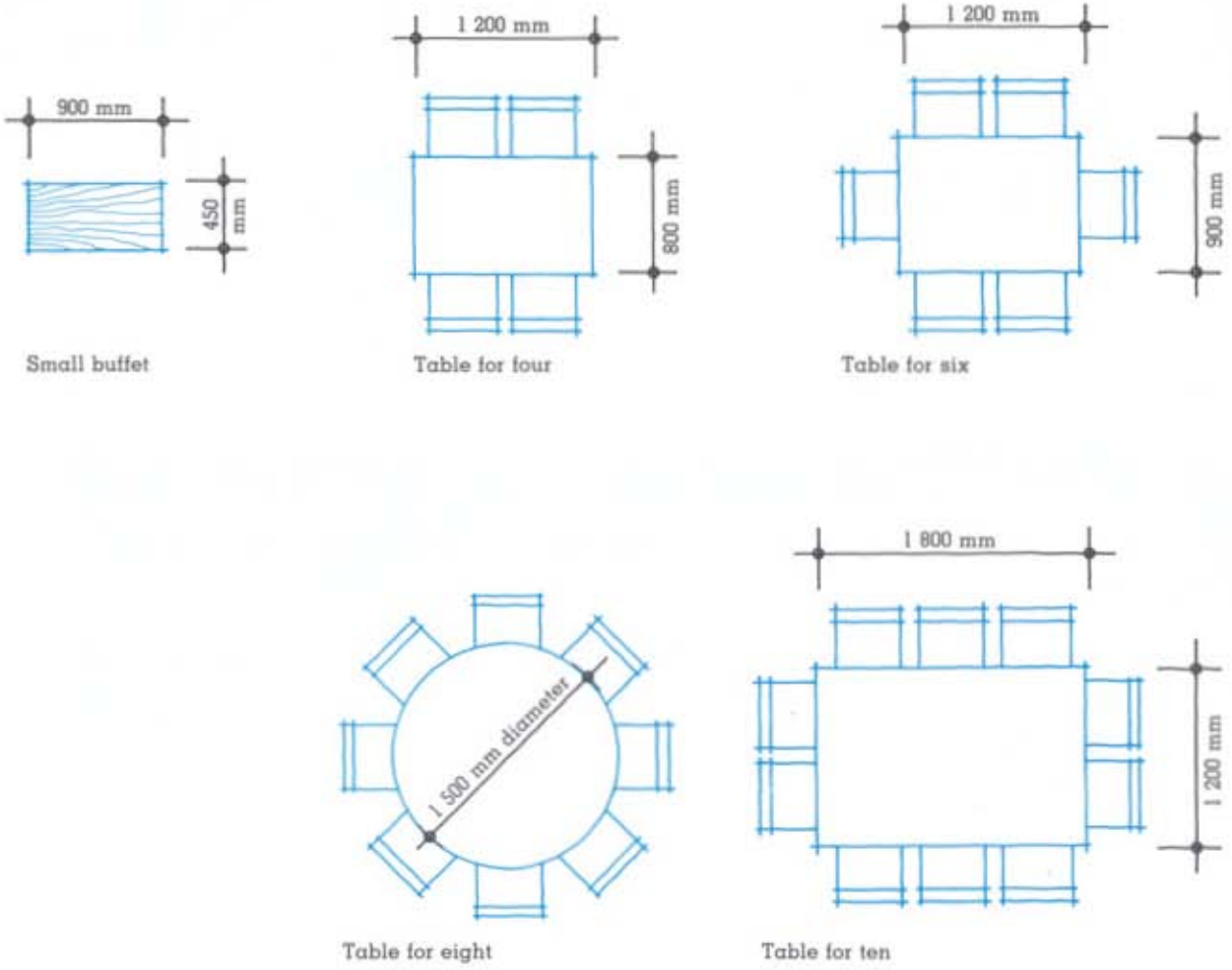


Figure 39
Typical dining room furniture

Scale 1:150

Clearances

Clearances should be provided in front of and sometimes around furniture in the dining room to allow activities to take place efficiently and in comfort. In some cases, greater clearances are required to accommodate the needs of elderly people, wheelchair users and invalids.

Recommendations

1. Recommendations for clearances aound furniture are shown in Figures 40 to 43.

2. Ceiling heights should be 2 300 mm over at least 75 per cent of the floor area, with a clear height of 2 100 mm at every point.

3. For typical plans illustrating minimum dimensions to meet primary activites, see Figures 44 and 45.

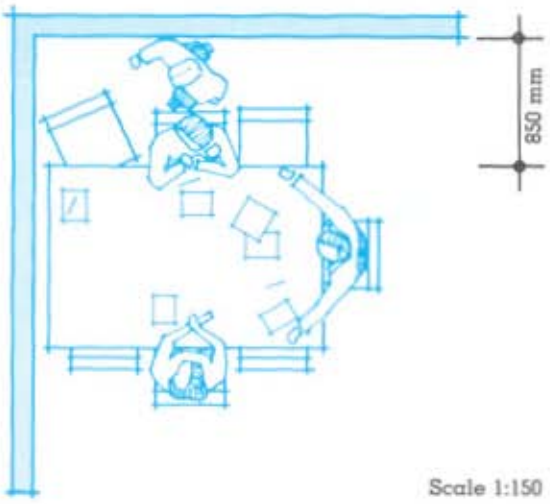


Figure 40
Limited access behind a chair in cul-de-sac circulation space

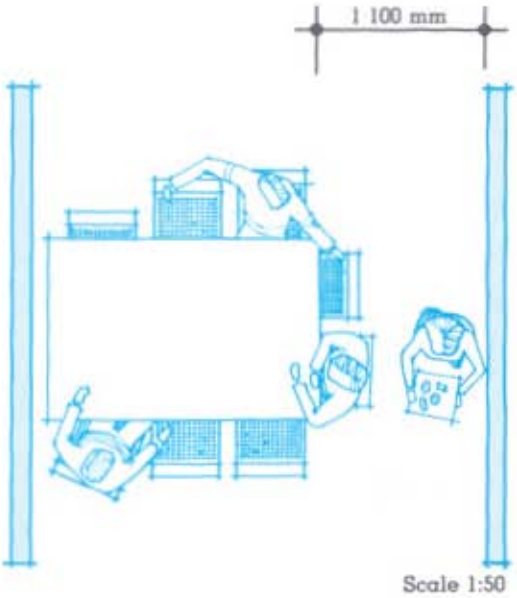


Figure 41
Access behind a chair in through circulation space

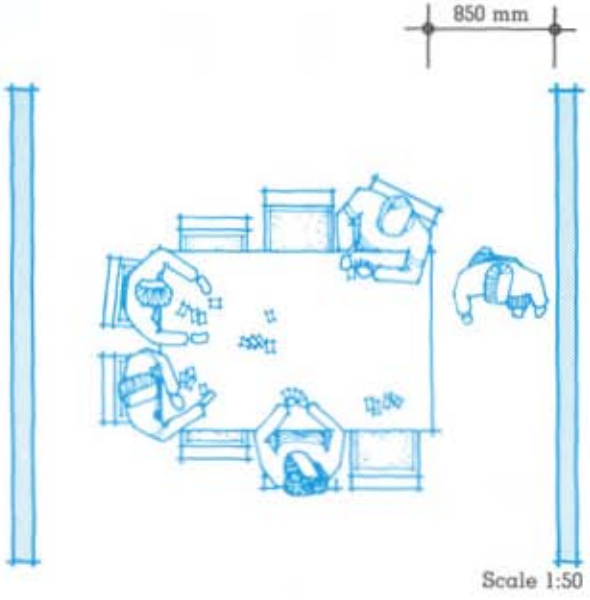


Figure 42
Access behind a table and a wall

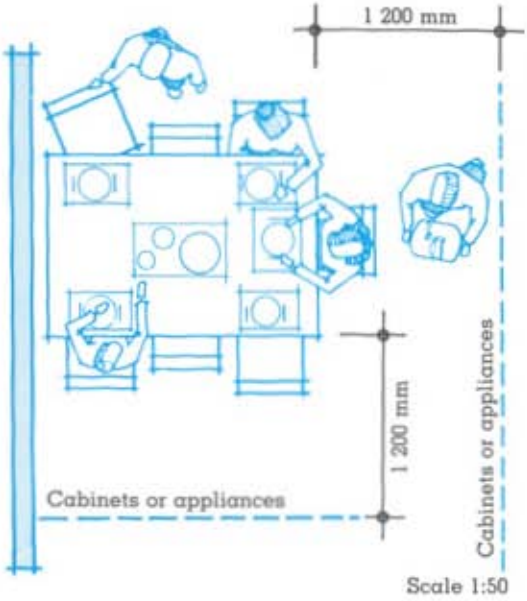


Figure 43
Access behind a chair and cabinets or appliances

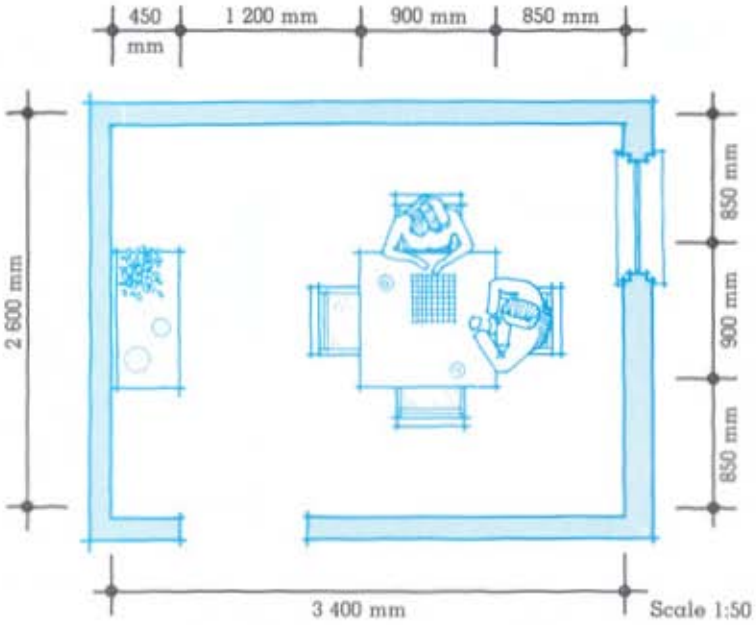


Figure 44
Two-person household. Recommended net area 8.84 m^2

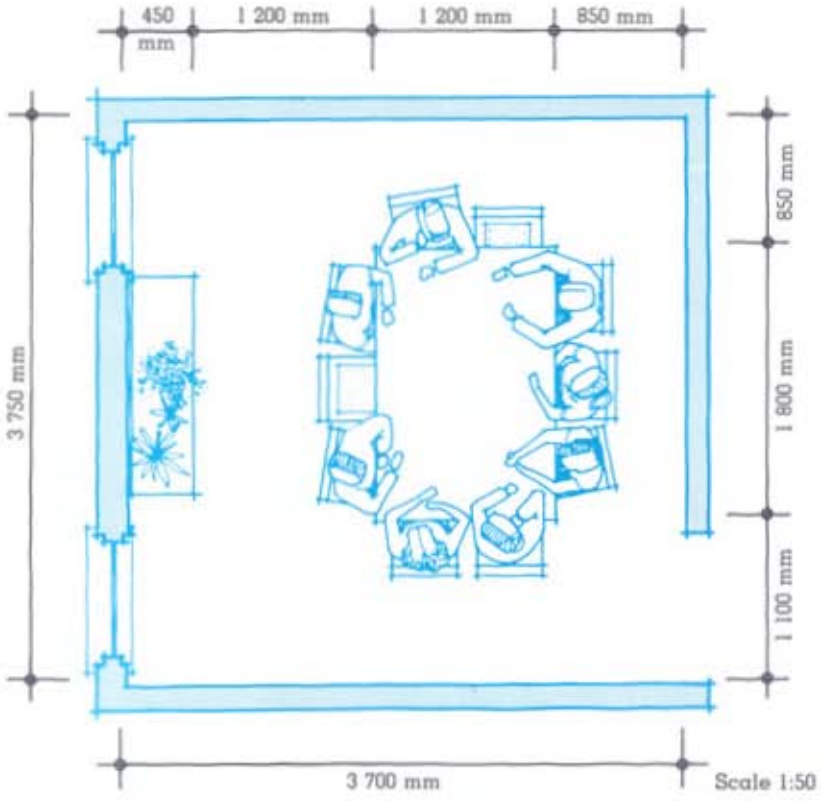


Figure 45
Eight-person household. Recommended net area 13.87 m^2

Space Size and Number

Families of the same size but different composition have different requirements.

Large families with young children may prefer combined kitchen/dining rooms over combined living/dining rooms; dining spaces are used as family rooms when young children are present and spills matter less in the kitchen area than they would elsewhere.

Large families with teenagers may prefer two separate eating areas so that formal and informal dining can sometimes take place at the same time.

Households composed of older adults may prefer a combined kitchen-dining space because of the inconvenience of carrying food from one room to another.

A family's lifestyle also affects its requirements. One that entertains frequently will probably prefer a separate dining space over a combined kitchen/dining space. A family that considers the dining space as a formal one, to be used only on special occasions, may need a second, less formal eating space.

Residents who consider dining to be a special event may find it difficult to reconcile the character of a working kitchen with the comfort and elegance required for a formal dinner.

The following recommendations provide the space adaptability needed to suit the range of different recommendations discussed above and may be used instead of the recommendations listed under Furniture and Clearances (see also Table 9).

Recommendations

1. The space allocated for eating and for secondary activities taking place in dining rooms or spaces should be proportional to the size of the household and the number of its bedrooms.

2. Based on the Minimum Dining Area required to accommodate the eating patterns of one or two persons, at least one dining space within a dwelling should have an area of 7.5 m^2; the minimum dimension within the required area should be 2 500 mm. In dwellings designed for more than two persons, an additional area of 1 m^2 should be added for each extra person.

3. Most people, whatever their social or economic background, will eat some meals in the kitchen.

Table 9. Minimum Standards for Dining Rooms

Household Size *Number of Persons*	Dwelling Type *Number of Bedrooms*	Dining Room Use	Minimum Floor Area m^2	Smaller Dimension *mm*
1-2	0 and 1	P*	7.5	2 500
1-2	0 and 1	P&S**	10.5	2 500
3-4	2	P	9.5	2 500
3-4	2	P&S	12.5	2 500
5-6	3	P	11.5	2 500
5-6	3	P&S	14.5	2 500
7-8	4	P	13.5	2 700
7-8	4	P&S	16.5	2 700

* P = Primary activities taking place in the dining room.
** S = Secondary activities taking place in the dining room (an average additional floor area of 3.0 m^2/per room is allocated to support secondary activities that may take place in dining rooms or spaces).

Space Configuration

Changing Needs

Of all the rooms within the dwelling, the dining room may be adapted most readily for activities other than eating. The dining room table can be covered and used as a work surface; it can be pushed aside to provide more floor space for children's play; it can be placed against a wall to provide space for a couple of armchairs and a television set.

In larger dwellings, dining rooms tend to be reserved for formal meals. Here, the informal activities that often take place in the dining room of smaller dwellings will be accommodated in a family room or a separate study.

Unfortunately, there tends to be little opportunity to change the layout of dining rooms (Figure 46). Sometimes there is only one spot where a dining table may be placed or only one wall against which a large piece of furniture can be put. Square dining rooms tend to provide greater opportunity to vary furniture arrangements than rectangular dining rooms. Retaining the corners in dining rooms, even by providing short walls where none is required, will increase the room's potential for alternative furniture arrangements.

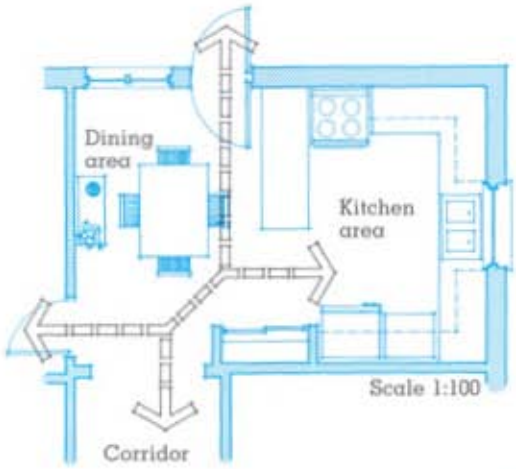


Figure 46
This dining room affords little opportunity to vary furniture arrangements because of the need for circulation space and the lack of walls against which to place furniture

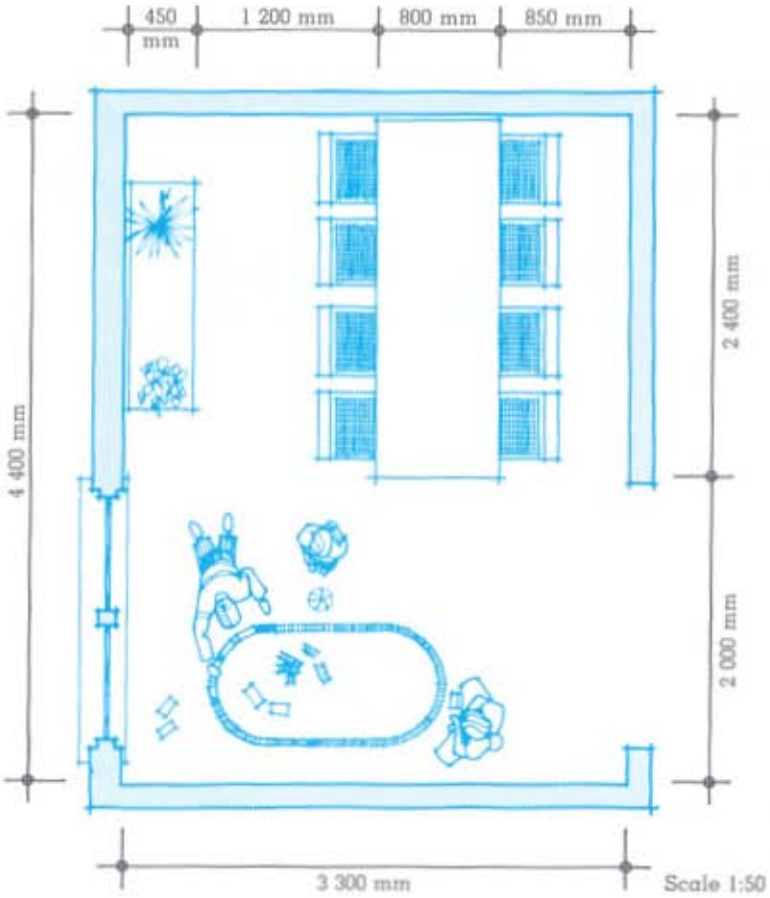


Figure 47
Grouping together the table, chairs and buffet creates a sizeable place for children to play in the dining area of this 3-bedroom dwelling. Recommended net area: 14.5 m^2

Recommendations

1. Dining rooms should be designed so that at least two, and preferably more, different furniture arrangements can be made with typical numbers and sizes of furniture pieces, (that is, there should be a choice between a layout including a table with people sitting on all sides and a layout including a table with one end placed against a wall and with people sitting on two opposite sides).

2. Dining rooms should maximize uninterrupted floor and wall space for furniture arrangement. All dining rooms should have at least 2 500 mm of wall space uninterrupted by openings of less than 900 mm above the floor.

3. The location of doors, windows and heating registers should be governed by the probable furniture arrangements. Remember that dining rooms are often used for more than one purpose, and so should have clearly defined space for each function (Figures 47 and 48).

Figure 48
Dining room doors should open only into clear access space

Window Height

Low windowsills hinder the placement of furniture. On the other hand, at least one window should be low enough for a seated person to see out.

Recommendations

1. Dining room windows should be approximately 900 mm high to allow buffets, dining tables and other pieces of dining room furniture to be placed beneath them.

2. One window should be low enough (600 mm high) to allow people sitting in the dining room to see out through it.

Space Location

The location of space for eating activities and secondary activities should be determined primarily by the following considerations:

- privacy
- the relationship of the dining room to sun and views
- the relationship of the dining room to other spaces in the dwelling.

Privacy

Residents do not like visitors to be able to look into the dining area from the entrance hall.

Recommendation
The dining room or space should be screened from the dwelling's main entrance.

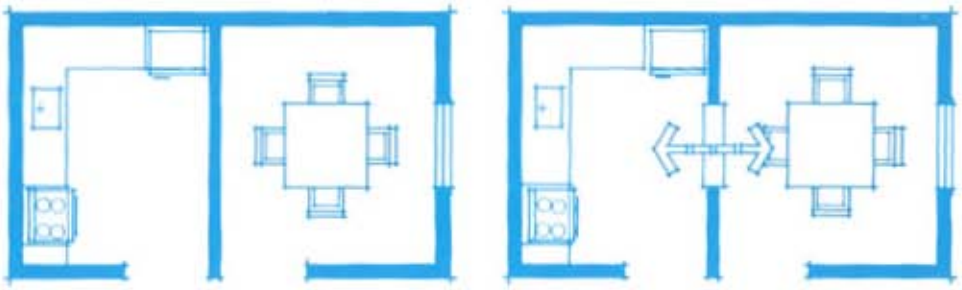
Relationship of the Dining Room to Sun and Views

Residents usually seek both natural light and a view from the dining room to the outdoors.

Recommendation
Efforts should be made to see that the dining space has a window with an attractive view.

Table 10. Separate Dining Room (Figure 49)

Advantages	*Disadvantages*
It is easier to create a formal dining atmosphere in a separate dining space.	The atmosphere of a separate dining room may be too formal for some family meals.
Cooking odours are isolated.	When the dining room is separated from the kitchen, it becomes necessary to have a space for eating casual meals in the kitchen.
The room can be more easily used for different functions than when it is combined with other rooms.	Good service is more difficult than if the dining space is combined with the kitchen. This problem can be reduced if the kitchen and the dining room are linked by a service hatch.
When additional eating facilities are provided in the kitchen, the room may be more easily converted to other uses on a more long-term basis (an additional bedroom, a family room, a study) than when it is combined with other rooms.	Separate dining rooms are generally more costly than combined dining rooms because they tend to increase the dwelling's total floor area.
It is easier to display more appropriately formal furniture than when the room is combined with a kitchen (Figure 54).	



Adjacent to the kitchen

Adjacent to the kitchen with a service hatch

Not to scale

Figure 49
Dining room

Relationship of the Dining Room to Other Spaces

The relationships of the dining room to the kitchen and the living room varies (see Figures 49 to 53). The most frequently mentioned advantages and disadvantages of various options are listed in Tables 10 to 15.

Recommendations

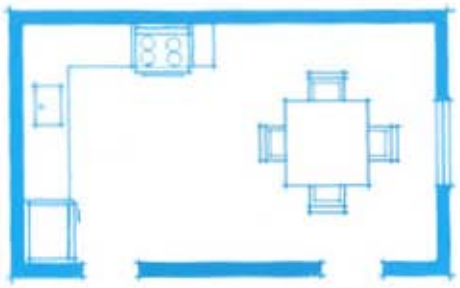
1. Because individuals differ in their preferences for living/dining/kitchen arrangements, the dining room or space may be a room in itself or just part of a room. Architects should therefore ensure that these spaces can be used in different ways at different times of the day, on different occasions, and even at different stages in a family's development (see Figures 34 and 35).

2. The dining room or space should be directly accessible from the kitchen; serving meals and cleaning up afterwards is made so much easier.

3. It should be possible to screen access between the kitchen and the dining room.

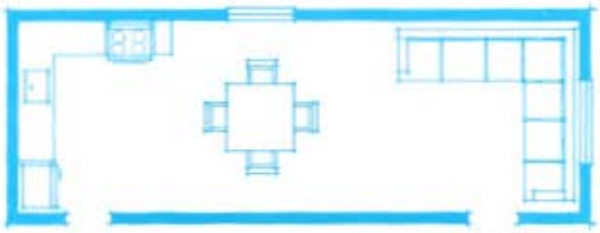
Table 11. Dining Room in Combination with Kitchen (Figure 50)

Advantages	*Disadvantages*
It matters less if food is spilt in the kitchen area than in other rooms. Parents can supervise the eating habits of small children.	Some people do not like to be seen attending to dishes when they are entertaining.
Household members can eat one after the other and can even prepare meals separately for themselves.	Some people do not like a mess of dishes and pans in the kitchen to be seen when they are eating.
The kitchen and dining room may be accommodated in a smaller area yet still appear spacious.	Small children playing in the combined kitchen/dining space may be a nuisance if the eating area and the working area are not clearly defined. A clear separation may be achieved by proper zoning or by physical barriers such as counters.
Convenient for cooking and serving.	
Research shows that families often use dining rooms linked to kitchens for informal activities that they feel are inappropriate in formal dining rooms.	
The person who prepares the meal is not isolated from the family or guests when he or she is cooking it.	



Not to scale

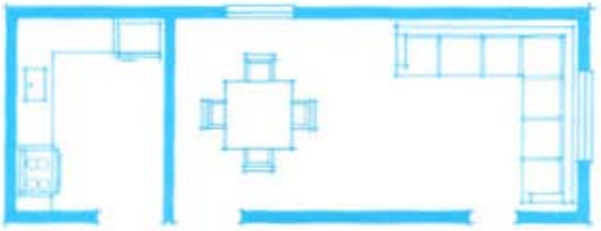
Figure 50
Dining room in combination with kitchen



Not to scale

Figure 51
Dining room in combination with living room and kitchen

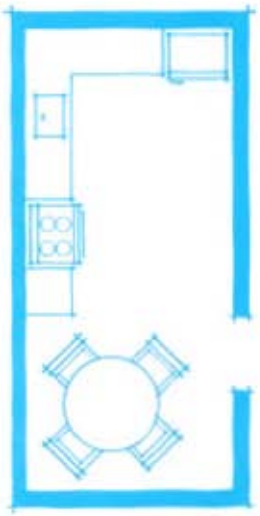
In a well-defined area in an inner portion of the living room



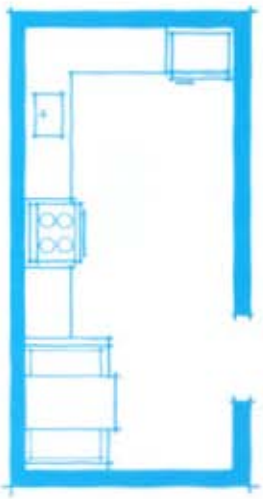
Not to scale

In a well-defined area in a windowed portion of the living room

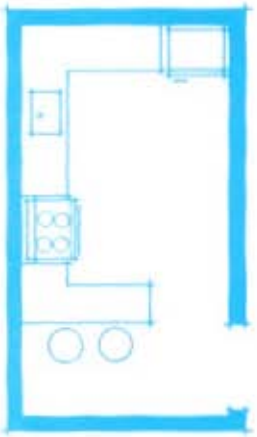
Figure 52
Dining room in combination with living room



In an area accomodating table and chairs



In a built-in breakfast nook



On a counter and stools

Not to scale

Figure 53
Dining room in one or the other locations identified in Figure 52, with an additional eating area in the kitchen

Table 12. Dining Room in Combination with Living Room and Kitchen (Figure 51)

Advantages	*Disadvantages*
The kitchen, living room and dining room may be accommodated in a smaller total area when they are combined than when they are separated.	Odours from the kitchen may be unwantedly pervasive.
When the space is limited, the dining room, living room and kitchen appear to be more spacious.	It is difficult to present a formal room to guests when the kitchen, dining and living areas are combined (Figure 55). This is particularly true for families with small children.
Families which value sociability and informality tend to prefer one large room to two separate ones.	Most people prefer the living and dining rooms to be separate, when the kitchen and dining areas are combined.

Table 13. Dining Room in Combination with Living Room (Figure 52)

Advantages	*Disadvantages*
The dining and living rooms may be accommodated in a smaller area than when they are separated.	It is not possible to work or read quietly in one room while a noisy activity goes on in the other room.
The living room and dining room appear more spacious when the space is limited.	The potential use of the dining room for secondary activites is reduced.
Kitchen odours are isolated.	Where no casual eating place is provided in the kitchen, the more formal living area becomes associated with the informal activity of daily eating. Consequently, either the living space becomes more informal or mealtimes tend towards an undesirable formality.
It is easier to entertain large groups.	If the dining room is placed in an alcove within the dwelling's inner zone, the natural light is poor. If the dining room is located along a windowed area of an extended living room, this increases the building's perimeter and consequently the building costs.
	Carrying food from the kitchen to the dining room is often inconvenient.
	Some residents find it difficult to create a cosy atmosphere in a combined dining/living room (Figure 56).

Table 14. Dining Room in one or the other above locations with additional eating facilities in Kitchen (Figure 53)

Advantages	*Disadvantages*
Most people, regardless of their economic and social background, like to be able to have at least some meals in the kitchen.	Providing an additional eating space within the dwelling increases building costs.
It increases the range of activities possible in the dwelling and facilitates their coordination. This is particularly true in high-rise buildings and in colder regions of the country, where children remain indoors for longer periods of time.	

Figure 54
It is easier to display appropriately formal furniture in a separate dining room than when the dining room is combined with other areas

Figure 55
It is difficult to present a formal dining area when it is combined with other spaces. In this case, the occupants decided to hang posters to help provide a sense of separation

Figure 56
These occupants have used screens and plants to help separate the dining area from the living room

4 Kitchens

Space Function

Primary and secondary activities that usually take place in kitchens are listed below:

Primary Activities	Secondary Activities
Food preparation	Eating
Mixing	Clothes mending/ washing
Cooking	Socializing
Serving	Children's play
Storing food and utensils	Study and homework
Cleaning up after meals	Hobbies

Appliances and Counter Frontage

A minimum number of appliances and a minimum amount of counter space are required if occupants are to be able to carry out their normal activities in the kitchen. These appliances and spaces should be grouped according to "work centres". The work centres concept suggests that, within a kitchen, the basic appliances (refrigerator, sink and range) can be used more effectively if there is a certain amount of storage space and convenient working surfaces. Each appliance, along with its own auxiliary counter space and storage, forms a basic centre:

1. Sink and cleanup
2. Range and serve
3. Refrigerator
4. Mixing zone.

Other typical kitchen appliances are shown in Figure 57.

Recommendations

1. Depending on the occupancy of the dwelling, the kitchens should accommodate at least the appliances and counters shown in Table 15, which have been grouped according to Work Centres.

2. Built-in wall ovens require a 500 mm wide adjacent counter.

3. The range should be located at least 600 mm from all windows to prevent curtains touching the burners and catching fire.

4. Wall cabinets should not be placed over a range unless a fire-rated exhaust hood (the full width of the range) is provided.

Table 15. Minimum Schedule of Individual Appliances and Counter Frontage[1]

	Size of Household Minimum Frontages in Lineal Millimetres				
Work Centres	*1 and 2P**	*1 and 2P*	*3 and 4P*	*5 and 6P*	*7 and 8P*
Sink and cleanup	500	600	600	800	800
Counter on each side of sink	400	450	550	600	750
Range and serve	650	650	800	800	800
Counter on one side of range	400	450	550	600	750
Refrigerator	800	800	950	950	950
Counter on one side of refrigerator	400	400	400	400	500
Mixing zone	550	750	900	900	1 100

* 1- and 2-Person Households living in a zero-bedroom dwelling (that is, a bachelor or studio apartment)

Table 16. Minimum Schedule of Overall Counter Frontage and Countertop Area[2]

	Size of Household				
	*1 and 2P**	*1 and 2P*	*3 and 4P*	*5 and 6P*	*7 and 8P*
Minimum Counter Frontage (mm)	1 550	2 100	2 350	2 400	2 750
Minimum Countertop Area (m^2)	0.93	1.26	1.44	1.44	1.65

* In zero-bedroom dwellings.

[1] When the area requirements of work centres are contiguous, Table 16 may be used instead of this table.

[2] When the assembly of the work centre is not continuous, Table 15 should be used.

5. Required countertop spaces may be combined when they are located between two fixtures — sink, range, or refrigerator (see Figure 58). Such countertops should have a minimum frontage, equal to that of the larger of the countertop being combined plus 300 mm.[3] This combined counter may also be the mixing counter if its minimum length is equal to that required for the mixing counter. Countertop frontages may continue around corners, but the linear dimension must be calculated from the front edge.

   The kitchen should have countertops providing at least the length of cabinet front and area of work surface shown in Table 16 (excluding the area occupied by the sink, the range and the refrigerator).

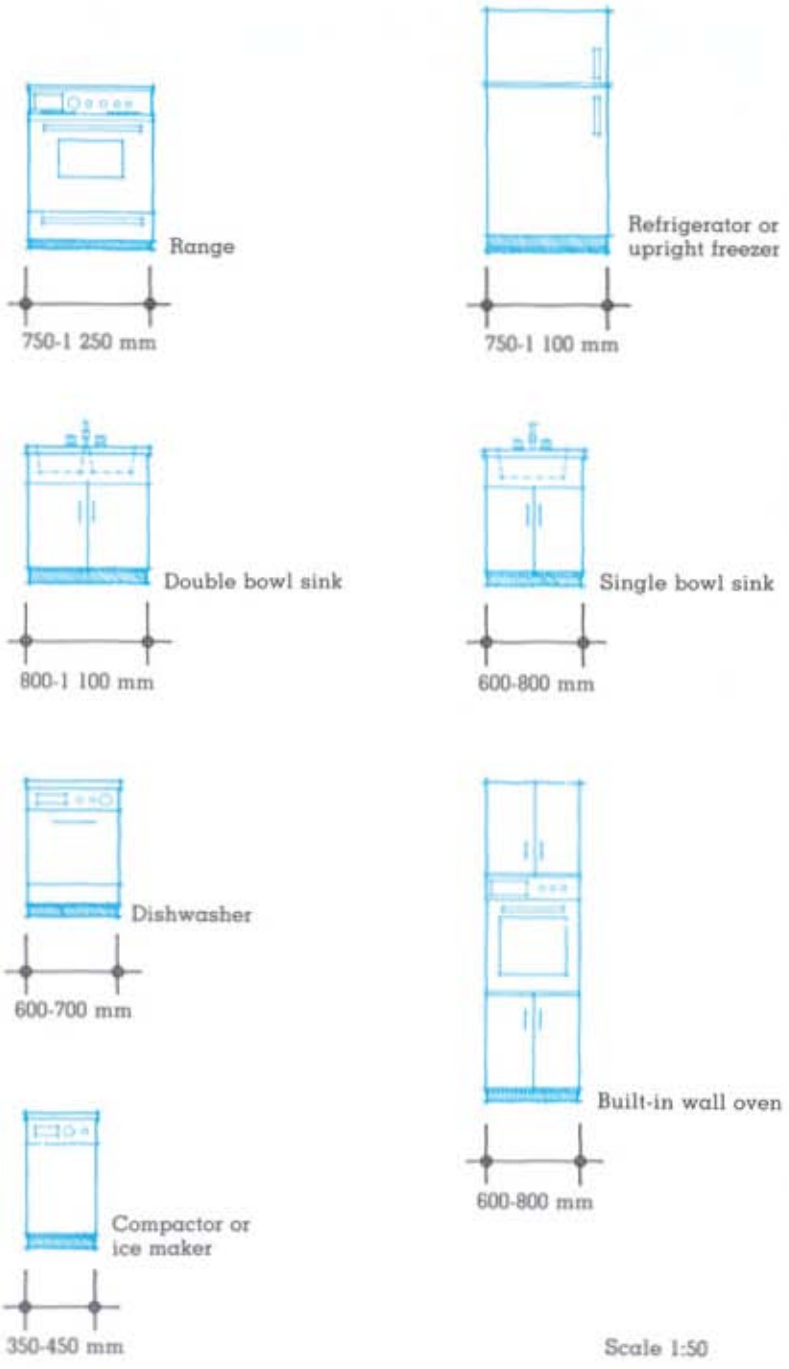


Figure 57
Typical kitchen appliances showing widths

[3] This 300 mm may be left out in zero-bedroom dwellings because it is assumed that food preparation would tend to be less elaborate here than in larger dwellings.

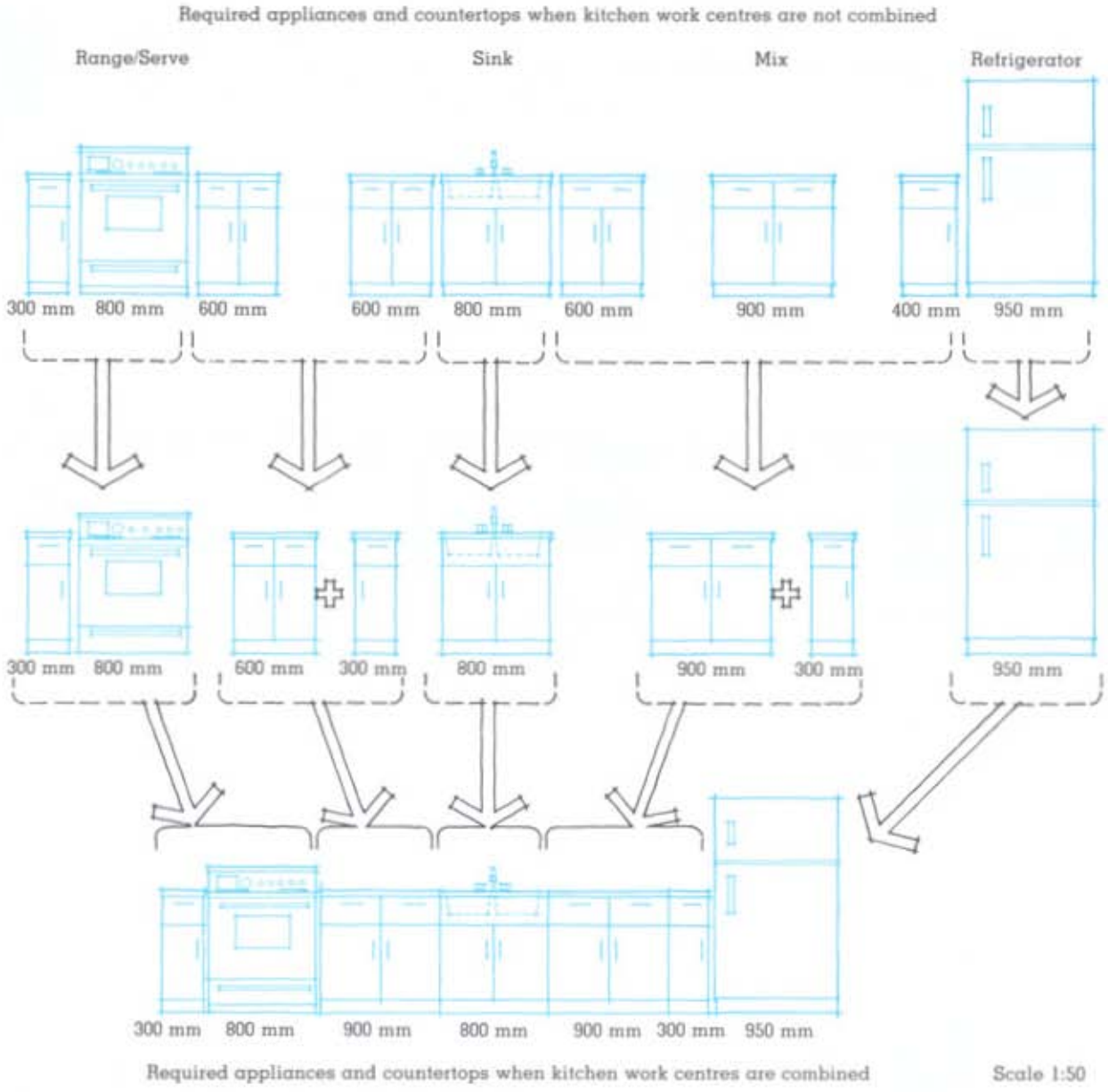


Figure 58
Illustration showing how counter space may be combined to meet functional requirements but reduce overall length. This example is based on the requirements of 5-to 6-person households

Storage Volume and Cabinet Dimensions

A minimum storage volume and cabinet dimension is required to contain food, dishes and utensils in the kitchen.

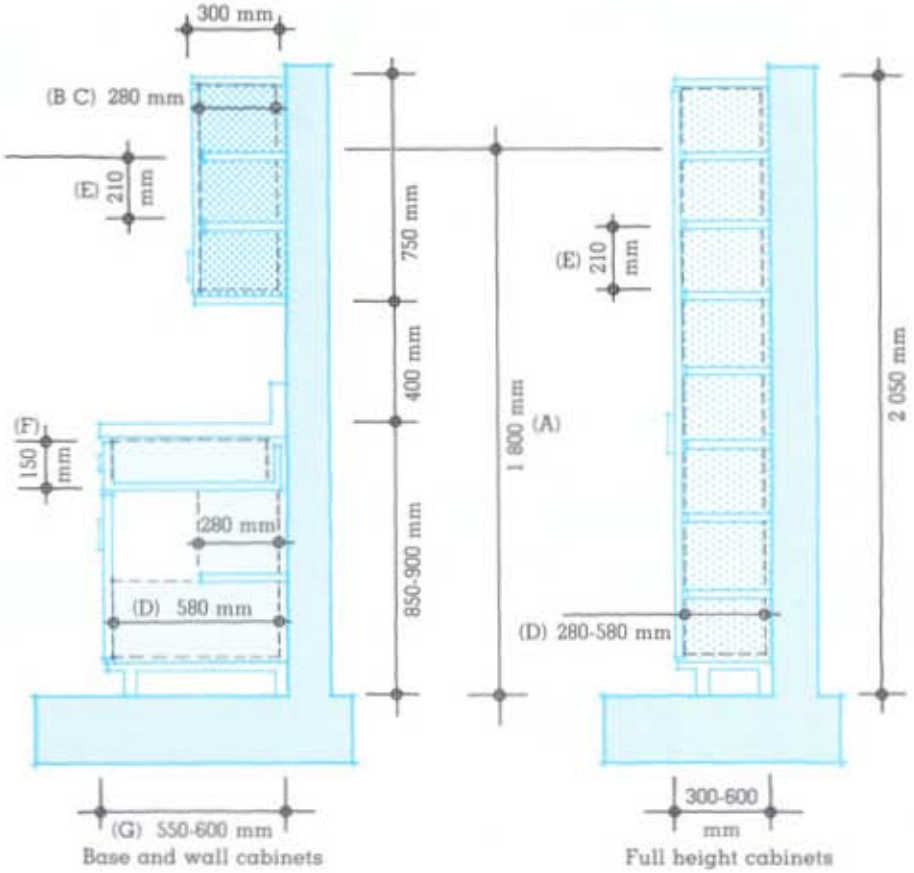
Minimum and maximum kitchen cabinet dimensions for efficient and safe usage are shown in Figure 59. There are three basic types of cabinet: base cabinets, wall cabinets, and full height cabinets.

Recommendations

1. Depending on the occupancy of the dwelling, the kitchen should accommodate at least the storage volume shown in Table 17.

2. Storage space should be enclosed by cabinet doors to protect the contents from dust and cooking grease deposits.

3. The upper portion of every base cabinet should contain at least one drawer.



A = Maximum permissible shelf height
B = Mimimum depth required for 75 per cent of shelves; the remainder may have a depth of 130 mm
C = Maximum depth of shelves required for computing shelf volume in wall cabinets
D = Maximum depth of shelves when computing shelf volume in base and full height cabinets
E = Minimum vertical clearance required for 75 per cent of shelves
F = minimum vertical depth required in all drawers
G = May be increased to 750 mm when there are no wall cabinets above

Figure 59
Cross-sections showing minimum and maximum kitchen cabinet dimensions for efficient and safe use

Table 17. Miminum Kitchen Storage Volume

	Size of Household				
	*1 and 2P***	*1 and 2P*	*3 and 4P*	*5 and 6P*	*7 and 8P*
Minimum Net* Storage Volume (m^3)	1.3	1.5	1.9	1.9	2.3

* The net volume is the volume available for storing items; it does not include:
1) the thickness of shelves, doors and the bottoms of drawers.
2) the following base cabinet spaces:
   - dishwasher space
   - inside corner space (where revolving shelves are used, the actual shelf area may be counted)
   - bulk storage space under sink
   - garbage chamber under counter
   - drawers in range.
3) the following wall cabinets over:
   - refrigerator
   - sink
   - range
   - wall oven.

** In zero-bedroom dwellings.

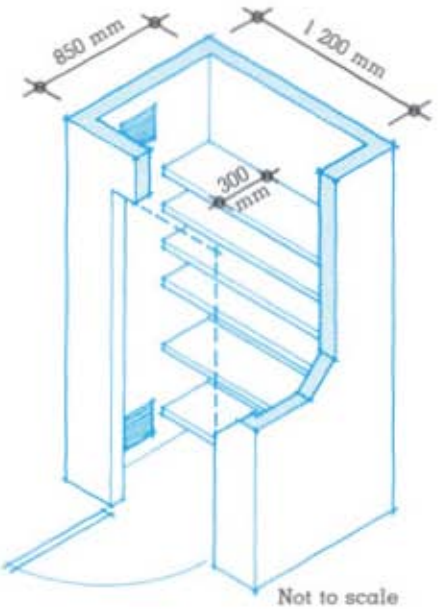


Figure 60
Recommended internal dimensions for a food pantry in a 3-bedroom dwelling

Food Pantry and Bulk Garbage Storage

Food Pantry

Whenever possible, dwellings should have a pantry for food that does not need to be kept in a refrigerator but which is best not kept in the warm conditions of the kitchen (for example, fruits, vegetables, jars of preserves, wine, beer, and soft drinks).

Recommendations

1. The food pantry should be an integral part of the kitchen and should be located on the dwelling's coolest wall.

2. The food pantry should be equipped with adjustable shelves.

3. Interior walls and the door should be well insulated and close fitted so that the coolness is kept in and the kitchen's warmth is kept out. The bottom and top of the outside wall should be vented to create a natural flow of air.

4. Figure 60 illustrates the recommended dimensions for a food pantry in a 3-bedroom dwelling.

Bulk Garbage Storage

Some dwellings require an enclosed space for the storage of garbage bags or cans between city collections.

Recommendations

1. The bulk garbage space may be located inside or outside the dwelling but should be easily accessible from the kitchen.

2. If it is inside the dwelling, the bulk garbage space should be located against an outside wall. Interior walls and the door should be well insulated and close fitted. The bottom and the top of the outside wall should be vented (Figure 61).

3. Even though its size is dependent on the number of occupants in the dwelling, the bulk garbage storage space should accommodate at least the volume shown in Table 18.

Table 18. Minimum Bulk Garbage Storage Volume

Household Size *Number of Persons*	Dwelling Type *Number of Bedrooms*	Garbage Storage Volume m^3
1-2	0	0.15
1-2	1	0.15
3-4	2	0.30
5-6	3	0.60
7-8	4	0.90

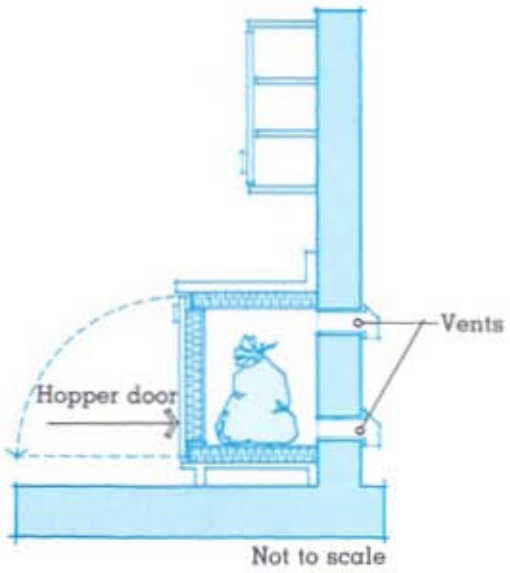


Figure 61
Insulated bulk garbage chamber under a kitchen counter

Clearances

For access and circulation, clearances are needed in front of, and between kitchen cabinets and appliances. In some cases, greater clearances are required to accommodate the needs of elderly people, wheelchair users and invalids.

Recommendations

1. Recommendations for clearances in front of, and between cabinets and appliances are shown in Figures 62 to 71.

2. Ceiling height should be 2 300 mm over at least 75 per cent of the required floor area, with a clear height of 2 100 mm at any point over that area.

3. For typical plans illustrating minimum dimensions to meet primary activities, see Figures 72 to 75.

Figure 62
Recommended room for movement in front of sink, range, refrigerator and working surface

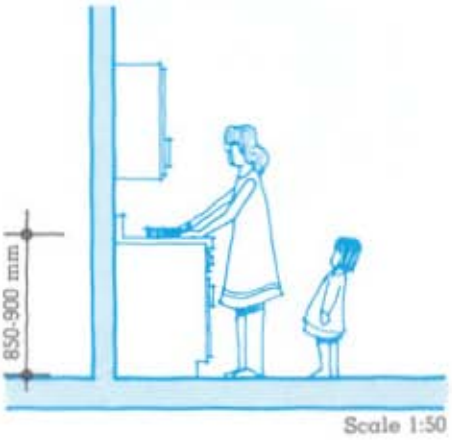


Figure 64
Recommended base cabinet height for standing position

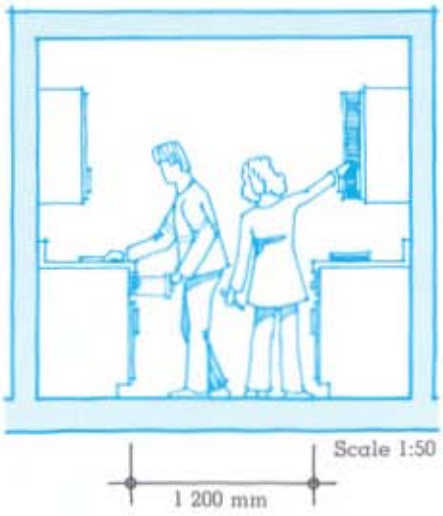


Figure 63
Recommended minimum distance to allow two persons to work simultaneously

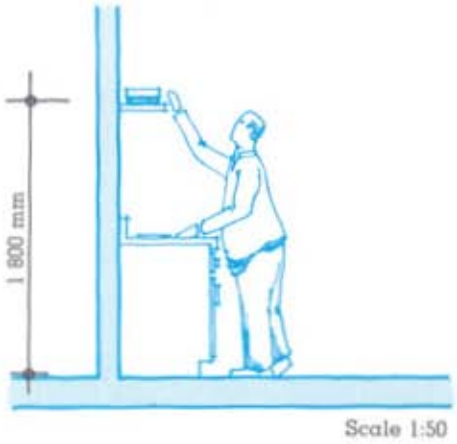


Figure 65
Comfortable height of reach over base cabinet, 1 800 mm (assuming a 600 mm deep base cabinet). The accessibility of top shelves in wall cabinets determines their relative safety

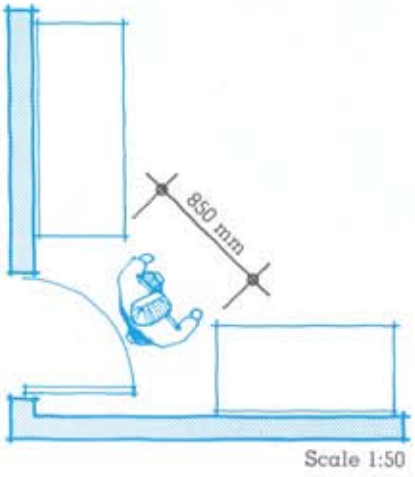


Figure 66
Recommended corner-to-corner clearance between base cabinets at right angles to each other

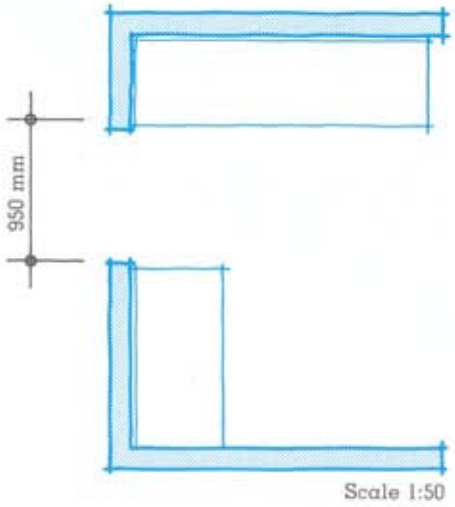


Figure 68
Recommended minimum clearance between base cabinets on adjacent walls

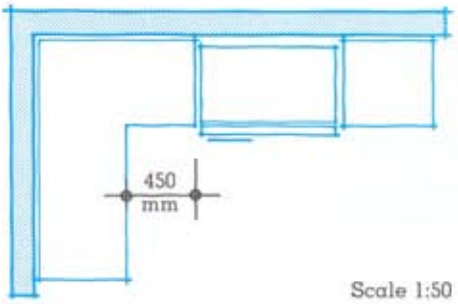


Figure 70
Recommended minimum distance between side of refrigerator to adjacent corner cabinet

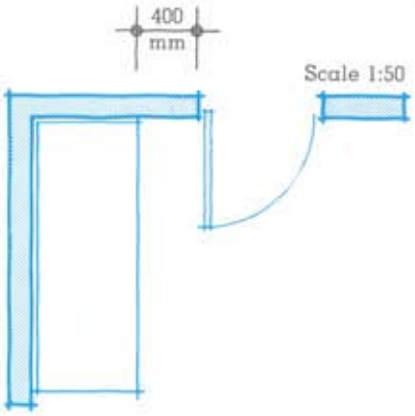


Figure 67
Recommended minimum clearance between inward-opening door and front of base cabinet

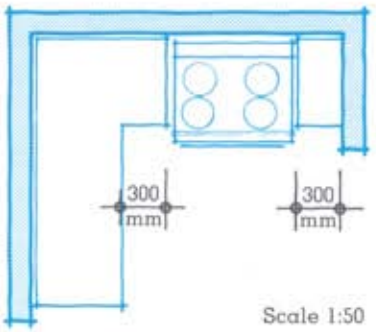


Figure 69
Recommended minimum distance between the edge of a range and the base cabinet corner. There should be a 300 mm wide space on the other side of the range; this ensures that hot pot handles can be safely turned away from burners and from the front of the range

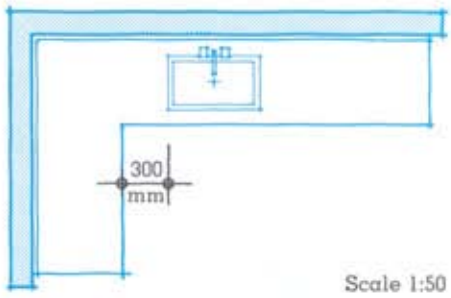
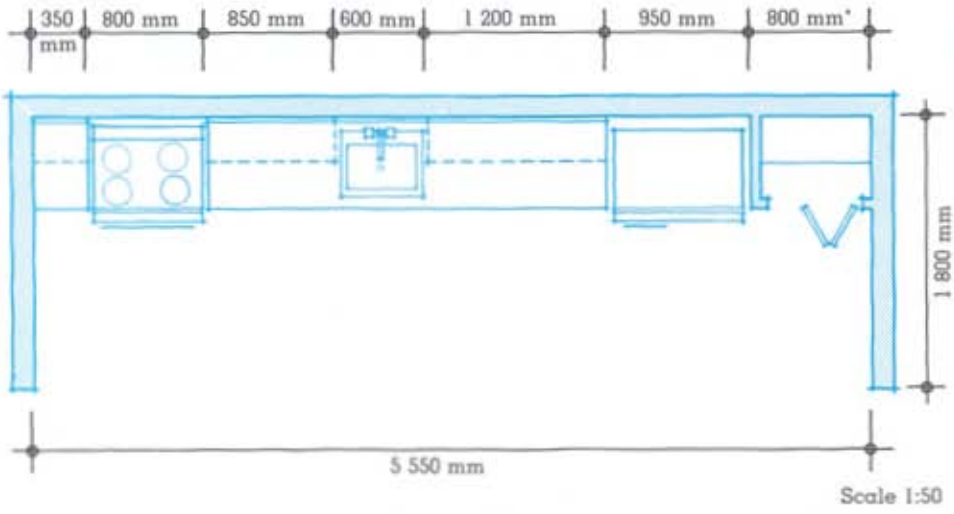


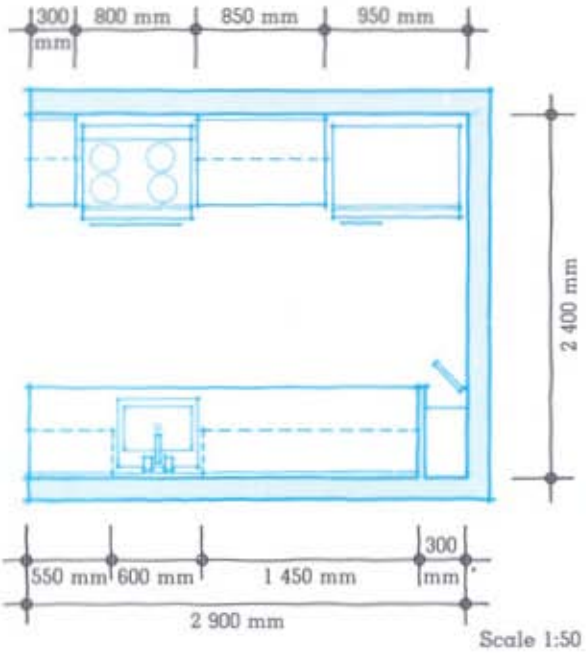
Figure 71
Recommended minimum distance between sink and base cabinet



	Prototypical Plan	*Minimum Requirement*
Counter frontage	2 400 mm	2 330 mm
Countertop area	1.44 m^2	1.44 m^2
Storage volume	1.9 m^3	1.9 m^3

* Full height cabinet

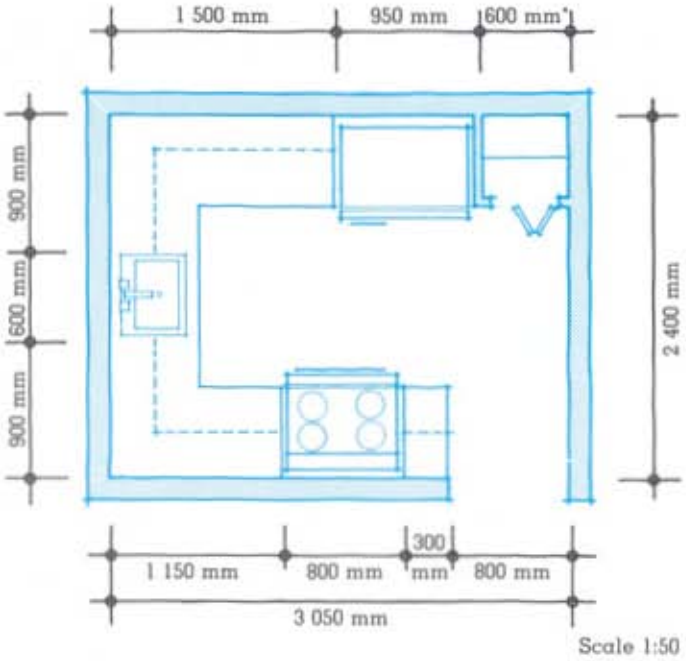
Figure 72
In-line shaped kitchen designed for 3- and 4-person households. Recommended net area: 10 m^2



	Prototypical Plan	*Minimum Requirement*
Counter frontage	3 150 mm	2 350 mm
Countertop area	1.89 m^2	1.44 m^2
Storage volume	1.9 m^3	1.9 m^3

* Full height cabinet

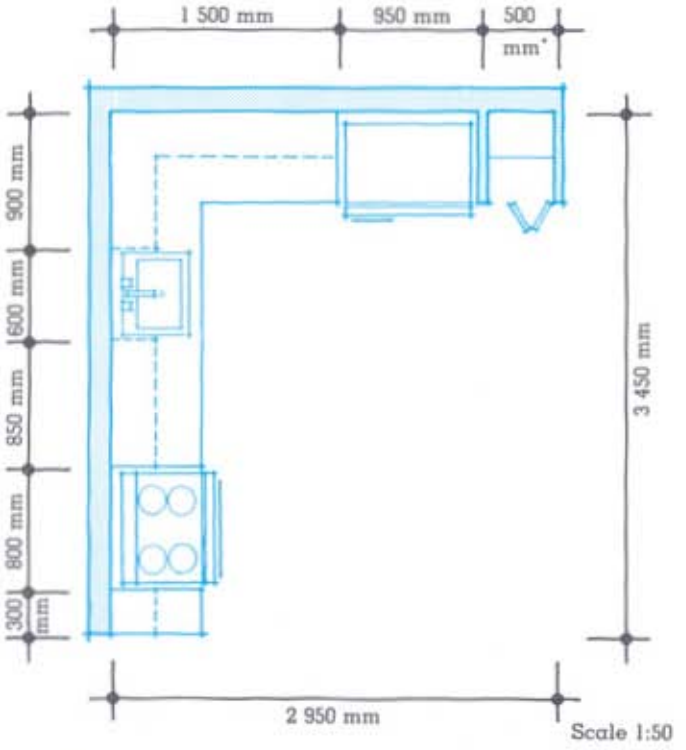
Figure 73
Galley type kitchen designed for 3- and 4-person households. Recommended net area: 7 m^2



	Prototypical Plan	*Minimum Requirement*
Counter frontage	2 350 mm	2 350 mm
Countertop area	2.13 m^2	1.44 m^2
Storage volume	1.9 m^3	1.9 m^3

* Full height cabinet

Figure 74
U-shaped kitchen designed for 3- and 4-person households. Recommended net area: 7.3 m^2



	Prototypical Plan	*Minimum Requirement*
Counter frontage	2 650 mm	2 350 mm
Countertop area	1.95 m^2	1.44 m^2
Storage volume	1.9 m^3	1.9 m^3

* Full height cabinet

Figure 75
L-shaped kitchen for 3- and 4-person households. Recommended net area: 10.2 m^2

Space Size

Families of the same size but of different composition and lifestyle have different requirements. A large family may be satisfied with a compact kitchen if it is used by only one person at a time. Conversely, a small household may require a large kitchen if two or more persons wish to work simultaneously.

The number of food items, utensils and dishes to be stored may also vary considerably from one family to another.

Individual household preferences determine whether the kitchen area should include such equipment as a utility cabinet, dishwasher, freezer, and so on, or space for eating, washing, sewing and other activities. Usually these preferences are not known to the designer.

Given the above variations, it would not be appropriate to establish rigid standards for kitchens. What is important is that a wide range of preferences be accommodated. The requirements listed below provide the adaptability needed to suit these differences and complement the requirements listed under Appliances and Counter Frontage, Storage Volume and Cabinet Dimensions, and Clearances (see also Table 19).

Recommendations

1. The kitchen should be proportional to the size of the household and to the number of bedrooms within the dwelling.

2. A minimum kitchen space for a dwelling should have an area of 6.0 m^2. An additional area of: 0.52 m^2 should be added for a third and for a fourth person. 0.25 m^2 should be added for a fifth, a sixth, a seventh, and an eighth person.

Preparing a meal is essentially the same whether it is for five or for eight people. There is little advantage in increasing the size beyond that required for four-person households since this will result in longer walking distances.

Table 19. Minimum Standards for Kitchens

Household Size *Number of Persons*	Dwelling Type *Number of Bedrooms*	Kitchen Use	Floor Area** m^2
1-2	0 & 1	P*	6.0
1-2	0 & 1	P&S	9.0
3-4	2	P	7.0
3-4	2	P&S	10.0
5-6	3	P	7.5
5-6	3	P&S	10.5
7-8	4	P	8.0
7-8	4	P&S	11.0

* P = Primary activities taking place in kitchen
S = Secondary activities taking place in kitchen (an average additional floor area of 3.0 m^2/per room is allocated to support secondary activities that may take place in the kitchen).

** Including the area occupied by cabinets.

Space Configuration

The layout of the kitchen should be determined primarily by the following considerations:

- location and sequence of work centres
- safety
- view of the exterior
- the provision of special kitchen features.

Location of Work Centres

When work is being done in the kitchen, movement occurs between various centres. The efficiency and safety of a kitchen design is closely related to their location.

Recommendations

1. Sink and Cleanup Centre

   The sink-cleanup centre is the most frequently used and should be located near the middle of the kitchen assembly.

   If possible, the sink should be placed under a window. Because the tasks done there tend to involve longer periods of continuous work than those in other centres, good natural light is particularly important. The garbage-holding area should be located adjacent to this centre.

2. Mixing Centre

   The mixing centre should be placed between the sink and the refrigerator centres. It is also the best location for the storage of dry food ingredients and portable appliances (that is, blenders, mixers and scales).

3. Cooking Centre

   The cooking centre should be placed near the sink; serving is often the next operation after cooking. The centre should be convenient to the dining facilities.

   The cooking centre should not be located in a passageway because handles of cooking pots may protrude; it should not be placed so that the swing of any door might strike a handle or a person standing in front of it.

4. Refrigerator Centre

   The refrigerator should be located at one end of a kitchen assembly, in order to avoid blocking the flow of work along the assembly counter.

   It should be positioned to avoid interference with the transfer of food between counters and the dining table.

Sequence of Work Centres

The efficiency and safety of the kitchen is also influenced by the sequence of work centres. The following is a typical work sequence:

1. Food is taken to the mixing area from the refrigerator and other storage areas.
2. Food is made ready for cooking (or eating) at the mixing centre.
3. Since water is likely to be needed, the sink centre can be used.
4. Once prepared, the food may be moved directly to the dining area or it may go through a cooking process at the range and serve centre.

This pattern of operations calls for the following recommendation.

Recommendation

Whenever possible, the kitchen work centres should be arranged in the following sequence:

1. Refrigerator and other food storage centre
2. Mixing centre
3. Sink and cleanup centre
4. Range and serve centre

Preferences for right-to-left or left-to-right sequence for these operations depends on the individual.

Distance between Work Centres

The work-triangle is one means of measuring the efficiency of a kitchen. It is defined as a triangle whose sides are formed by lines connecting the centre front of the sink, range and refrigerator. This triangle encompasses the area of major activity in the kitchen. Time and steps are saved if the sum of the sides of the work triangle is relatively small, but the space enclosed is large enough to ensure that occupants are not crowded.

Recommendations

1. The following distances between appliances will maximize efficiency and safety:
   - between refrigerator and sink: 1 200 to 2 200 mm.
   - between sink and range: 1 200 to 1 900 mm
   - between range and refrigerator: 1 200 to 2 900 mm.

2. With all other design factors satisfactorily resolved, the sum of the sides of the work-triangle should not be less than 3 600 mm nor more than 7 000 mm.

3. The work-triangle should not be crossed by traffic flow between areas adjacent to the kitchen (Figures 76 and 77).

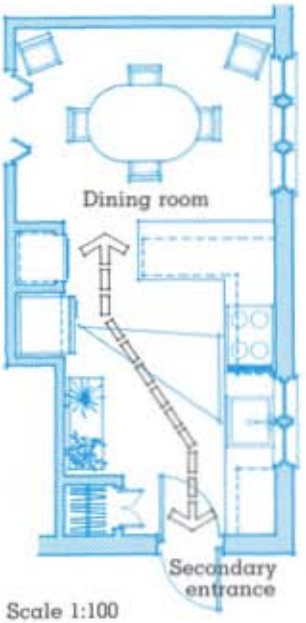


Figure 76
This illustration shows a poor kitchen arrangement. The work triangle is crossed by traffic between the dining area and the entrance from the garden

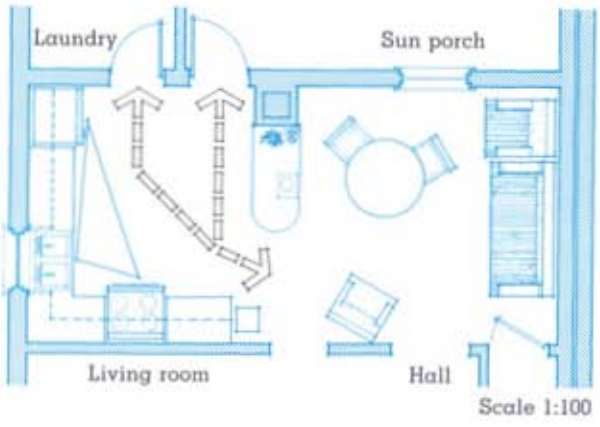


Figure 77
This illustration shows a well-planned kitchen layout with ample work space. The traffic flow provides easy access to and from adjacent areas without crossing the work triangle

Combination of Work Centres

There are various ways in which work centres may be combined to form different kitchen types (Figure 78). The most frequently mentioned advantages and disadvantages of these combinations of work centres are listed in Tables 20 to 23. No one type of work centre combination will fit the requirements of every dwelling.

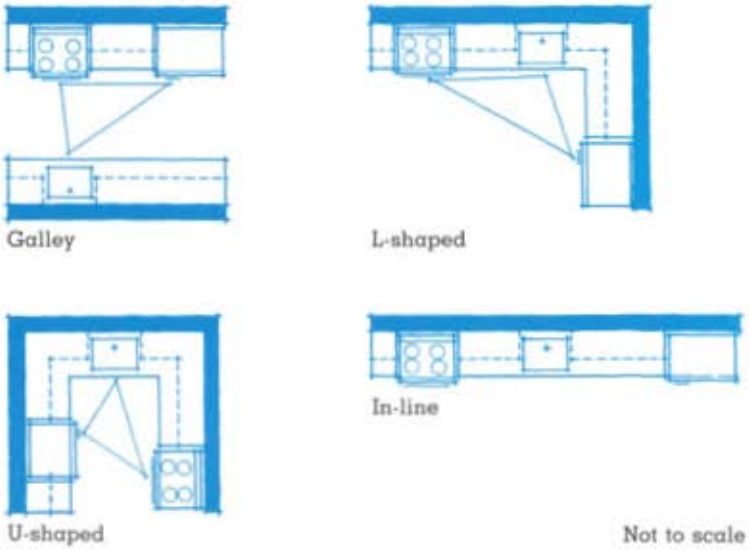


Figure 78
Kitchen types

Table 20. Galley Kitchen

Advantages	*Disadvantages*
It is compact, economical of space and requires less walking than other types of kitchens. Galley and U-shape kitchens offer the best countertop area for the amount of floor area required.	Circulation will pass through the work triangle if the kitchen is open at both ends.
All storage space is accessible.	
Allows access to different parts of the dwelling if the galley kitchen is open at both ends.	

Table 21. U-shaped Kitchen

Advantages	*Disadvantages*
Does not allow traffic through the work triangle.	Installation tends to be more expensive than in the In-line or Galley types of assemblies because there are two corners.
Is particularly suitable for a working alcove as a part of a larger space and can be considerably varied.	With two dead corners, storage is not fully accessible.
Compact and economical of space.	Can be crowded if more than one person is working in the space.

Table 22. L-shaped Kitchen

Advantages	*Disadvantages*
Traffic does not usually pass through the work triangle.	Not compact or economical of space if the opposite corner is not used.
The work triangle is reasonably efficient.	Has one dead corner; storage is therefore not fully accessible.
Allows room for a dining area or for extra storage in the opposite corner.	Can be crowded if more than one person is working in the space.

Table 23. In-line Kitchen

Advantages	*Disadvantages*
A simple combination of work centres.	The distance between appliances may become excessive in large kitchens.
All storage is accessible.	Not compact and not economical of space if the opposite side is not used for a complementary function.
	Traffic will pass through the work area if the kitchen is a corridor.

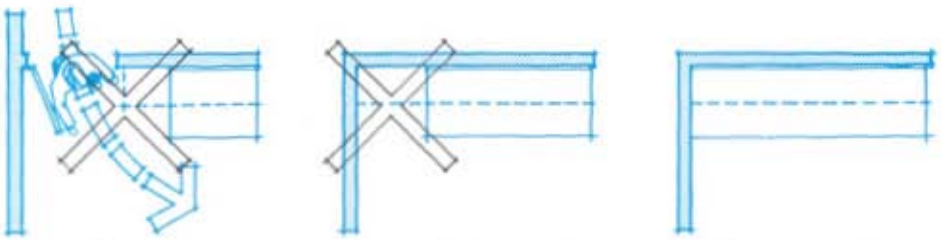


Figure 79
Wall cabinets should not be placed where there are no base cabinets, to avoid the risk of bumping one's head

Safety

Most accidents in the dwelling happen in the kitchen, so every effort should be made to minimize hazards. The following recommendations should be considered.

Recommendations

1. Wall cabinets should not be used where there is no base cabinet or lower shelf; people could bump their heads (see Figure 79).

2. Doors to the kitchen should be placed so as to minimize traffic flow through the work triangle.

3. The swing of all doors (including cabinet doors) in the kitchen should be planned to prevent collisions.

4. Cupboard doors should not project beyond the front of the counter; this should eliminate the discomfort of bumped heads.

5. Since passageways and access routes into the kitchen interrupt the continuous wallspace for cabinets and appliances, there should not be more than two, or at the most, three access ways to the kitchen; these should be located primarily in one part of the space.

View to the Exterior

It is important that the height of kitchen windows should be sufficient to minimize interference with base cabinets and to ensure the best view outside.

Recommendations

1. The height of kitchen windows should be based on estimated base cabinet location alternatives as well as on the standard base cabinet height (850-900 mm) plus splashback (100 mm).

2. Where a window can be provided, it should be placed above the sink since the tasks done there tend to involve longer periods of continuous work than those in other kitchen centres (Figure 80).

Special Kitchen Features

Research indicates that the provision of certain kitchen features will ease kitchen maintenance, improve kitchen efficiency, and keep occupants content.

Recommendations

The following features can increase the occupants' satisfaction with the kitchen space:

- a splashback at the junction of the countertop and wall (minimum height of 100 mm)
- double sinks
- pass-through between kitchen and dining area
- sections of counter on castors that will allow the kitchen space to be rearranged
- message boards
- garbage containers integrated with base cabinets
- a ventilating hood over the range
- a lockable or inaccessible cabinet for dangerous items that should be kept away from small children.

Figure 80
Where a window can be provided, a preferred location is above the sink. Tasks done there tend to involve longer periods of continuous work than those at other kitchen centres

Space Location

The location of the kitchen should be determined primarily by the following requirements:

- privacy
- efficiency of food service
- children surveillance
- natural lighting and views
- the relationship of the kitchen to exterior activity spaces.

Privacy

Residents dislike having the primary dwelling entrance look directly into the kitchen area.

Recommendation

The kitchen space should be screened from the main entrance to the dwelling.

Efficiency

The kitchen should be efficiently located in the dwelling plan since there are frequent trips from the kitchen to the dining room and other living areas.

Recommendations

1. The kitchen should connect directly with the dining area.

2. There should be easy access to the primary entrance in order that residents may answer calls.

3. There should be a reasonably direct connection to the garage, driveway, or elevator to facilitate the transport of supplies to the kitchen.

4. The garbage storage area (i.e., outside or down the corridor, depending on the dwelling type) should be accessible without occupants having to pass through living areas or the primary entrance.

5. When small children play indoors, adults should be able to supervise from the kitchen, but they should be away from the kitchen equipment and not underfoot.

Child Surveillance

In many dwellings the kitchen is an area where the parent who looks after the children during the daytime is likely to spend a relatively large amount of time. Child surveillance from this area should be made easier.

Recommendations

1. The kitchen should be placed on an outside wall where children playing outside may be casually supervised by an adult through a window or doorway.

2. Playspaces inside the dwelling should be within sight of the kitchen.

Security from Strangers

Many residents feel it is important to be able to see strangers approaching the dwelling from the kitchen.

Natural Lighting and Views

Residents dislike kitchens without windows. Although living-room views are usually given first priority, many residents spend more daylight hours in the kitchen and greatly appreciate a pleasant view from it. The enjoyment of nature and the observation of community life will enhance the outside view and may be an especially important benefit for elderly people.

Recommendations

1. Locate the kitchen on an outside wall so that windows can be provided.

2. For one- and two-person households, an internal kitchen may be an acceptable compromise in the face of space-planning constraints. However, for the elderly and others who tend to spend a great deal of time inside, a kitchen window should be provided whenever possible. Most housing for the elderly has a combined living/dining/kitchen area, in which the kitchen has no windows.

3. If the kitchen is to be located centrally without exterior walls, openings into an adjoining room should be provided to admit daylight as well as to enable those in the kitchen to see through the windows of that room.

Relationship to Exterior Spaces

Access should be provided from the kitchen to the adjacent exterior space to facilitate outdoor food service and outside clothes drying when clothes are washed in the kitchen.

5 Laundries

Space Function

Primary and secondary activities that take place in laundries are:

Primary Activities	Secondary Activities
Washing	Storing dirty clothing
Drying	Sorting
	Pre-iron storing
	Ironing

Appliances and Accessories

Minimum appliances and accessories standards are required to help occupants launder clothes. These standards are listed below, together with the horizontal dimensions of the appliances and accessories required.

Recommendations

1. Every dwelling should contain one clothes washing space that can accommodate the following appliances, or their equivalent, with comfortable use and circulation space:
   - 1 automatic washer of 800 x 800 mm
   - 1 automatic dryer of 800 x 800 mm
2. A well-planned laundry area should be large enough to accommodate the following additional accessories:
   - 1 double laundry tub: 1 200 x 600 mm
   - 1 sorting counter or table: 1 000 x 600 mm
   - 1 ironing board: 1 400 x 400 mm
   - 1 clothes drying rack: 700 x 500 mm
   - 1 laundry cart or basket: 450 x 650 mm

Clearances

Clearances should be provided in front of appliances to allow laundering activities to take place efficiently and in comfort. In some cases, greater clearances are required to satisfy the needs of elderly people, wheelchair users and invalids.

Recommendations

1. Recommendations for clearances in front of appliances and around accessories are shown in Figures 81 to 84.
2. Ceiling height should be 2 100 mm in any area where a person would normally be in a standing position.
3. For a typical plan illustrating minimum dimensions to meet primary activities, see Figure 85.

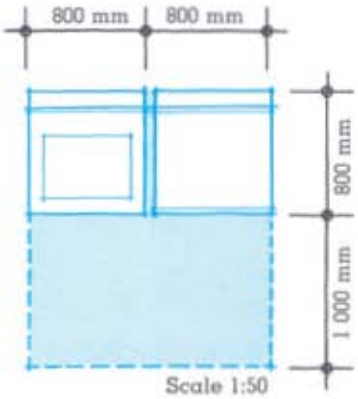


Figure 81
Clearance in front of automatic washer and dryer. If the space in front of the automatic washer and dryer is a corridor, this dimension should be increased to at least 1 200 mm. This will permit a second person to pass through when someone is doing the laundry. If a washer and dryer are located opposite each other, this dimension should also be 1 200 mm

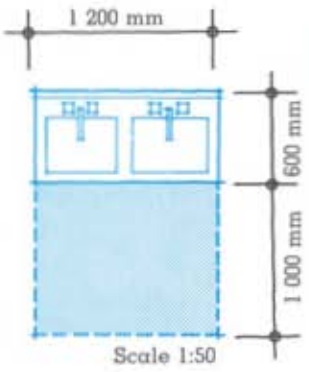


Figure 82
Clearance in front of laundry tub

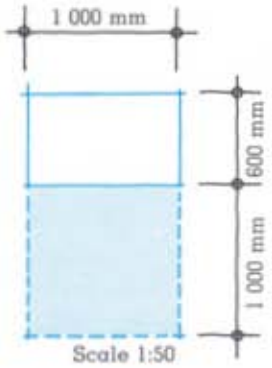


Figure 83
Clearance in front of sorting counter or table

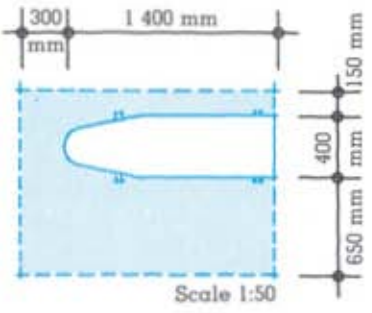


Figure 84
Space around ironing board

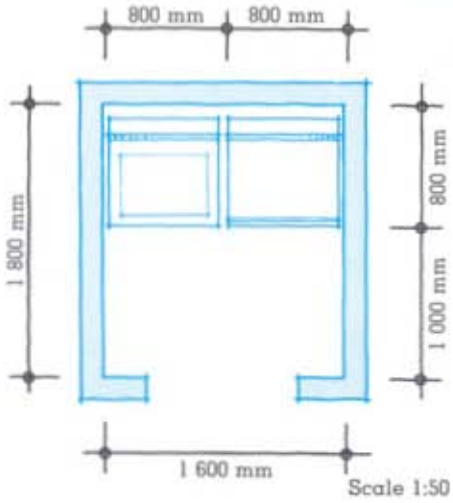


Figure 85
Typical plan illustrating minimum dimensions for laundering space. Net area: 2.9 m^2

Space Size

The required space for laundering does not vary significantly with the size of the household. However, each dwelling should have at least the minimum required. Most residents prefer to install washing machines and clothes dryers in their dwellings. Communal laundry facilities are valued by residents who cannot afford their own applicances.

Recommendations

1. Every dwelling should have a space to accommodate one automatic washer and dryer and that space should have a minimum floor area of 2.9 m^2. The minimum horizontal dimension within the required area should be 1 600 mm and the ceiling height should be not less than 2 100 mm.

2. It may be appropriate for zero- and one-bedroom dwellings in multiunit buildings to have a shared laundry space.

3. Where a shared laundry facility is provided, there should be one automatic washer and dryer for each twenty bedrooms.

Laundry Storage

Each laundry area should have enclosed storage space for washing materials such as bleaches, laundry soap and conditioners. This storage space should be provided in the form of built-in cabinets (Figure 86).

Recommendation

A space of 0.14 m^3 within or adjacent to the laundry area should be provided for storing washing materials. Half of that space should be a limited access or lockable storage unit for items that may be dangerous to young children.

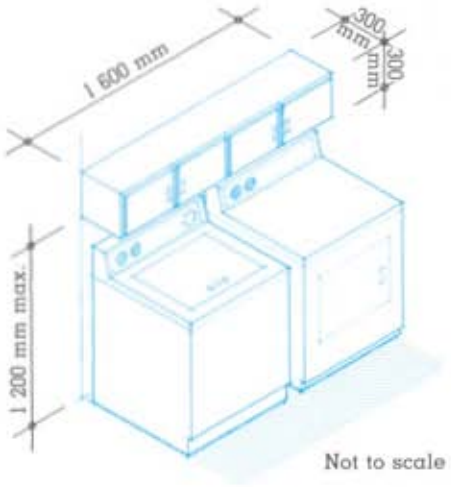


Figure 86
The minimum storage volume required in a laundry may be provided in a wall cabinet of this type. Approximate volume: 0.14 m^3

Space Configuration

The layout of the laundry area should be determined primarily by considerations of:

- efficiency
- natural ventilation.

Efficiency

The efficiency of the laundry is closely related to the travel distance between work centres. Laundering will be simplified by having work operations occur in the following sequence: collection, sorting, washing, drying, hanging, sorting and folding.

Recommendation

The layout of the laundry space should facilitate the movement of articles to be laundered from the laundry cart or basket to:

1. the sorting/folding counter (a work surface of 1 000 x 600 mm is recommended)
2. the laundry tub, if stains and soiled spots have to be removed from clothes
3. the washer
4. the dryer
5. the sorting/folding counter
6. the ironing centre.

Natural Ventilation

Dryers need to be vented to the outside to avoid moisture and lint buildup within the dwelling. The arrangement of the laundry area should enable the dryer to be placed near an outside wall.

Space Location

The ideal location of the laundry space is a matter of preference. The laundry area may be separate or combined with the bathroom, the kitchen, the utility space, or the corridor. The most frequently mentioned advantages and disadvantages of these various options are listed in Tables 24 to 28.

Table 24. Separate Laundry

Advantages	*Disadvantages*
A separate space can be used for other activities such as sewing and hobbies, if it is large enough.	Providing this extra room increases the cost of the dwelling.
Clothes may be hung for air drying without interfering with other household activities.	
Noise from laundry appliances can be shut off from the rest of the dwelling.	
Temporary holding or storage of clothing to be washed or ironed is made easier.	

Table 25. Laundry in Combination with Bathroom

Advantages	*Disadvantages*
When the bathroom is located near the bedrooms, the washer and dryer are close to where most laundry originates. This facilitates gathering soiled articles and putting away clean linen and clothing.	A bathroom will usually accommodate only washing and drying facilities. Other laundry related activities, such as ironing, will have to be carried out elsewhere in the dwelling.
Combining the laundry space with a half bathroom adjacent to the kitchen provides many of the advantages of a separate laundry room.	Occupants may wish to use the bathroom when laundry is being washed or dried.
The tops of the laundry appliances provide useful horizontal space on which to lay clothes.	
Floor and wall finishes in bathrooms are usually resistant to high humidities.	
Usually, additional plumbing costs are minimal.	
The bathroom sink may be used for hand washing.	
Mechanical ventilation can be provided economically for both functions.	

Table 26. Laundry in Combination with Kitchen

Advantages	*Disadvantages*
Suitable in housing for young families because the person doing the laundry can keep an eye on the washing machine while doing other jobs and supervising the children.	Danger of cross-contamination through the handling of dirty washing during food preparation.
Direct access to the outside for clothes drying is likely to be easier than from laundries located in a basement or on a second storey.	Grease and cooking smells can be passed on to clean clothes.
Kitchen sinks are usually sizeable and can be used for laundering.	Noise generated by running appliances cannot easily be shut off from the rest of the dwelling.
Additional plumbing costs are usually small.	

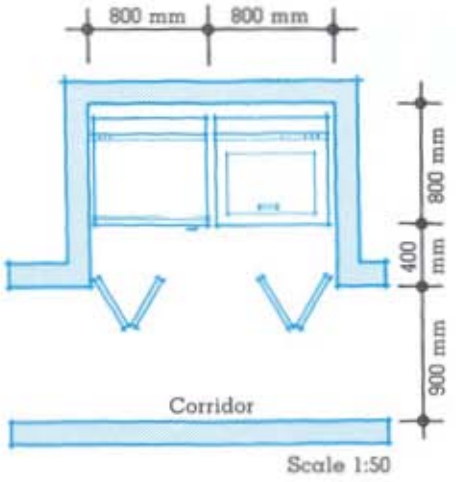


Figure 87
When space is limited, it may be possible to locate the laundry space next to a corridor

Table 27. Laundry in Combination with Utility Space in Basement

Advantages	*Disadvantages*
Generally, as much space as needed can be provided.	Laundry must be carried up and down stairs, although automatic dryers have eased the problem of carrying heavy baskets of damp clothes to outdoor clotheslines.
Noise generated by running appliances can be easily shut off from the rest of the dwelling.	

Table 28. Laundry in Combination with Corridor

Advantages	*Disadvantages*
The space is used more economically (Figure 87).	Noise generated by running appliances cannot be easily shut off from the rest of the dwelling.
The space above the appliances may be used as a linen closet.	An alcove adjacent to a corridor will accommodate only a minimum-sized laundry area. Other laundry related activities, such as ironing, will have to be carried out elsewhere in the dwelling.
The appliances can be hidden from sight when they are not in use; they can be recessed into the wall and enclosed with doors.	

6 Bedrooms

Space Function

Primary and secondary activities that usually take place in bedrooms are listed below:

Primary Activities	Secondary Activities
Sleeping	Reading
Dressing/ undressing	Writing
Storing clothes	Studying
Personal care	Watching television
	Listening to music
	Children's play
	Knitting, mending and sewing
	Ironing
	Telephoning
	Drawing and painting
	Sitting and entertaining
	Doing exercise
	Resting and convalescing
	Hobbies and crafts
	Keeping pets
	Storing bulky items and seasonal clothes

Furniture Requirements

There are minimum requirements for furniture and space if occupants are to be able to carry out their normal bedroom activities. These are listed below, together with the horizontal dimensions of the recommended furniture. See also Figure 88.

Two basic types of bedrooms have been identified:

1) the single occupancy bedroom, which will accommodate one single bed;

2) the double occupancy bedroom, which will accommodate one double bed or two single beds.

Recommendations

1. Single occupancy bedroom
   - 1 single bed — 1 000 x 2 100 mm
   - 1 bedside table — 500 x 450 mm
   - 1 single dresser[1] — 900 x 450 mm
   - 1 desk, or another piece of furniture of equivalent size — 1 000 x 450 mm
   - 1 chair — 450 x 450 mm

2. Double occupancy bedroom with double bed
   - 1 double bed — 1 350 x 2 100 mm
   - 2 bedside tables — 500 x 450 mm
   - 1 double dresser[2] or 2 single dressers[2] — 1 250 x 450 mm / 900 x 450 mm
   - 1 desk or other piece of furniture of equivalent size — 1 000 x 450 mm
   - 1 chair — 450 x 450 mm

3. Double occupancy bedroom with single beds
   - 2 single beds — 1 350 x 2 100 mm
   - 2 bedside tables — 500 x 450 mm
   - 1 double dresser[2] or — 1 250 x 450 mm
   - 2 single dressers[2] — 900 x 450 mm
   - 1 desk or other piece of furniture of equivalent size — 1 000 x 450 mm
   - 1 chair — 450 x 450 mm

4. Single occupancy bedroom in combination[3] with other spaces
   - 1 single bed — 1 000 x 2 100 mm
   - 1 bedside table — 500 x 450 mm
   - 1 single dresser[3] — 900 x 450 mm

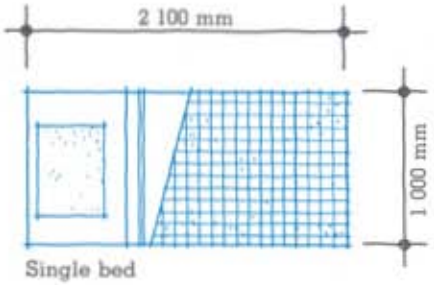
[1] Unless built-in bedroom cabinets are provided with the same capacity.

[2] Unless built-in bedroom cabinets are provided with the same capacity.

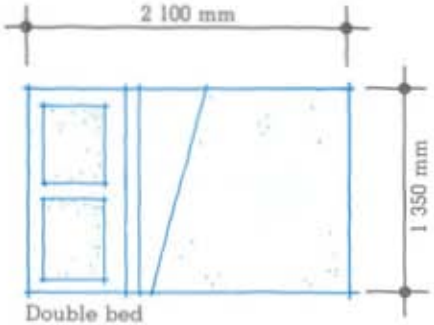
[3] Two or more areas are considered as a combination room if the dividing wall occupies less than 60 per cent of the separating plane.

5. Double occupancy bedroom (with double bed) in combination with other spaces
   - 1 double bed — 1 350 x 2 100 mm
   - 2 bedside tables — 500 x 450 mm
   - 1 double dresser[4] — 1 250 x 450 mm

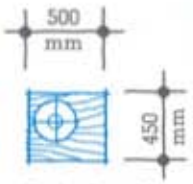
6. Double occupancy bedroom (with single beds) in combination with other spaces
   - 2 single beds — 1 000 x 2 100 mm
   - 2 bedside tables — 500 x 450 mm
   - 1 double dresser[4] — 1 250 x 450 mm



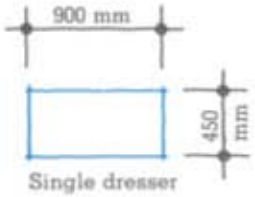
Single bed



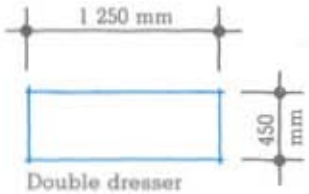
Double bed



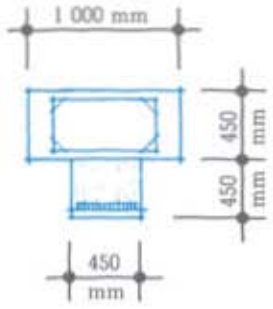
Bedside table



Single dresser



Double dresser



Desk and chair

Scale 1:50

Figure 88
Typical bedroom furniture

[4] Unless built-in bedroom cabinets are provided with the same capacity.

Clearances

Primary Activities

Clearances should be provided in front of and around furniture in bedrooms so that primary activities can take place efficiently and in comfort. In some cases, greater clearances are required to satisfy the needs of elderly people, wheelchair users and invalids.

Recommendations

1. Recommendations for clearances around furniture are shown in Figure 89 to 93.

2. Ceiling height should be 2 300 mm over at least 50 per cent of the required floor area or 2 100 mm over the entire required floor area. Any part of the floor having a clear height of less than 1 400 mm should not be considered to contribute to the required floor area.

3. For typical plans illustrating minimum dimensions, see Figure 94 to 97.

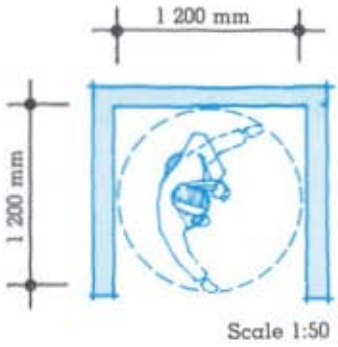


Figure 89
Space for dressing

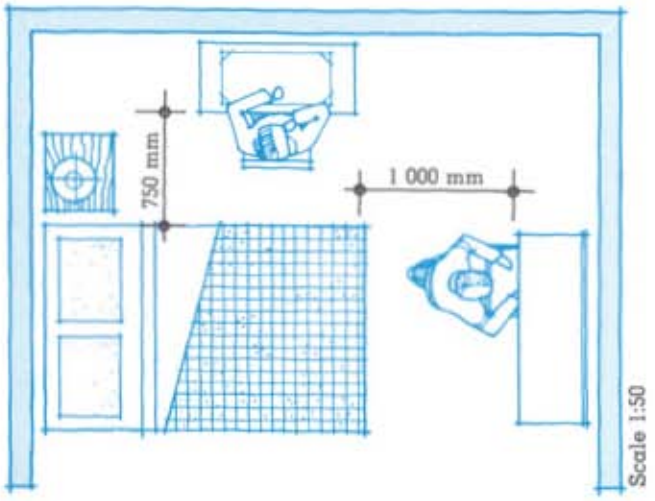


Figure 90
Access between bed and dresser and between bed and desk

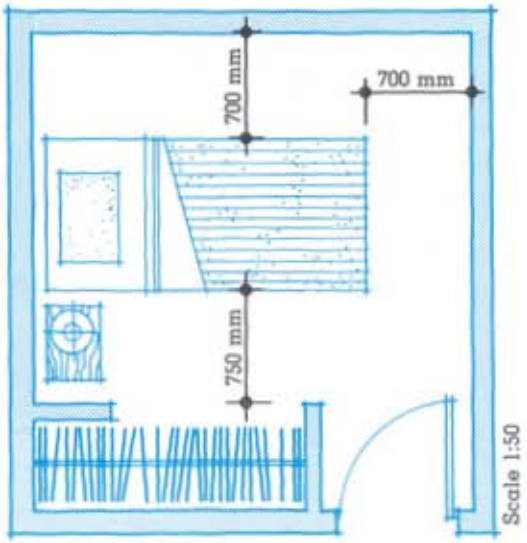


Figure 91
Access between bed and closet and between bed and wall

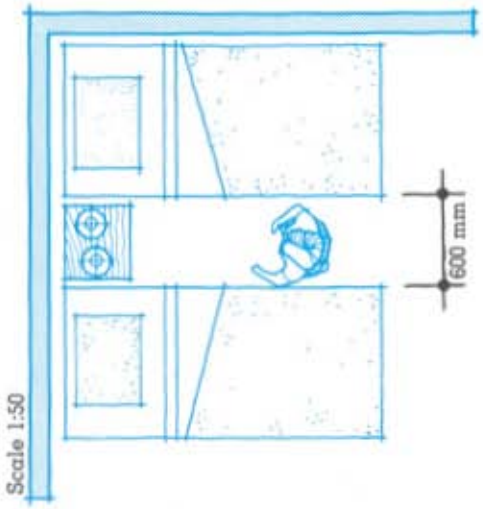


Figure 92
Access between beds

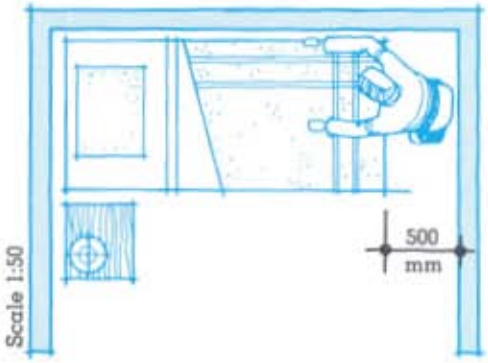


Figure 93
Space for making beds

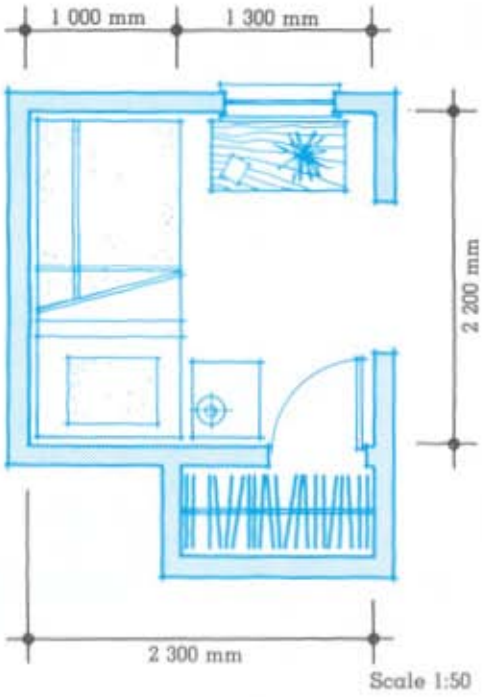


Figure 94
Single occupancy bedroom in combination with another space. Net area: 5 m^2. Adults are most likely to be found in this type of bedroom

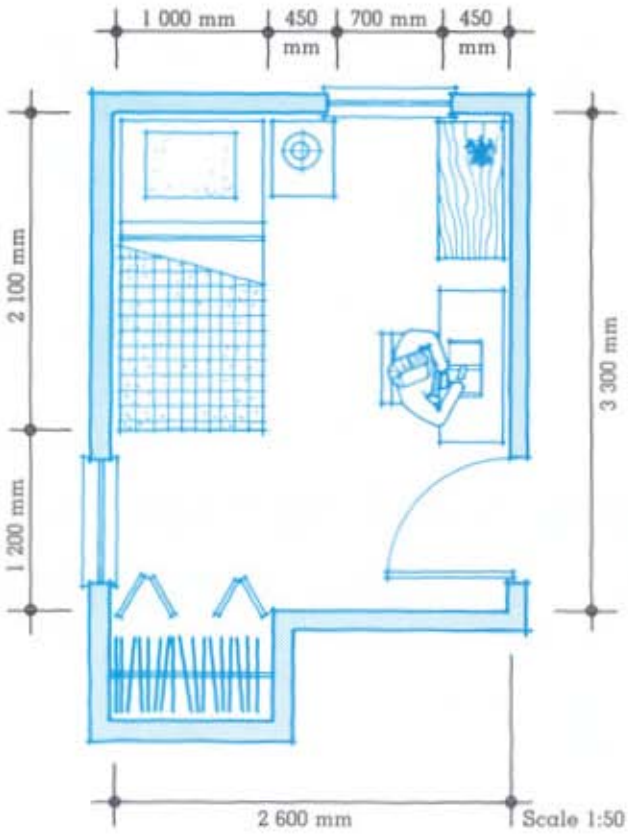


Figure 95
Single occupancy bedroom. Net area: 8.5 m^2. The most likely occupants of this bedroom type are: the elderly, adults, teenagers, and the pre-adolescent child (i.e., the school age child, 9 to 12 years old)

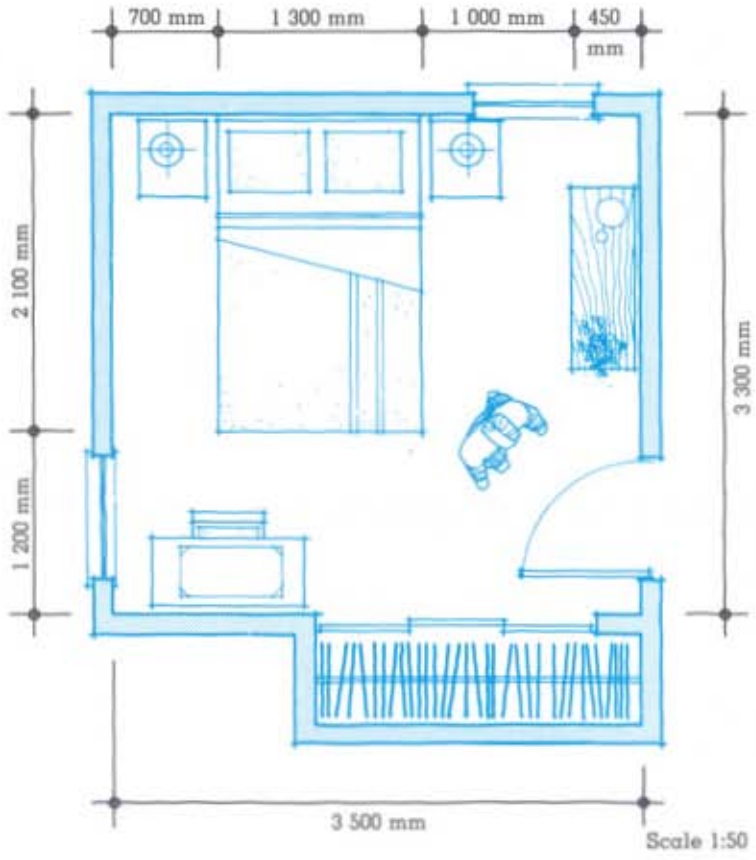


Figure 96
Double occupancy bedroom. Net area: 11.5 m^2. Adults are the most likely occupants of this type of bedroom, which is often referred to as the master bedroom

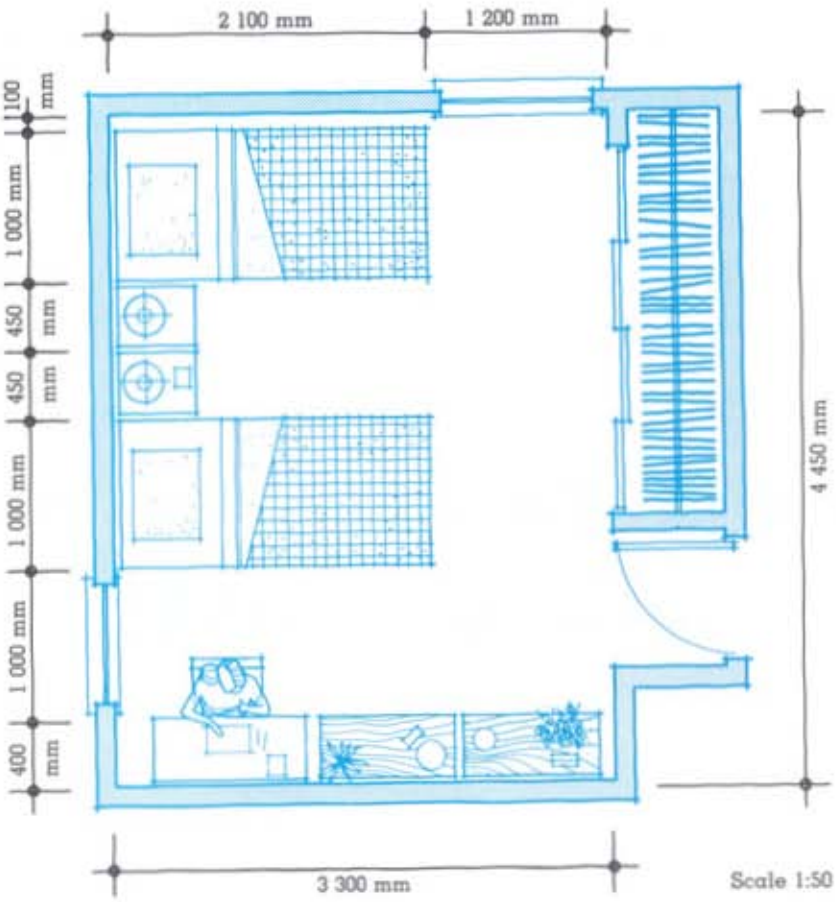


Figure 97
Double occupancy bedroom. Net area: 14.7 m^2. The most likely occupants of this type of bedroom are adults, school age children of the same sex, children of different sexes who are less that nine-years old, and pre-schoolers

Secondary Activities

The bedroom may be used for many activities other than sleeping and dressing. Among these activities, the following tend to occur most frequently: infant care, children's play, adult and teenager socializing, reading, working, writing, studying, watching television, listening to music, knitting, mending and sewing.

Recommendations

1. Infant care

   Based on the minimum requirements for easy access to furniture (crib, baby bath, storage unit, nursing chair) to support baby care, the area that would be required for a nursery could vary from 7 m^2 to 10 m^2. This area may be reduced if certain items of furniture are placed in the bathroom (see Figure 98).

2. Children's play

   In bedrooms for preschoolers and school-age children, furniture arrangements should maximize the amount of open floor space available for play (Figure 99). An open area of 3 to 4 m^2 for each child is suggested. The space should be at least 1 500 mm to 1 600 mm deep and as square a shape as possible.

   While it may be desirable to have individual rooms for all children, privacy in the sense of a "separate"closable space may not be as important until they become teenagers. However, all children require a place of their own, even if it's just a bed, and a table or a box in which to keep their special possessions.

3. Adult and teenager socializing

   Teenagers need to be able to socialize with their friends in reasonable privacy. Where there is no separate family room, den, or other space to get together away from the family, teenagers and adults need larger bedrooms. The additional area required may vary from 3 to 7 m^2 (Figure 100). This floor space would be adequate for a range of activities such as exercises, hobbies, sewing, watching television, and so on.

4. For typical plans illustrating bedrooms supporting secondary activities, see Figures 101 and 102.

Figure 98
Typical nursery, showing storage unit, crib and change table

Figure 99
Floor space can be created for play by placing a bed against the wall in a child's bedroom

Figure 100
Teenagers have definite ideas about the kind of room they want. This bedroom houses a rock fan who uses his space to sleep, to study, to listen to music, to play music, to socialize with his friends and for various other hobbies such as keeping a pet

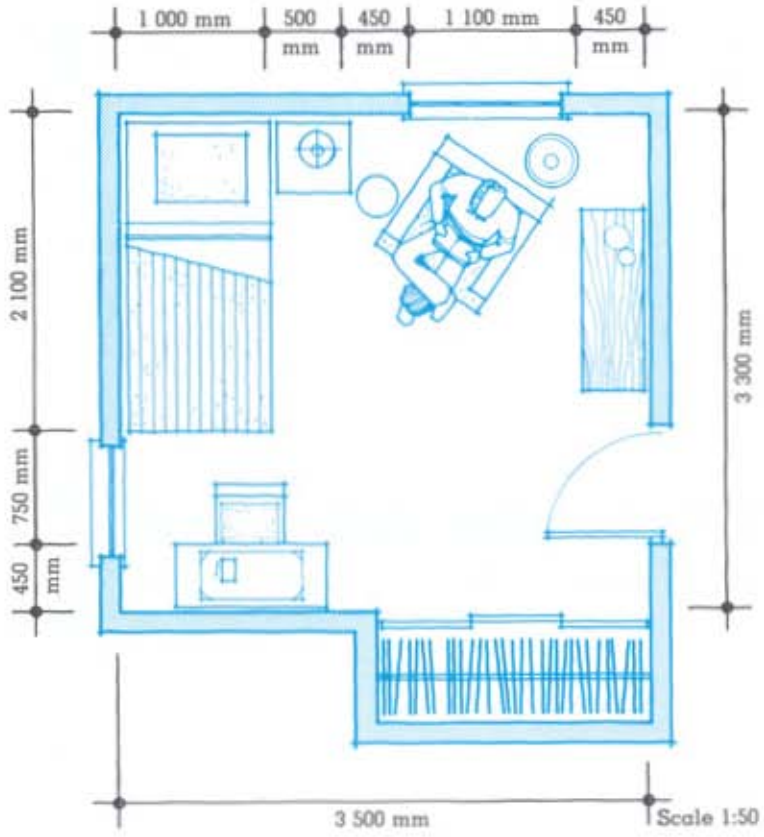


Figure 101
Single occupancy bedroom and sitting room. Net area: 11.5 m^2. The most likely occupants of this type of bedroom are the elderly, adults and teenagers

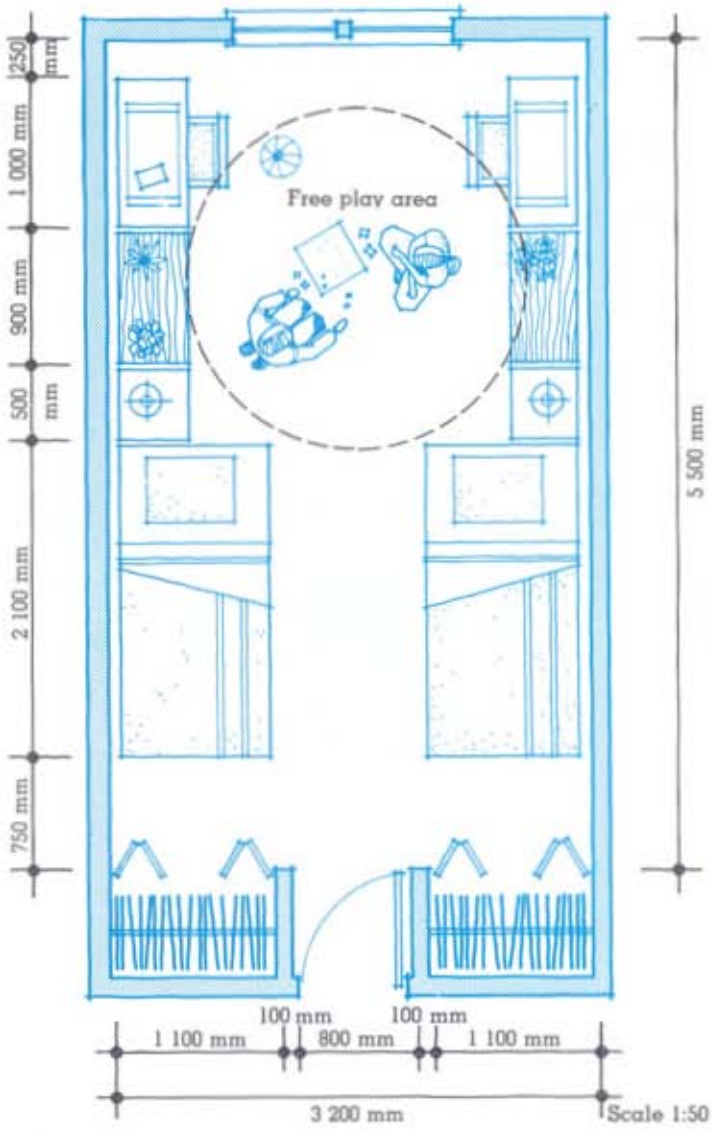


Figure 102
Double occupancy bedroom and playroom. Net area: 17.5 m^2. The most likely occupants of this type of bedroom are school-age children of the same sex, or of different sexes if they are less than nine years old

Space Size and Number

Families of the same size but different compositions have different requirements (Table 30). Some people use bedrooms solely as sleeping space and undertake all other activities elsewhere; some people spend a lot of time in their bedroom and use it for activities more typically carried out in a living space.

Often parents take the largest bedroom in a dwelling; however, it may be preferable to give two children the largest room to provide them with more space.

Spouses do not always share the same bedroom. Some people snore; others are light sleepers and find they get more rest in separate bedrooms. Some people have widely different lifestyles or sleep cycles.

Given these variations, it is not appropriate to establish rigid standards for bedrooms. What is important is that the planning of bedroom spaces should maximize the range of different possible uses. The requirements listed below provide the adaptability needed to suit these differences, and may be used instead of the requirements listed under Minimum Furniture and Minimum Clearances (see also Tables 29 and 30).

Recommendations

1. The space allocated for sleeping, dressing, personal care and for secondary activities taking place in bedrooms should be proportional to the size of the household.

2. Based on an Average Sleeping Area required per person, each dwelling should have 8.5 m^2 of space for each occupant (for sleeping, dressing and personal care). This bedroom space may be individual or shared with other members of the household. It may be separated or combined[5] with other space. If combined, the area may be reduced by 3.5 m^2. If built-in bedroom cabinets are provided, the space may be reduced by 0.5 m^2 (see Table 29).

3. At least one space in each dwelling should be capable of accommodating one of the following:
   1) the primary and secondary activities of *one occupant*
   2) the primary activities of *two occupants.*

Based on this principle, at least one bedroom within each dwelling should have an area of 11.5 m^2. If built-in bedroom cabinets are provided, this area may be reduced by 1.0 m^2. The minimum dimensions within the required area should be 2 800 mm.

[5] Two or more areas are considered to be a combination room if the dividing wall occupies less than 60 per cent of the separating plane.

Table 29. Minimum Sizes for Bedrooms

Bedroom Type[1]	Number of Users	Bed Type	Bedroom Use	Relationship	Minimum Floor Area m^2	Least Dimension *mm*
A	1	Single	P[2]	Sep.[3]	8.5[4]	2 200
B	1	Single	P&S	Sep.	11.5[4]	2 200
C	2	Double	P	Sep.	11.5[5]	2 800
D	2	Double	P&S	Sep.	14.5[5]	2 800
E	2	Single	P	Sep.	14.5[5]	3 000
F	2	Single	P&S	Sep.	17.5[5]	3 000
G	1	Single	P	Com.	5.0[4]	2 200
H	2	Double	P	Com.	10.0[5]	2 800
I	2	Single	P	Com.	13.0[5]	3 000

[1] The identification of bedroom types by letters provides a key to Table 30.
[2] P = Primary activities taking place in bedrooms.
S = Secondary activities taking place in bedrooms (an average additional floor area of 3.0 m^2 per room is allocated to support secondary activities that may take place in bedroom spaces).
[3] Sep. = Bedroom is separated.
Com. = Bedroom is combined with other space(s).
[4] If built-in bedroom cabinets are provided, this area may be reduced by 0.5 m^2.
[5] If built-in bedroom cabinets are provided, this area may be reduced by 1.0 m^2.

Figure 103
Floor to ceiling closet door system. Full height sliding doors provide optimal accessibility. If the closet is not needed for storage, this type of door can be easily removed to significantly increase the bedroom space size

Clothes Closets

Each bedroom should have enclosed storage space for clothes. This storage space may be provided in the form of built-in or convertible closets (i.e., alcoves that can be easily made into closets by adding doors and hardware — see Figure 103).

Recommendations

1. The space allocated for clothes storage should be proportional to the bedroom's occupancy capacity.

2. Based on the Minimum Clothes Closet Area required in a bedroom designed for one person, at least one clothes closet within each bedroom should have an area of 0.55 m^2. The minimum dimensions within the required area should be 600 mm.

3. In bedrooms designed for more than one person, an area of 0.55 m^2 should be added for each extra person.

4. Clothes closets should be completely enclosed and have the minimum dimensions shown in Figure 6.

Table 30. Hypothetical range of accommodations required by eight different four-person families
This table illustrates how families of the same size but of different compositions may have different requirements.

Family Composition	Bedroom Use		Bedroom type, i.e., Variation in Space Size Requirements**						Variations in Space Number Requirements
	P*	S	A	B	C	D	E	F	
Family 1. One grandparent, one single parent, and two teenagers.									
Grandparent	*	*		11.5					4 bedrooms required
Parent	*			11.5					
Teenager	*	*		11.5					
Teenager	*	*		11.5					
Family 2. One couple and two preschoolers.									
Parents	*				11.5				2 bedrooms required
Preschoolers	*	*						17.5	
Family 3. One couple, one infant, and one preschooler.									
Couple–Infant	*	*				14.5			2 bedrooms required
Preschooler	*		8.5						
Family 4. One couple, one preschooler, and one school-aged child of same sex.									
Couple	*						14.5		2 bedrooms required
Children	*						14.5		
Family 5. One couple and two school-aged children (pre-adolescents of different sexes).									
Couple	*				11.5				3 bedrooms required
Boy	*		8.5						
Girl	*		8.5						
Family 6. One couple and two school-aged children (pre-adolescents of same sex).									
Couple	*						14.5		2 bedrooms required
Children	*	*						17.5	
Family 7. Single parent, one baby, one preschooler, one teenager.									
Parent	*	*		11.5					4 bedrooms required
Baby	*		8.5						
Preschooler	*		8.5						
Teenager	*	*		11.5					
Family 8. Couple with two single adults.									
Couple	*			11.5					3 bedrooms required
Adult	*	*		11.5					
Adult	*	*		11.5					

* P and S refer to type of activity taking place (see Table 29).
** See Table 29.

Space Configuration

The layout of space for sleeping, dressing, personal care and secondary activities should be determined primarily by the following considerations:

- change in use of space over time
- dressing
- maintenance/housekeeping
- natural ventilation
- window height
- usable floor and wall space.

Changing Needs Over Time

Bedroom occupants change, lifestyles change, household requirements vary, family size increases or decreases over time, and bedrooms are often used for functions other than sleeping. Unfortunately, there is rarely an opportunity to vary the layout of bedrooms. Sometimes there is only one wall against which a bed can be placed.

Recommendations

1. Bedrooms should be designed so that at least two, preferably more, different furniture arrangements are possible. Square bedrooms tend to provide more opportunity for variation than rectangular ones.

2. All bedrooms, except those that are combined with other spaces, should have at least one 3 000 mm long wall space uninterrupted by openings of less than 1 200 mm above the floor.

Dressing

Bedrooms should be planned so that their furniture can be grouped together in one area. This will allow people to dress in a single space. Good lighting and a mirror — preferably full length — are essential.

Recommendation

Every bedroom should have a clearly defined space for dressing.

Maintenance/Housekeeping

It is often difficult to make beds and to vacuum because of restricted space. As a general rule, a single bed may be placed along the length of a wall or projected out from it, while a double bed should be accessible from both sides.

Recommendation

Bedrooms should be designed so that double beds have access on both sides. This will also ensure that they can be made without having to be moved.

Natural Ventilation

Windows for natural ventilation may not be crucial in air-conditioned dwellings. However, the positioning of the windows is important if the dwelling is to be cooled by natural ventilation. The best ventilation occurs when there is a diagonal flow of air across the bed.

Recommendations

1. To allow diagonal air circulation, windows, or a window and door, should be located in opposite corners of bedrooms (Figure 104).

2. To avoid the discomfort of cold drafts in winter, the bedroom layout should ensure that beds are not placed under windows.

Window Height

Furniture cannot be placed under low window sills. On the other hand, at least one window should be low enough for people to see through it when they are standing in the bedroom.

Recommendations

1. Bedroom windows should be high enough (approximately 1 200 mm) to allow chests of drawers and dressing tables to be placed beneath them (Figure 105).

2. One bedroom window should be low enough to allow a person standing in the bedroom to see out.

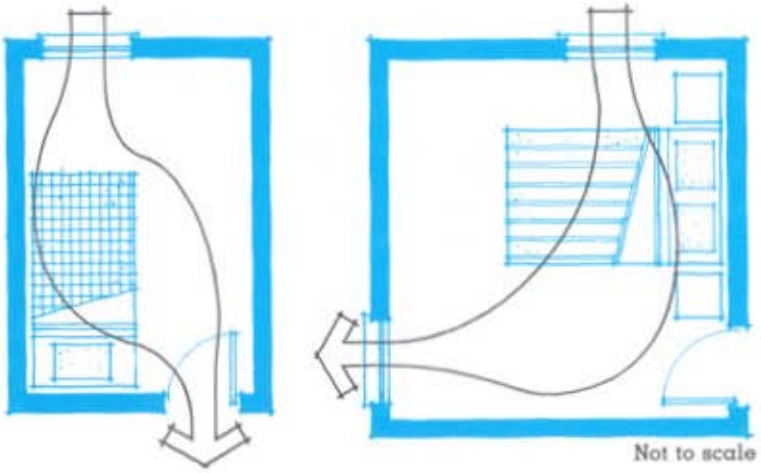


Figure 104
Cross-ventilation may be obtained by placing windows in opposite corners of the same room or by an open door and window

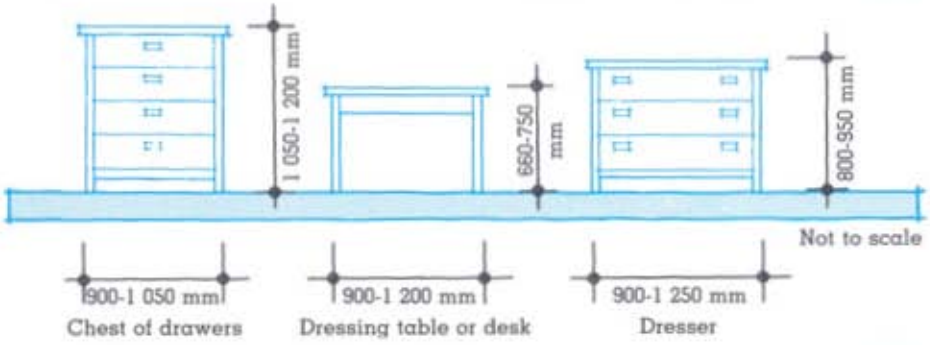


Figure 105
Drawing illustrating minimum vertical clearances that should be provided so that bedroom furniture can be placed beneath windows

Usable Floor and Wall Spaces

Bedrooms should provide as much uninterrupted floor and wall space as possible for alternative furniture arrangements. Doors, windows and heating registers should be placed with this principle in mind.

Bedroom doors and other openings located in the middle of walls generally cause more interference with circulation than those placed near corners (Figure 106).

If an inswinging door is placed 800 mm from the corner, furniture may be located along the adjoining wall up to that corner; alternatively, the door may be folded back out of the way (Figure 107).

Recommendations

1. The location of bedroom doors, windows and heating registers should be based on estimated furniture locations and, when possible, be placed in spaces that are cleared for access.

2. Bedroom entrance doors should be placed close to room corners to minimize interference with circulation.

3. Doors that are adjacent and at right angles should be avoided, since one must be closed before the other can open (Figure 108).

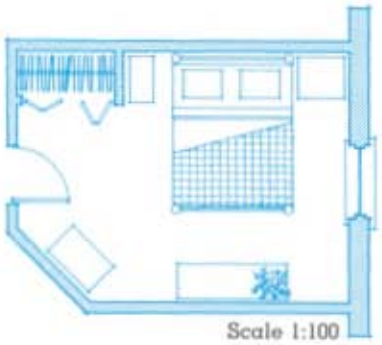


Figure 106
The full height window, the angled wall, the entrance door, and the closet location restrict the flexibility of this bedroom

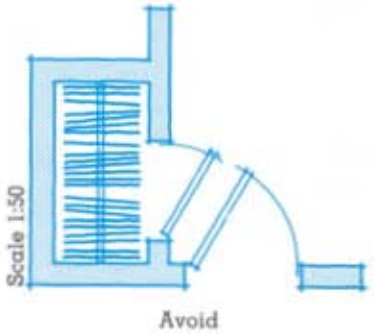


Figure 108
Doors that are adjacent and at right angles should be avoided since one must close one door in order to open the other

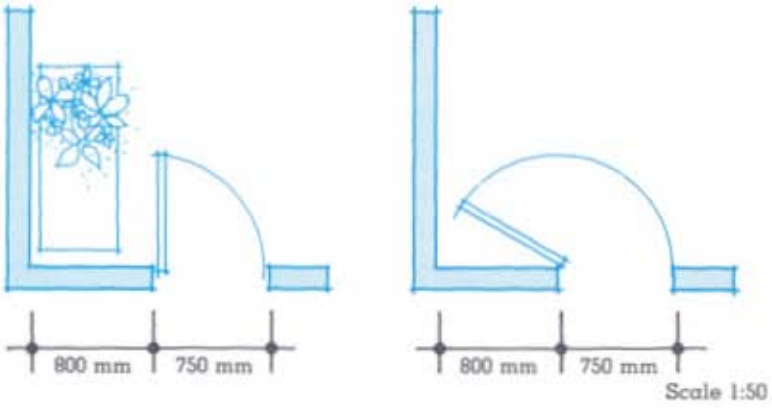


Figure 107
When inswinging doors are located 800 mm from the corner, furniture may be placed along the adjoining wall up to that corner or the door may be folded back out of the way

Space Location

The location of space for sleeping, dressing, personal care and secondary activities should be determined primarily by the following:

- privacy
- child care
- relationship of bedrooms to sun and view.

Privacy — Bedrooms from Living Areas

Residents generally like their bedrooms to be acoustically and visually isolated from living areas. Conversation in the living areas may prevent people from sleeping when members of the family entertain late at night.

Recommendation

Bedrooms should be separated from areas such as the living and dining rooms by intervening spaces or intervening sound-insulated walls (see Figure 109).

Locating bedrooms and common activity spaces on different levels or floors can reinforce the visual and acoustical separation between these areas.

Privacy — Circulation

Residents need to be able to come and go from the primary entrance to their bedroom and from bedroom to bathroom without being seen by visitors in the living areas of the dwelling.

Recommendations

1. Bedrooms should be located so that there is access from any bedroom to the bathroom without being seen from the living spaces (see Figure 109).
2. Bedrooms should be located in a private sector of the dwelling and not have to be used as a passageway to somewhere else.
3. Bedrooms should be located so that it is possible to gain access to any bedroom from the dwelling entrance without passing through the living spaces (living/dining rooms) (see Figure 109).
4. It should not be possible to see into bedrooms from the dwelling's entry (see Figure 109).

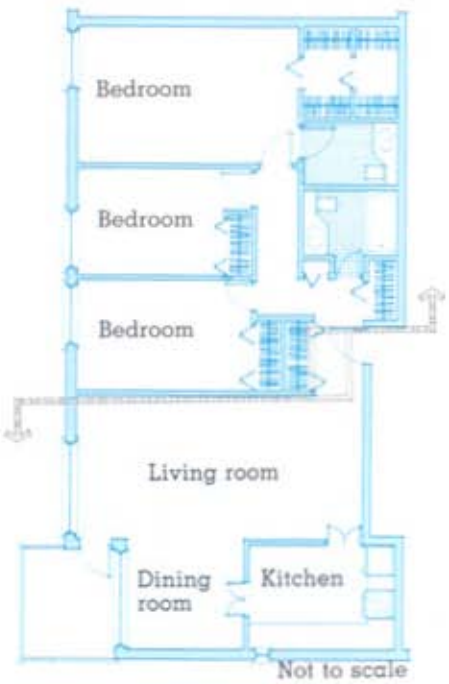


Figure 109
This dwelling plan provides excellent separation between bedrooms and living areas, privacy from living areas when one is moving from bedroom to bathroom, and from dwelling entrance to bedroom

Privacy — Adults' Bedrooms from Adjacent Rooms

Visual and acoustical separation is particularly important for adult bedrooms. Depending on the degree of separation wanted, privacy may be achieved by means of doors and sound insulation. Privacy may be improved by locating a closet, corridor, staircase or bathroom between adult bedrooms and adjacent rooms.

Privacy — Teenagers' Bedroom(s) from Parents' Bedroom

Proximity is important between parents' bedrooms and small children's bedrooms. However, separation becomes more appropriate as children become older. Older children need autonomy, and parents need quietness.

Relationship of Bedrooms to Sun and View

There are several different and sometimes conflicting preferences concerning sunlight and view for bedrooms. In general, bedrooms that are used during the daytime should have a view.

7 Bathrooms

Space Function

Primary and secondary activities that usually take place in bathrooms are listed below:

Primary Activities	Secondary Activities
Personal hygiene	Infant care
Elimination	Hand laundering
Body care	Clothes drying
Grooming	Exercising

Fixtures

A minimum number of fixtures and space are required for occupants to carry out their normal bathroom activities. These are listed below, together with the horizontal dimensions of the recommended fixtures (see also Figure 110).

Recommendations

1. Dwellings designed for 1- to 6-person households should contain the following fixtures:
   - 1 bath 1 700 mm x 750 mm
   - 1 wash-basin and counter space 600 mm x 500 mm
   - 1 water closet 500 mm x 700 mm
   - 1 bidet (optional) 400 mm x 700 mm
   - 1 mirror 300 mm x 450 mm
   - 1 vertical grab bar at bath
   - 1 toilet-paper holder at water closet
   - 1 towel bar (length — 500 mm x number of bedrooms)

   In a full bathroom, the water closet may be located in a separate space from the room with the bath but it should then contain a washbasin of its own.

2. Multi-level dwellings designed for 5-6 person households should contain:
   a) the fixtures listed above, plus
   b) the following fixtures in a half-bathroom configuration:
      - 1 wash-basin 600 mm x 500 mm
      - 1 water closet 500 mm x 700 mm
      - 1 mirror 300 mm x 450 mm
      - 1 toilet-paper holder at water closet
      - 1 towel bar not less than 500 mm.

3. Dwellings designed for 7 or more-person households should contain:
   a) the fixtures listed above, plus
      - 1 shower within the half-bathroom 900 x 900 mm.

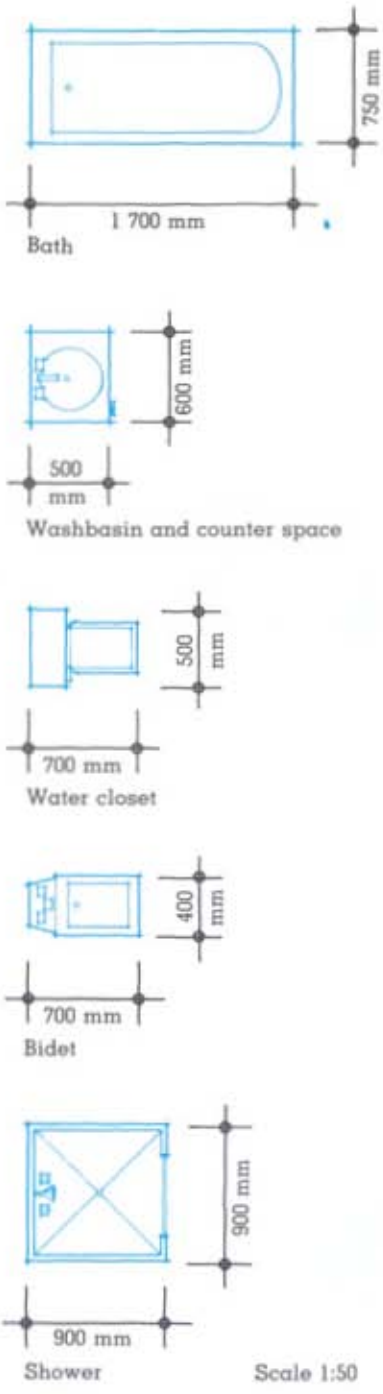


Figure 110
Typical bathroom fixtures

Clearances

Clearances should be provided in front of and at the sides of bathroom fixtures for access and circulation. Greater clearances are required to meet the needs of elderly people, wheelchair users and invalids.

Recommendations

1. Recommendations for clearances in front of and at the sides of fixtures are shown in Figure 111 to 119.

2. Ceiling heights should be 2 100 mm in any area where a person would normally be in a standing position.

3. For typical plans illustrating minimum dimensions to meet primary activities, see Figure 116 to 119.

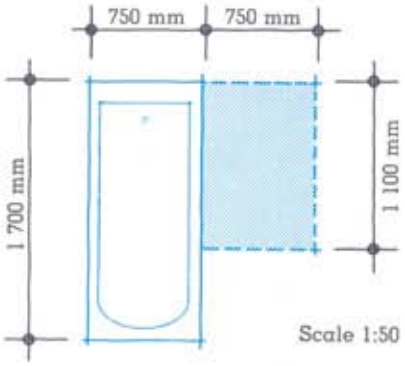


Figure 111
Access to bath. It is recommended that in households with small children the 750 mm dimension be increased to 1 000 mm to allow a parent enough space to tend a child in the tub

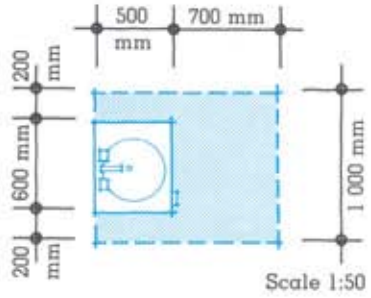


Figure 112
Access to washbasin

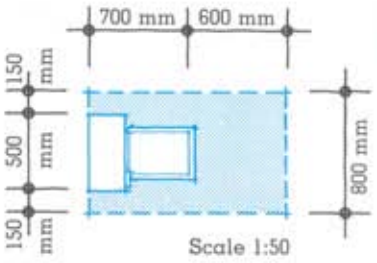


Figure 113
Access to water closet

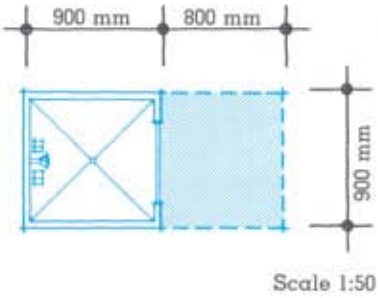


Figure 114
Access to the shower

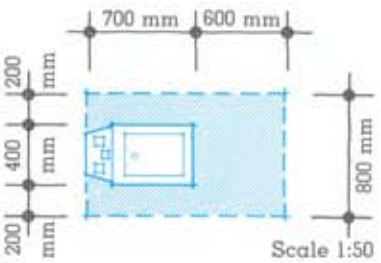


Figure 115
Access to the bidet

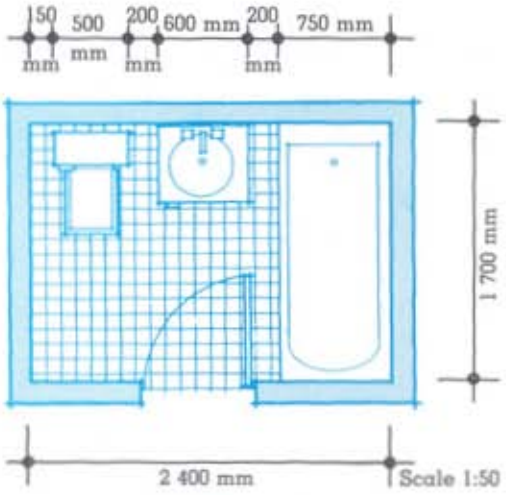


Figure 116
Full bathroom. Net area: 4.08 m^2

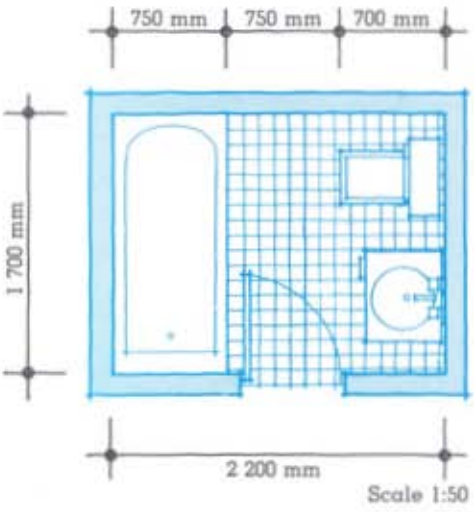


Figure 117
Full bathroom. Net area: 3.74 m^2

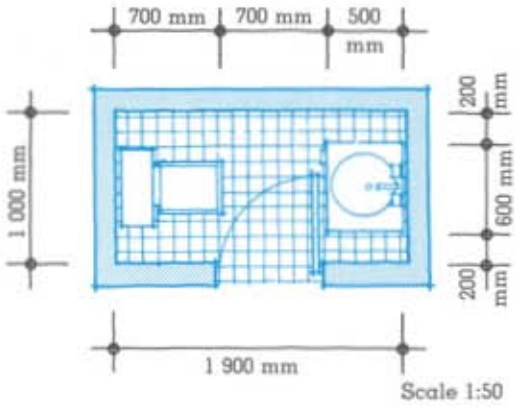


Figure 118
Half-bathroom. Net area: 1.9 m^2

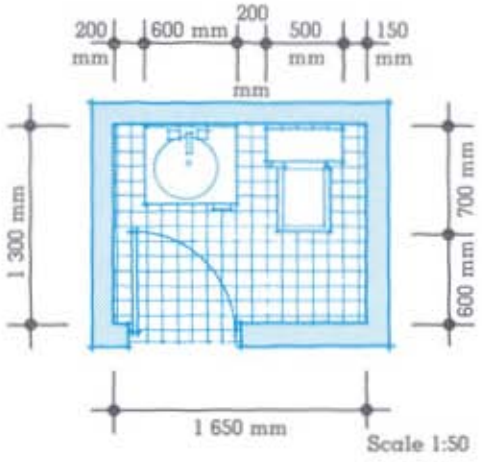


Figure 119
Half-bathroom. Net area: 2.1 m^2

Space Size and Number

Families of the same size but different composition have different requirements. Bathroom requirements may also depend on the number of floor levels within the dwelling.

Larger bathrooms are convenient for the safe bathing of infants.

Parents will share the bathroom with small children, but as children become older they will expect more privacy.

Families living in multi-storey dwellings will require more than one bathroom (i.e., a full bathroom at the bedroom level and a half-bathroom on the main level).

Given the above variation, it would not be appropriate to establish rigid standards for bathrooms. The recommendations listed below provide for adaptability and may be used instead of the requirements listed under Fixtures and Clearances.

Table 31. Minimum Number of Bathrooms

Number of Bedrooms	Number of Levels		Required Bathroom Number	
	One	More than One	Full Bathroom	Half Bathroom
0,1,2 + 3	*	*	1	0
3 + 4		*	1	1
5 + 6	*		1	1
5 + 6		*	1	1 + shower

Recommendations

1. Bathroom fixture allocation should be related to the size of the household and to the number of levels within the dwelling (see Table 31).

2. Additional floor space in the bathroom should be provided whenever possible for portable accessories (waste basket, weigh scale, infant's bath, clothes hamper, exercise devices, vanity bench). The average additional floor area necessary to accommodate secondary activities or accessories using a medium amount of space should be approximately 1 to 3 m^2.

Bathroom Storage

Each bathroom should have enclosed storage space for such items as medicine, dental equipment and supplies, shaving equipment, deodorants, make-up, brushes and combs, grooming aids, soap, toilet paper, tissues, cleaning equipment and supplies. This storage space should be provided in the form of built-in cabinets.

Recommendations

1. In full bathrooms, a storage space of 0.17 m^3 should be provided. One third of that space should be contained in a limited access or lockable storage unit for items that may be dangerous to young children (Figure 120).

2. In half-bathrooms, a storage space of 0.015 m^3 should be provided in a limited access or lockable storage unit for items that may be dangerous to young children.

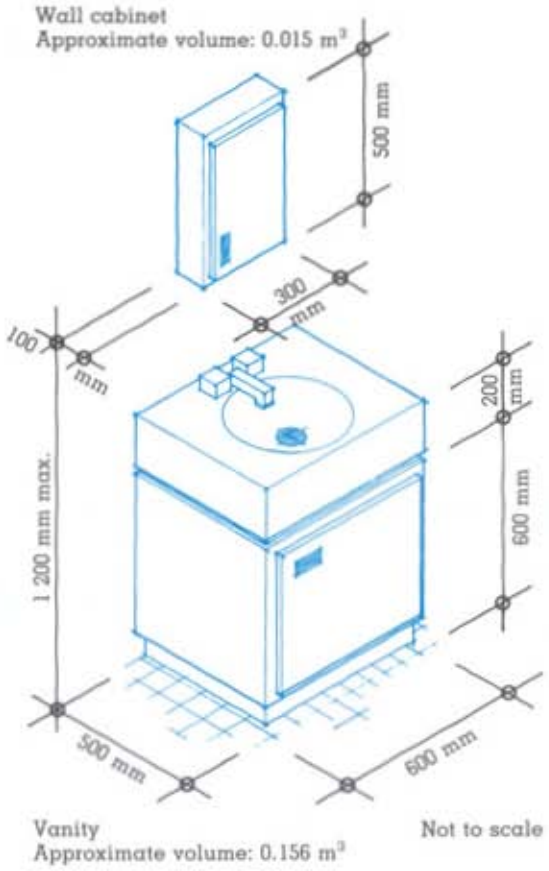


Figure 120
The minimum storage volume required in a full bathroom may be provided in a wall cabinet and vanity combination of this type. Approximate volume: 0.170 m^3

Space Configuration

The layout of bathrooms should be determined primarily by the following considerations:

- number and types of fixtures, and the relationship of the bathroom to other spaces
- window location
- water-closet location
- safety measure to prevent accidents
- special bathroom features, such as seating, hooks for robes, and larger washbasins.

Number and Types of Fixtures and Relationship of Bathroom with Other Spaces.

In previous sections of this chapter, the following three types of bathrooms have been mentioned:

- half-bathroom with two fixtures (Figure 121)
- half-bathroom with three fixtures (Figure 122)
- full bathroom with three fixtures (Figure 123).

Other common types of bathrooms include:

- full-bathroom with four or five fixtures (Figures 124 to 126)
- compartmentalized bathrooms (Figure 127)
- bathroom combined with laundry room (Figure 128).

The most frequently mentioned advantages and disadvantages of these various options are listed in Tables 32 to 34. The bathroom-laundry room combination (Figure 128) has been discussed in the chapter on Laundries (see Table 25).

Not to scale

Figure 121
Half-bathroom (2 fixtures). Approximate area: 2.0 m^2

Not to scale

Figure 122
Half-bathroom (3 fixtures). Approximate area: 3.75 m^2

Table 32. Half-bathrooms (Figures 121 and 122)

Advantages	*Disadvantages*
Good complement to a full bathroom in family households; particularly useful in the early mornings.	An additional full bathroom instead of a half-bathroom may increase the flexible use of the dwelling without a large increase in cost or space.
May be used as a guest bathroom or powder room.	
When located near most frequently used entrance to the dwelling, it reduces the dwelling maintenance.	

Not to scale

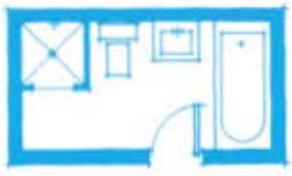
Figure 123
Full-bathroom (3 fixtures). Approximate area: 4.0 m^2

Table 33. Full Bathrooms (Figures 123 to 126)

Advantages	*Disadvantages*
It is compact and therefore less costly than a compartmentalized bathroom.	May be used by only one individual at a time; may be inconvenient in the mornings.
The addition of a bidet is hygienic but increases costs.	
The inclusion of a shower.	

Not to scale

Figure 124
Full-bathroom (3 standard fixtures & bidet). Approximate area: 5.5 m^2



Not to scale

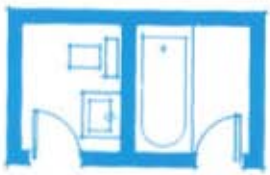
Figure 125
Full-bathroom (3 standard fixtures & shower). Approximate area: 5.5 m^2

Not to scale

Figure 126
Full-bathroom (5 fixtures). Approximate area: 7.0 m^2

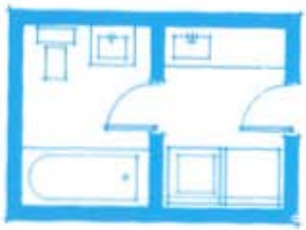
Table 34. Compartmentalized Bathrooms (Figure 127)

Advantages	*Disadvantages*
Two people may use different fixtures simultaneously.	Less compact and therefore more costly than three-fixture bathrooms.
Partially avoids the high humidity conditions common in the usual three-fixture bathroom.	Bathtub or shower stall compartment area may be too cramped if of minimum size.
Connecting doors between compartments are also possible, but are not recommended as the only means of access.	Some bathing activities — shaving, for example — remain incomplete without a washbasin. Connecting doors can help solve this problem.
In even the minimum-sized bathroom of this type, there is generally room for an additional washbasin.	



Not to scale

Figure 127
Compartmentalized bathroom (with bath or shower). Approximate area: 4.75 m^2



Not to scale

Figure 128
Bathroom combined with laundry. Approximate area: 7.0 m^2

Window Location

The shape and position of bathroom windows are important for light, ventilation and privacy.

Recommendations

1. For privacy, bathroom window sills should be at least 1 200 mm off the ground. Windows behind and above the water closet are seldom desirable.

2. Windows should not be placed over the bath because of the need to step into the bath to open or clean the window and because cold drafts can make bathing uncomfortable.

3. Skylights may be used if they are large enough to provide adequate light. They should be triple glazed to reduce condensation and cold drafts.

Water-Closet Location

Recommendations

1. Wall-hung water closets make floor cleaning easier.

2. The water closet should be placed in such a way that, with the lid down, an adult may conveniently sit and bathe a young child in the tub.

Safety

The bathroom accounts for approximately 25 per cent of all home accidents. Falls are the most frequent accident, caused by the slippery surface of tubs, showers and floors. Cuts from broken glass (tub or shower doors) and hot water burns are also not uncommon.

The following design recommendations will minimize many causes of bathroom accidents.

Recommendations

1. Doors should open into the bathroom but space should be provided so that the door will not strike a person who is using one of the appliances. When bathroom doors open out into a passage (where a person might walk into the open door in the dark), the doorway should be recessed or sliding doors should be used.

2. Safety glass should be used in bathtub and shower enclosures, doors and mirrors.

3. Lockable latches should not be used on bathtub and shower doors.

4. Bathtubs should have a nearly flat bottom.

5. Only bathtub and shower stall units with integral slip-resistant finishes should be used.

6. Faucet sets in bathtub/shower combinations should be mounted 750 to 850 mm above the bottom inside surface of the tub. Improperly positioned controls and accessories that are difficult to reach often lead to bathroom falls, especially with bathtub/shower combinations.

7. Controls for shower operation should be mounted 1 200 to 1 350 mm above the inside bottom surface.

8. At least one soap dish in tub/shower combinations should be mounted 750 to 850 mm above the bottom inside surface of the tub.

9. A towel bar or ring should be installed no farther than 150 mm away from the entrance to the bathtub or shower.

Special Bathroom Features

Research indicates that the provision of certain additional bathroom features will make the room more flexible, efficient and convenient.

Recommendation

Whenever possible or applicable, the following bathroom features should be provided:

- larger countertop surfaces (900 mm wide) and larger washbasins. They will facilitate light laundry, hair washing, bathing and dressing the baby
- additional towel bars or a drying rack for drying hose and other light laundry
- robe hooks
- step-up retractable stools for children when they are using the washbasin
- provision of a chair or seat.

Space Location

The location of bathrooms should be determined primarily by:

- accessibility
- privacy
- natural lighting
- economy.

Accessibility — Bedroom to Bathroom

Bathrooms should be near bedrooms because they are most in demand in the morning, as members of the household prepare for the day, and at night when they are ready to retire. Proximity is also important if it is necessary to get up in the night.

Recommendation

A bathroom should be accessible to each bedroom without requiring passage through another room.

Accessibility — Living Areas to Half-bathrooms

Recommendation

Where a half-bathroom is required, it should be located near the principal living areas, and should be convenient for guest use. In family dwellings, it should be located near the entrance that would be most frequently used by children playing outdoors.

Private access to the half-bathroom is important but not as important as for the full bathroom.

Privacy

Recommendation

When the bathroom is being located, the need for visual as well as acoustical privacy of access and use should be considered.

Natural Lighting

Recommendations

1. Whenever possible, the bathroom should be placed on an exterior wall so that a window may be provided.

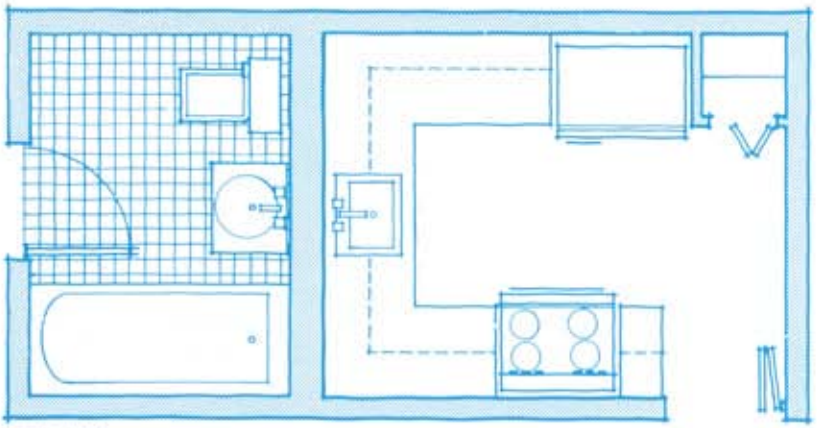
2. Internal bathrooms should have a dependable system of natural or mechanical ventilation.

Economy

Economies of labour and material are usually achieved when sanitary appliances are grouped together and plumbing connections are concentrated in one part of the dwelling (Figure 129).

Recommendation

For reasons of economy, when other design criteria have been satisfied, bathroom, kitchen and laundry rooms should be placed either back-to-back or one above the other.



Scale 1:50

Figure 129
Placing plumbing fixtures back to back along a common wall helps to reduce costs

8 General Storage and Utility Spaces

Storage is one of the most frequently identified problems in housing studies, for the following reasons:

1. Where there is lack of storage space, family possessions spill all over the dwelling. This creates difficulties for parents and places a strain on children.

2. An inadequate storage area may create fire and tripping hazards (Figure 130).

3. Built-in storage areas (i.e., closets, cupboards and cabinets) tend to prescribe room function and to limit the dwelling's flexibility.

4. Storage is often provided only in leftover spaces of the dwelling, instead of being located near the areas where the items will be used.

5. Regulatory requirements for storage space in multi-unit buildings often specify remote and inconvenient locations; this can cause a security risk.

6. Technological change and an increasing flow of new consumer products has increased the demand for storage space.

7. The division of labour along gender lines in the household has tended to mask important storage needs or allowed them to go unrecognized by male-dominated design professions.

Previous chapters examined storage spaces that should be found within or very near particular dwelling spaces (i.e., coat storage at entrances; food, dishes, utensils and garbage storage in kitchens; clothes storage in bedrooms). This chapter concentrates on storage and utility spaces that do not have to be as closely tied to particular spaces. These include:

- linen closets
- maintenance equipment storage
- general interior bulk storage
- general exterior bulk storage
- utility space.

Figure 130
Lack of convenient appropriate storage space creates a tripping hazard

Linen Closets

Every dwelling should contain a built-in and enclosed storage space for bedroom linens (blankets, sheets, pillows slips) and for bathroom linens (face towels, bath towels, guest towels, bathmats).

Recommendations

1. The space allocated for linen storage should be proportional to the size of the household (Table 35).

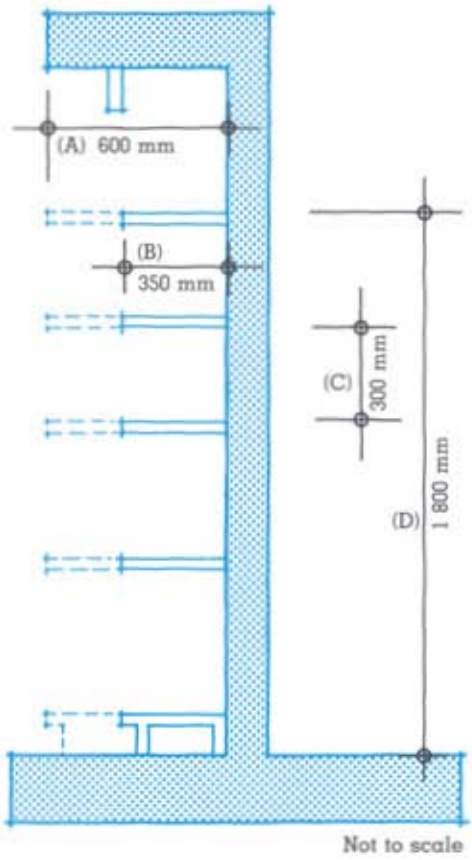
2. Minimum and maximum linen closet dimensions for convenient storage are shown in Figure 131.

3. The linen closet shelves should be adjustable and of various depths.

4. The linen closet should be near the bedroom area, although it may be located in the bathroom or laundry room.

Table 35. Minimum Linen Closet Size

Household Size *Number of Persons*	Dwelling Type *Number of Bedrooms*	Minimum Shelf Area m^2
1-2	0 & 1	0.80
3-4	2	1.60
5-6	3	2.40
7-8	4	3.20



A = Maximum shelf depth
B = Minimum shelf depth
C = Minimum clearance between shelves
D = Maximum permissible shelf height
Note: minimum shelf width should be 600 mm

Figure 131
Cross-section showing minimum and maximum linen closet dimensions for convenient storage

Maintenance Equipment Storage

Every dwelling should provide a built-in and enclosed storage space for maintenance equipment such as brooms, vacuum cleaners, floor polishers, ironing boards, buckets and mops, as well as shelves for smaller cleaning equipment and materials.

Recommendations

1. Figure 132 recommends internal dimensions for a maintenance equipment storage space in a 3-bedroom dwelling. The volume needed for this storage space does not vary greatly from one dwelling type to another.

2. The maintenance equipment storage space is best located in or near the kitchen. Where kitchen space is severely limited, the storage space may be adjacent to a corridor, or combined with the general interior bulk storage space or with the utility space, provided that these spaces are convenient and readily accessible.

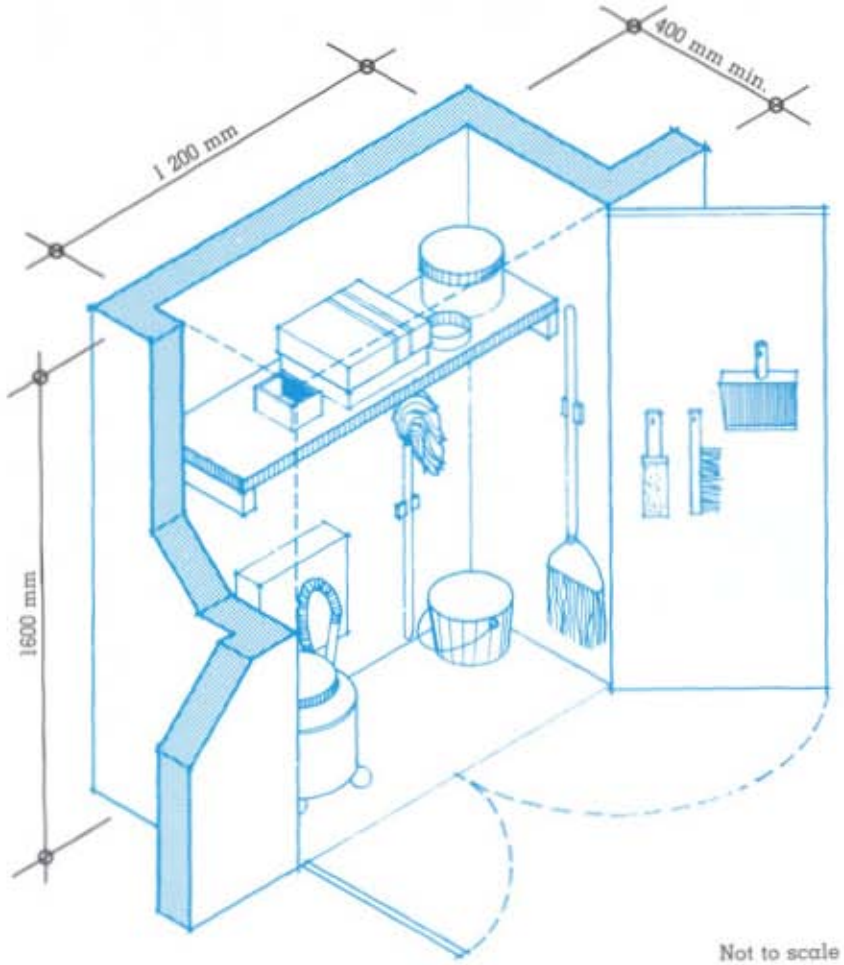


Figure 132
Recommended internal dimensions for a maintenance equipment storage space in a 3-bedroom dwelling. Approximate volume: 0.75 m^3

General Interior Bulk Storage Space

Every dwelling should contain built-in and enclosed general interior bulk storage space to accommodate items such as sports gear, luggage, baby or infants' equipment, camping gear, unused furniture, seasonal items, large toys, hobby equipment, and odds and ends of sentimental interest.

Recommendations

1. The space allocated for general interior storage should be proportional to the size of the household (Table 36).

2. At least one-third of the general interior bulk storage space should be finished and centrally located within the dwelling to contain items used regularly, such as card tables and chairs, extra leaves from dining room tables, projection equipment and screen, games, and exercise equipment. This space may be combined with coat or clothes closets, provided that the space is additional to the required closet size.

3. The remaining two-thirds of the general interior bulk storage space may be located in a dry unfinished area of the dwelling (i.e., basement or attic) to store items that are used occasionally or seasonally such as luggage, holiday decorations, camping gear and unused furniture. This storage space may be combined with the utility space, provided that the area is additional to the size of the required utility space.

General Exterior Bulk Storage Space

Every dwelling should contain built-in and enclosed general exterior bulk storage space to accommodate items such as bicycles and prams, garden tools, patio furniture, lawn-mowers, barbecue grills, outdoor toys, snow shovels, automative supplies, snow tires, shopping carts, and so on.

Recommendations

1. The space allocated for general exterior bulk storage should be proportioned to the size of the household (Table 37).

2. The general exterior bulk storage space may be located in an unfinished space, but it should be dry and placed near the activity area where the items are most likely to be used (Figures 133 and 134).

3. General exterior storage spaces may be separated or may be combined with the finished areas of the dwelling or with the utility space, provided that access to the storage from the outside is possible without passing through a habitable room.

Table 36. Minimum Interior Bulk Storage Space Size

Household Size *Number of Persons*	Dwelling Type *Number of Bedrooms*	Minimum Volume m^3	Minimum Height *mm*	Minimum Horizontal Dimension *mm*
1-2	0 & 1	5	2 100	1 200
3-4	2	7	2 100	1 200
5-6	3	9	2 100	1 200
7-8	4	11	2 100	1 200

Table 37. Minimum Exterior Bulk Storage Space Size

Household Size *Number of Persons*	Dwelling Type *Number of Bedrooms*	Minimum Volume* m^3	Minimum Height *mm*	Minimum** Horizontal Dimension *mm*
1-2	0 & 1	5	2 100	1 850
3-4	2	9	2 100	1 850
5-6	3	13	2 100	1 850
7-8	4	17	2 100	1 850

* Where there are two general exterior storage spaces, two-thirds of this volume should be contained in one unit having a minimum dimension of 1 850 mm.

** Where there are two general exterior storage spaces, this dimension may be reduced to 1 200 mm in the second storage space.

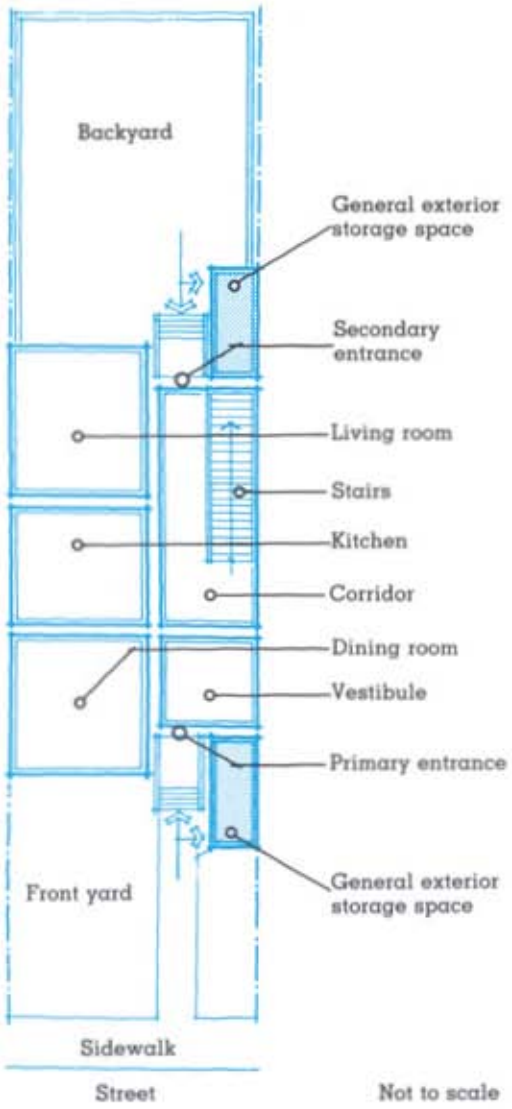


Figure 133
This row house, which has no garage or basement, requires two general exterior storage spaces: 1) on the street side adjacent to the primary entrance, for the storage of bicyles, snow tires, and so on; 2) on the rear garden side to store garden tools and furniture

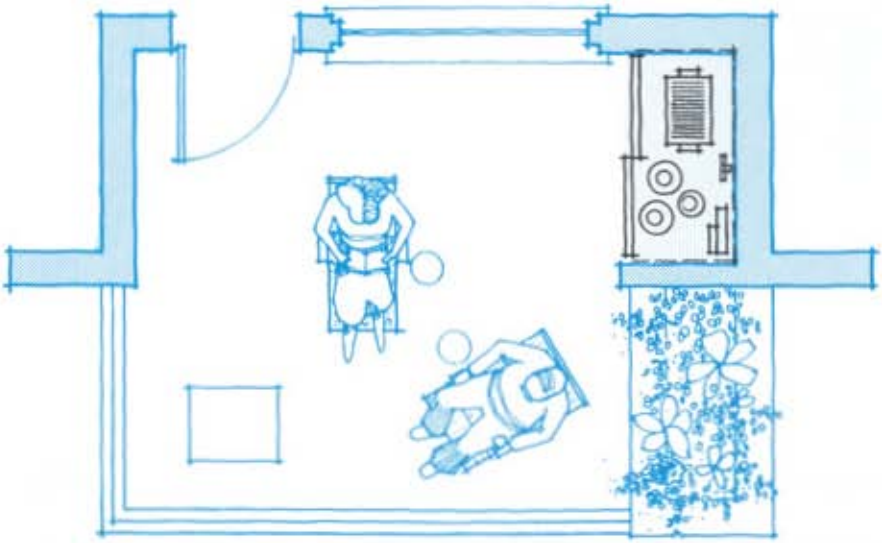


Figure 134
A 3-bedroom dwelling with a large balcony located on the sixth floor of an apartment building, may require two different types of general exterior storage: 1) a storage locker near the ground floor for the storage of bicycles, a ski rack, snow tires, and so on; and 2) a smaller storage unit at the balcony (illustration) for the storage of a barbecue grill, barbecue utensils, gardening pots and accessories

Utility Space

Every dwelling should contain an enclosed utility space for activities that are messy, unsightly, that require a long time to set up, and are not easily dismantled (such as painting for instance), and for various home repairs. The utility space may also be used to accommodate appliances and equipment that cannot be put anywhere else in the dwelling or which are of seasonal or occasional use, such as heating and air-conditioning equipment, freezers, power tools, and ping-pong tables.

Recommendations

1. Within every dwelling (except zero- and 1-bedroom dwellings), some area should be set aside as a utility space. A minimum area of 5 m^2 is suggested for dwelling units in apartment buildings above grade and a minimum area of 15 m^2 is suggested for dwelling units at grade. The minimum ceiling height within the utility space should be 2 100 mm.
2. The utility space may be separate or combined with the general exterior bulk storage space.
3. The utility space should have direct access to the exterior to facilitate the transfer of tools and materials for home repairs, maintenance and gardening.
4. The utility space should be planned so that it may be finished by the residents (i.e., it should be provided with a window and the location of mechanical and electrical services should maximize the open space).

Afterword

This publication has been prepared to assist in the planning and design of dwellings that will have long and useful lives. The design recommendations tend toward a more generous provision of space than absolute minimums, in the belief that a good amount of space is a dwelling's most valuable attribute. With more than a bare minimum of space, the range of possible uses of the dwelling is opened up; there is a greater likelihood that, long after the original occupants have left, the dwelling will be able to adapt to new preferences and family situations and to technological change. The housing stock of Canada represents a tremendous investment of the nation's capital and the wellbeing of its people. Canada Mortgage and Housing Corporation has published this document to help maintain the valuable resource through the encouragement of good design and planning.

Bibliography

Adams, B., J. Ash, J.L. Littlewood. *The Family at Home. A Study of Households in Sheffield*. Ministry of Housing and Local Government, London: Her Majesty's Stationery Office, 1969.

Adams, B., J. Conway. *The Social Effects of Living Off the Ground*. London: Department of the Environment, Housing Development Directorate, 1975.

Alexander, C. *et al. Houses Generated by Patterns*. Berkeley: Center for Environmental Structure, 1969.

Alexander, C., S. Chermayeff. *Community and Privacy*. Garden City, New York: Anchor Books, 1963.

"Alternatives to fear". *Progressive Architecture* (10), 1972, 92-105.

Archea, J., B.L. Collins, F.I. Stahl. *Guidelines for Stair Safety*. Washington, D.C.: US Department of Commerce, 1979. NBS Building Science Series, 120.

Archer, J. *A Study of the Relationship of Selling Price and Attributes of Housing Quality in the Mill Woods Area of Edmonton*. Ottawa: Central Mortgage and Housing Corporation, 1978.

Associate Committee on the National Building Code. *Residential Standards*. Ottawa: National Research Council, 1980.

Beck, R. *et al. User Study of Low Income Family Housing: Phase 1 Report*. Montréal: Université de Montréal, 1973.

Beck, R.J., R. Rowan, P. Teasdale. *User Generated Program for Lowrise Multiple Dwelling Housing*. Vol. 2: *House Design Requirements*. Montréal: Université de Montréal, 1975.

Beck R.J., P. Teasdale. *User Generated Program for Lowrise Multiple Dwelling Housing. Ligne directrices suggérées par les occupants pour la conception d'ensembles d'habitation multifamiliales, peu élevés*. Montréal: Université de Montréal, 1977.

Becker, F. *Housing Messages*. Stroudsburg, Pa.: Dowden, Hutchinson & Ross. Community Development Series, 30, 1977.

Becker, F.D. *Design for Living: The Residents' View of Multi-Family Housing*. Ithaca, New York: Center for Urban Development Research, Cornell University (for the New York State Urban Development Corporation), 1974.

Becker F.D. *et al. User Participation, Personalization and Environmental Meaning: Three Field Studies*. Ithaca, New York: Cornell University, 1977.

Birley, R. *et al. High Density Housing Project for the Greater London Council at Bethnal Green. Design Brief*. London: Department of the Environment, 1970.

Birley, R. *et al. Spaces in the Home. Kitchens and Laundering Spaces*. London: Her Majesty's Stationery Office, 1972.

Bostadsstyrelsen. *God Bostad. Exempel pa lägenheter radhus i ett plan 78 M*. Stockholm: Bostadsstyrelsen, 1976.

Buffalo Organization for Social and Technological Innovation. *Home Safety Guidelines for Architects and Builders*. Washington, D.C.: US Department of Commerce, 1978.

Canada Mortgage and Housing Corporation. *Housing Disabled Persons. Logements pour les handicapés*. Ottawa: Canada Mortgage and Housing Corporation, 1982.

Carroll, J., B. Gowling, M. Spaziani. *Residential Design Guidelines*. Ottawa: City of Ottawa, 1977. Draft copy.

Carson, D.H. *et al. Safety on Stairs*. Washington, D.C.: US Department of Commerce, 1978. NBS Building Sciences Series, 108.

Central Mortgage and Housing Corporation. *Choosing a House Design. Le choix d'un modèle de maison*. Ottawa: Central Mortgage and Housing Corporation, 1973.

Central Mortgage and Housing Corporation. *Housing the Elderly* (metric edition). *Logements pour personnes âgées* (édition métrique). Ottawa: Central Mortgage and Housing Corporation, 1978.

Central Mortgage and Housing Corporation. *Modest House Designs. Modèles de petites maisons*. Ottawa: Central Mortgage and Housing Corporation, 1977.

Central Mortgage and Housing Corporation. *Safety in the Home. La sécurité au foyer*. Ottawa: Central Mortgage and Housing Corporation, 1974.

Central Mortgage and Housing Corporation. *The Use and Design of Space in the Home. L'usage et la disposition des espaces dans un logement*. Ottawa: Central Mortgage and Housing Corporation, 1974.

Collins, B.L. *Windows and People: A Literature Survey*. Washington D.C.: US Department of Commerce, 1975. NBS Building Sciences Series, 70.

Community Development Group. *Search. Collection of Design Participation Games*. Raleigh, North Carolina: North Carolina State University, 1971.

Conran, T. *The Bed and Bath Book*. New York: Crown Publishers Inc., 1978.

Conran, T. *The House Book*. New York: Crown Publishers Inc., 1974.

Conran, T. *The Kitchen Book*. New York: Crown Publishers Inc., 1978.

Conway, D.J. (ed.) *Human Response to Tall Buildings*. Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1977. Community Development Series, 34.

Cooper, C. Easter Hill Village: *Some Social Implications of Design*. New York: Free Press, 1975.

Cooper, C. *The House as Symbol of Self*. Berkeley: Institute of Urban and Regional Development, University of California, Berkeley, 1971 (Working Paper 120).

Cooper, C. *Resident Dissatisfaction in Multi-Family Housing*. Berkeley: Institute of Urban and Regional Development, University of California, 1972.

Cooper, C. "User needs research in housing," in S. Davis: *The Form of Housing*. New York: Van Nostrand Reinhold Co., 1977, pp. 138-70.

Cronberg, Tarja. *Performance Requirements for Buildings. A Study Based on User Activities*. Stockholm: Swedish Council for Building Research, 1975.

De Chiara, J., J.H. Callender. "Residential," in J.D. De Chiara, J.H. Callender (eds.): *Time-Saver Standards for Building Types*. New York: McGraw-Hill, 1973.

De Chiara, J., L. Koppelman (n.d.) *Manual of Housing Planning and Design Criteria*. Englewood Cliffs, New Jersey: Prentice Hall.

Deilmann, H., J.C. Kirschenmann, H. Pfeiffer. *Wohnungsbau. The Dwelling. L'habitat*. Stuttgart: Karl Krämer Verlag Stuttgart, 1973. Dokumente der modernen Architektur, 8.

Department of the Environment. *Homes for Today and Tomorrow*. London: Her Majesty's Stationery Office 1961.

Department of the Environment. *Homes for Today and Tomorrow*. London: Her Majesty's Stationery Office, 1977.

Department of the Environment. *Housing Single People 2: A Design Guide with a Description of a Scheme at Leicester. Design Bulletin No. 29*. London: Her Majesty's Stationery Office, 1974.

Department of the Environment. *Housing the Family*. Lancaster, England: MTP Construction, 1974.

Department of the Environment. *Safety in the Home. Design Bulletin No. 13*. Edinburgh: Her Majesty's Stationery Office, 1971.

Department of the Environment. *Space in the Home. Design Bulletin No. 6*. Edinburgh: Her Majesty's Stationery Office, 1975.

Department of the Environment. *Spaces in the Home: Bathrooms and WCs. Design Bulletin No. 24, Part 1*. London: Her Majesty's Stationery Office, 1972.

Department of the Environment. *Spaces in the Home: Kitchen and Laundering Spaces. Design Bulletin No. 24, Part 2*. London: Her Majesty's Stationery Office, 1972.

Design and Planning Assistance Center. *Subsidized Housing in Albuquerque: Design Evaluation, Analysis and Recommendations*. Albuquerque, New Mexico: Albuquerque Bernalillo County Planning Department, 1978.

Diagram Group. *Child's Body*. New York: Wallaby Books, 1977.

Energie, Mines et Ressources Canada. *Emprisonnons la Chaleur*. Ottawa: Energie, Mines et Ressources Canada, 1976.

Environmental Research and Development Foundation Arrowhead. *Final Recommendations*. Bechtel, R.B., Kansas City, Missouri, 1971.

Gans, H.J. *The Levittowners: Ways of Life and Politics in a New Suburban Community*. New York: Pantheon Books, 1967.

Gaunt, L. *Childrens' Dwelling — Restrictions and Opportunities for Play*. Gävle, Sweden: National Swedish Institute for Building Research, 1978. Mimeo.

Grandjean, E. *Ergonomics of the Home*. London: Halstead Press, 1973.

Greater London Council, n.d. *Beaver Estate, Hounslow. Report of Housing Appraisal Survey*. London: Greater London Council.

Greater Vancouver Regional District. *A Qualitative Checklist for Compact Housing*. Ottawa: Canadian Housing Design Council, 1975.

Griffin, M.E. *Mount Hope Courts: A Social/Physical Evaluation*. Rhode Island: Brown University, 1973.

Hall, E.T. *The Hidden Dimension*. Garden City, New York: Anchor Books, 1966.

Hauf, H.D., J.D. Boaz (eds). "Equipment," in H.D. Hauf, J.N. Boaz (eds): *Architectural Graphic Standards*. New York: John Wiley & Sons, 1970, pp. 483-94.

Housing Development Directorate. *Housing Appraisal Kit — A Complete Social Survey Package*. Vol. 2: *Master Set of Documents for Reproduction*. London: Department of the Environment, 1978. Mimeo.

Housing and Urban Development Association of Canada. *Builders' Guide to Energy Efficiency in New Housing*. Toronto: Ministry of Energy, 1980.

Howell, S.C. *Private Space: Habitability of Apartments for the Elderly*. Cambridge, Mass.: Department of Architecture, MIT, 1978.

Howell, S.C. *Shared Spaces in Housing for the Elderly*. Cambridge, Mass.: Department of Architecture, MIT, 1978.

Howell, S.C. *Storage: Putting Things Away*. Cambridge, Mass.: Department of Architecture, MIT, 1979.

Howell, S.C. *Windows*. Cambridge, Mass.: Department of Architecture, MIT, 1978.

Institute of Environmental Research. *A Study of Storage Space in Multiple Unit Residential Buildings*. Prepared for Technical Research Division. Canada Mortgage and Housing Corporation, Ottawa, 1981. Mimeo.

Johnson, L., J. Shack, K. Oster. *Out of the Cellar and Into the Parlour. Guidelines for the Adaptation of Residential Space for Young Children*. Ottawa: Canada Mortgage and Housing Corporation, 1980.

Johnson, R.E. *Assessing Housing Preferences of Low Cost Single Family Homes Buyers*. Ann Arbor, Michigan: Architectural Research Laboratory University of Michigan, 1980. Monograph Series.

Jones, R.A., W.H. Kapple. *Kitchen Industry Technical Manual. Kitchen Planning Principles — Equipment — Appliances*. Champaign, Illinois: University of Illinois, 1975.

Kira, A. *The Bathroom*. New York: Viking Press, 1976.

Konsument Verket. *Kök Planering Inredning*. Vällingby, Sweden: Konsumentverket, 1977.

Lidmar, K., K. Andersson, O. Rex. *Lag och tät bebyggelse 1. kvalitetskriterier*. Stockholm: Statens rad för byggnadsforskning, 1978.

"Life safety". *Progressive Architecture*, Vol. 55, No. 4, April 1974.

Mackintosh, E., R. Olsen, W. Wentworth, *The Middle Income Family's Experience in an Urban Highrise Complex and the Suburban Single-Family Home*. United States Department of Health, Education and Welfare, 1977. Mimeo.

Macsai, J. *et al. Housing*. New York: John Wiley & Sons, 1976.

Mavtz' R., R. Kaplan. "Residential modification as a mode of self- expression," in *Man-Environment Interaction Evaluation and Application*. Environmental Design Research Association, 9:55-68, 1974.

Murray, J.A., H. Fliess. *Family Housing*. Ottawa: Canadian Housing Design Council, 1970.

National Committee for Human Settlements. *Habitat Bill of Rights*. Paper presented at the Conference on Human Settlements, Vancouver, June 1976. Teheran, Iran: Ministry of Housing and Urban Development, 1976.

Noble, J., T. Field. *High Density Housing*. London: Department of the Environment, Housing Development Directorate, 1973.

Norcross, C. *Townhouses and Condominiums: Residents Likes and Dislikes*. Washington, D.C.: Urban Land Institute, 1973.

Peter Barnard Associates. *Stacked Housing*. Toronto: Ontario Housing Corporation, 1973.

Pollowy, A.M. *The Urban Nest*. Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1977.

Portas, N. "Appropriation of space and dwelling constraints: some results of a survey in Lisbon and Oporto," paper published in the National Swedish Institute for Building Research, CIB Commission, *The Social Environment and its Effect on the Design of the Dwelling and its Immediate Surroundings*, Symposium proceedings, Stockholm, 1968.

Professional Standards and Technology Directorate. *Desk Assessment Technique: Evaluation. Phase 1: Development of a Project Evaluation System*. Ottawa: Central Mortgage and Housing Corporation, 1978.

Professional Standards and Technology Directorate. *Project Survey Reports*. Ottawa: Central Mortgage and Housing Corporation, 1978.

Professional Standards and Technology Directorate. *Project Survey Technique: Summary of Findings*. Ottawa: Central Mortgage and Housing Corporation, 1978.

Professional Standards and Technology Directorate. *User Questionnaire Technique: Summary of Findings*. Ottawa: Central Mortgage and Housing Corporation, 1978.

Rebeneck, A., D. Sheppard, P. Town. "The structuring of space in family housing," *Progressive Architecture*, November, 102-107, 1974.

Rapoport, A. *The Personal Element in Housing: An Argument for Open-Ended Design*. (Reprint from *Royal Institute for British Architects Journal, 75*(7), 300,307). Milwaukee: University of Wisconsin, Milwaukee, 1968.

Ray, A.A., J.R. Anderson, M. Spatz. *A Study of Some Housing Preferences in East Chicago Heights, Illinois*. A report to Home and Cook Country Office of Enonomic Opportunity, Housing Research and Development Program, University of Illinois at Urbana-Champaign, 1972.

Ruston/Shanahan and Associates. *A Consumer Preference Survey of the Moderate Priced Housing Market in Ottawa*. Toronto: Housing and Urban Development Association of Canada, 1978.

Ruston/Shanahan and Associates. *Group Interviews: A Project Evaluation Study*. Ottawa: Central Mortgage and Housing Corporation, 1978.

Ruston/Shanahan and Associates. *Potential Users Discuss Community and Households*. Ottawa: Central Mortgage and Housing Corporation, 1975.

Safdie, M. *Beyond Habitat*. Montreal: Tundra Books, 1970.

Saile, D.G. *et al. Activities and Attitudes of Public Housing Residents*. Rockford, Illinois: Housing Research and Development Program, University of Illinois, Urbana-Champaign, 1971.

Saile, D.G. *et al. Families in Public Housing: An Evaluation of Three Residential Environments in Rockford, Illinois*. Urbana-Champaign Housing Research and Development Program, University of Illinois, 1972.

Sawers, J.W. *Protecting Your Home Against Burglary*. Ottawa: Canada Mortgage and Housing Corporation, 1981.

Schoenauer, N. *Toward Optimum Standards*. Montréal, 1967. Mimeo.

Small Homes Council. *Basements. Circular F2.0*. Urbana-Champaign: University of Illinois, 1953.

Small Homes Council. *Bedroom Planning Standards. Circular C5.60*. Urbana-Champaign: University of Illinois, 1974.

Small Homes Council. *Cabinet Space for the Kitchen. Circular C5.31*. Urbana-Champaign: University of Illinois, 1949.

Small Homes Council. *Household — Storage Units. Circular C5.1*. Urbana-Champaign: University of Illinois, 1953.

Small Homes Council. *Indoor Storage. Circular C5.12*. Urbana-Champaign: University of Illinois, 1975.

Small Homes Council. *Kitchen Planning Standards. Circular C5.32*. Urbana-Champaign: University of Illinois, 1949.

Small Homes Council. *Kitchen Planning Standards. Circular C5.32*. Urbana-Champaign: University of Illinois, 1964.

Small Homes Council. *Laundry Areas. Circular C5.4*. Urbana-Champaign: University of Illinois, 1957.

Small Homes Council. *Window Planning Principles. Circular F11.0*. Urbana-Champaign: University of Illinois, 1954.

Syndicat d'études interindustries — construction 1C-1B (s.d.). *Construire ... quoi? pour qui?* Bruxelles: Syndicat d'études interindustries — construction 1C-1B.

Teasdale, P. *An Evaluative Framework for Measuring Housing Performance*. Montréal: Université de Montréal, 1979, Mimeo.

Teasdale, P. *Internal Space in the Dwelling Study. Case Studies/ Significant Findings*. Study Conducted for Technical Research Division, Canada Mortgage and Housing Corporation. Ottawa, 1982. Mimeo.

Teasdale, P. *A User and Visitor Generated Evaluation of Eight Experimental Townhouses. Study Report 1/2*. Ottawa: National Capital Commision and Central Mortgage and Housing Corporation, 1979

Teasdale, P. *A User and Visitor Generated Evaluation of Eight Experimental Townhouses. Study Report 2/2*. Ottawa: National Capital Commission and Central Mortgage and Housing Corporation, 1979.

Teledyne Brown Engineering. *A Design Guide for Home Safety*. Washington, D.C.: US Department of Housing and Urban Development, 1972.

Urban Research and Consulting Limited. *Design Evaluation of Multiple-Family Accommodation for Low-Income Families with Children. Final Report*. Ottawa: Central Mortgage and Housing Corporation, 1976.

US Department of Housing and Urban Development. *Manual of Acceptable Practices*. Washington, D.C.: US Department of Housing and Urban Development, 1973.

US Department of Housing and Urban Development. *Minimum Property Standards for Multifamily Housing*. Washington, D.C.: US Department of Housing and Urban Development, 1979.

US Department of Housing and Urban Development. *Minimum Property Standards for One- and Two-Family Dwellings*. Washington, D.C.: US Department of Housing and Urban Development, 1979.

Vedel-Peterson, F. *God bolig i etagehuse*. Kobenhavn: Statens Byggeforskningsinstitut, 1967.

Vedel-Peterson, F., K. Ranten. *Plan i kokkenet -2. aendrede og udvidede udgave*. Horsholm, Denmark: Statens Byggeforskningsinstitut, 1977.

Vischer-Skaburskis Planners, *False Creek — Area 6 — Phase 1. Post- Occupancy Evaluation. Vol. 1: Executive Summary*. Ottawa: Canada Mortgage and Housing Corporation, 1980.

Vischer-Skaburskis Planners. *False Creek — Area 6 — Phase 1. Post- Occupancy Evaluation. Vol. 2: Final Report*. Ottawa: Canada Mortgage and Housing Corporation, 1980.

Warshaw, L. *Options in Housing (Summary)*. Ottawa: National Design Council, 1974.

Wekerle, G.R., R. Peterson, D. Morley. *New Space for Women*. Boulder, Colorado: Westview Press, 1980.

Whitebread, M. "Two trade-off experiments to evaluate the quality of residential environments," *Urban Studies*, 15, 149-66, 1978.

Zeisel, J. *et al. Housing Designed for Families*. Cambridge, Mass.: Joint Center for Urban Studies of MIT and Harvard University, 1981.

Zeisel, J., M. Griffin. *Charlesview Housing: A Diagnostic Evaluation*. Cambridge, Mass.: Architecture Research Office, Graduate School of Design, Harvard University, 1975.

About This Book

This publication provides guidelines to architects, builders, regulatory officials, realtors and the public, for the internal design of dwellings that can be adapted to the users' needs.

The book's recommendations are based on the careful consideration of variations in room size, the relationship between rooms, and the lessening of emphasis on the designation of a room's particular function so that choice about the use of space can rest with the occupant.

However, it is understood that certain parts of dwellings are less flexible than others — external orientation, stairs and structural and mechanical systems, for example. These are costly to change and must therefore be designed and located with care. For the design of other aspects of a dwelling, however, the important question should be: "How easily can this dwelling accommodate the changing needs of various occupants over the passage of time?"

The book examines the activities carried out within rooms, the size and number of pieces of furniture needed, and the clearance between them required to carry out these activities. Based on this information, minimum space and size requirements have been established.

The book used 50 case studies of different Canadian dwelling types and is illustrated with 134 figures, which include photographs, drawings and floor plans.