

**TIME-SAVER
STANDARDS
FOR
BUILDING TYPES
2nd Edition**

JOSEPH DE CHIARA & JOHN CALLENDER



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Time-Saver Standards for Building Types

Second Edition

Edited by

JOSEPH De CHIARA

and

JOHN HANCOCK CALLENDER

TIME-SAVER STANDARDS FOR BUILDING TYPES second edition
INTERNATIONAL EDITION

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2nd printing 1987

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When ordering this title use ISBN 0-07-099076-X

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American Association for Health, Physical Education, and Recreation
American Association of Port Authorities
American Association for State and Local History
American Association of Zoological Parks and Aquariums
American Bar Association
American Library Association
American Medical Association
American Psychiatric Association
American Trucking Associations, Inc.
American Youth Hostels, Inc.
Association of College Unions—International
The Athletic Institute
Boy Scouts of America
Boys' Clubs of America
Brunswick Corp.
Canadian Museum Association
Center for Architectural Research, Rensselaer Polytechnic Institute
Conference Board of Mathematical Sciences
Civil Aeronautics Administration
Educational Facilities Laboratories
Eno Foundation
Federal Aviation Administration
Federal Housing Administration
General Motors Corporation
General Services Administration
Housing and Home Finance Agency
Housing Research Center, Cornell University
Humble Oil & Refining Co.
Institute of Outdoor Drama, University of North Carolina
Institute of Traffic Engineers
International Association of Chiefs of Police
International City Managers' Association
International Youth Hostel Federation
Michigan State Housing Development Authority

Mobile Homes Manufacturers Association
Mosler Safe Co.
Motor Vehicle Manufacturers Association of the U.S., Inc.
Music Educators National Conference
National Association of Engine and Boat Manufacturers, Inc.
National Association of Home Builders
National Council of the Young Men's Christian Association of U.S.A.
National Council on the Aging
National Crushed Stone Association
National Education Association
National Fire Protection—International
National Fisheries Center and Aquariums
National Institute of Mental Health
National Golf Association
National Office Products Association
National Recreation and Park Association
National Rifle Association
National Swimming Pool Institute
New York City Housing Authority
New York State University Construction Fund
Philadelphia Housing Association
Texas A & M University, School of Architecture
United Methodist Church, Board of Global Ministries
**U.S. Department of Health, Education, and Welfare (now called U.S. Department
of Health and Human Services)**
U.S. Department of Housing and Urban Development
U.S. Department of the Navy
U.S. Public Health Service
University of California
University of Oregon
University of Washington, Bureau of Government Research and Services
Urban Land Institute

Preface

to the Second Edition

The first edition of **TIME-SAVER STANDARDS FOR BUILDING TYPES** was a unique and significant publication. It established for the first time a comprehensive source of reference material dealing with the functional analysis and standards of all major types of buildings. It contained in a single source an extensive amount of essential planning data for the architectural designer and related professionals. This was accomplished by contributions from many individuals and by researching and consolidating a wide range of literature. As much as possible, the criteria were presented in graphic form for easier reference and use. In a span of a few short years, the first edition has established itself as a useful and popular reference source to both professionals and students. In order to maintain its effectiveness and meet this need, the book requires periodic review and revision to incorporate new developments and thinking. As a result, the second edition has been published. The new edition has been expanded by over two hundred pages and approximately twenty-five percent of the original book has been revised. Obsolete pages have been eliminated and more current materials have been added. Also, several new building types have been included.

The authors wish to emphasize to the user of this handbook that the material presented is primarily offered to give basic or general data for a particular building type. This material is not intended to give definitive schematics, rigid formulas, or final design solutions that will automatically provide the solution to the particular design problem at hand. Rather, these standards and criteria should be the starting point for further analysis, study, and review of the functional relationships of each building type. Primarily, the material in this handbook is intended to be used by the architect, designer, student, or related design professionals in the following manner:

1. to assist in developing building programs and establishing preliminary space allocations.
2. to analyze specific client needs and to quantify them
3. to study general and specific functional relationships
4. to assist in the preparations of preliminary architectural designs

The authors strongly believe in the principle that "form follows function" and that before a building can succeed aesthetically it must perform its function efficiently. All the material presented in this handbook deals with the function of a building rather than its form. There is absolutely no attempt to dictate or even suggest aesthetic or definitive design solutions to any

building type. The architectural designer must have complete freedom to exercise his or her creative abilities. With the handbook's solid functional basis, this goal can be achieved more successfully.

JOSEPH De CHIARA

Preface

to the First Edition

TIME-SAVER STANDARDS FOR BUILDING TYPES is a natural outgrowth of the present fourth edition of *Time-Saver Standards, A Handbook of Architectural Design Data*. Over the years, as *Time-Saver Standards* became more popular and comprehensive, it also became larger in size and more cumbersome to use. In addition to containing architectural design data, the fourth edition also had some design material dealing with specific types of buildings. When the book was ready for a fifth revision, it became apparent that changes had to be made in the content and format of the book. In order to be able to include new design data in a comprehensive manner, it was decided to remove the material dealing with building types from the fifth edition and use this material as a core for the new book: *Time-Saver Standards for Building Types*. The original material has been revised, greatly expanded, and reorganized to cover all of the major building types. The result has been a completely new handbook for the architectural profession. It evolved from and follows the tradition of the first four editions of *Time-Saver Standards*. *Time-Saver Standards for Building Types* and *Time-Saver Standards for Architectural Design Data*, 5th edition, are closely related but, in fact, are separate and independent books.

Time-Saver Standards for Building Types is intended primarily to meet the needs of those who are involved in the conceiving, planning, programming, or design of buildings. It is intended to give basic design criteria for each major type of building. It will give those unfamiliar with a specific type of building a talking or working knowledge of its functions, organization, and major components.

This material is intended to act as a guide or reference point from which the specific design solutions can be established. Absolutely no attempt is made in this book to present the final design solution for any building type, nor does it try to establish or influence the final aesthetic expression of the building. It is hoped that the designer or architect, by having at his disposal the widest range of information concerning a building type, will be able to design more functional, more meaningful, and more exciting buildings.

The editors wish to take this opportunity to express their gratitude and sincere thanks to the many individuals, architects, libraries, and many varied organizations who have generously contributed their expertise to this new creation, *Time-Saver Standards for Building Types*.

JOSEPH De CHIARA
JOHN HANCOCK CALLENDER

1

Residential

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DIMENSIONS OF THE HUMAN FIGURE

DIMENSIONS OF ADULTS

The dimensions and clearances shown for the average adult (Fig. 2) represent minimum requirements for use in planning building layouts and furnishings. If possible, clearances should be increased to allow comfortable accommodations for persons larger than average. The height of tabletops shown on the next page is 2 ft 5 in; some authorities prefer 2 ft 6 in, or sometimes 2 ft 6½ in.

Since doorways and passageways must normally be dimensioned to permit the movement

of furniture, they should seldom be designed merely on the needs of the average adult. (See section of this book relating to furniture sizes.)

DIMENSIONS OF CHILDREN

Children do not have the same physical proportions as adults, especially during their early years, and their heights vary greatly, but their space requirements can be approximated from the following table and from Fig. 1. (For heights of children's furniture and equipment, see section on "Schools.")

Average Height of Children

Age	Height, in	Age	Height, in
5	44	11	56
6	46	12	58
7	48	13	60
8	50	14	62
9	52	15	64
10	54	16	66

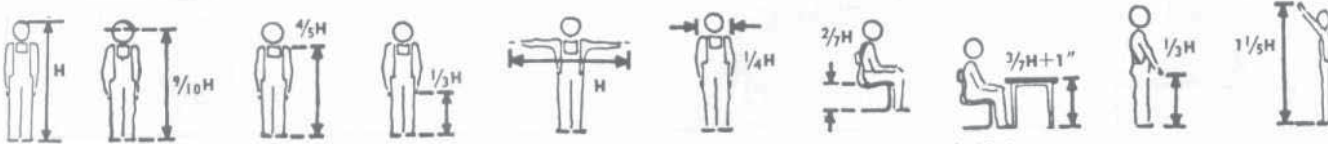


Fig. 1 Dimensions and clearances for children. Source: "Time-Saver Standards," 1st ed., F. W. Dodge Corp., New York, 1946.

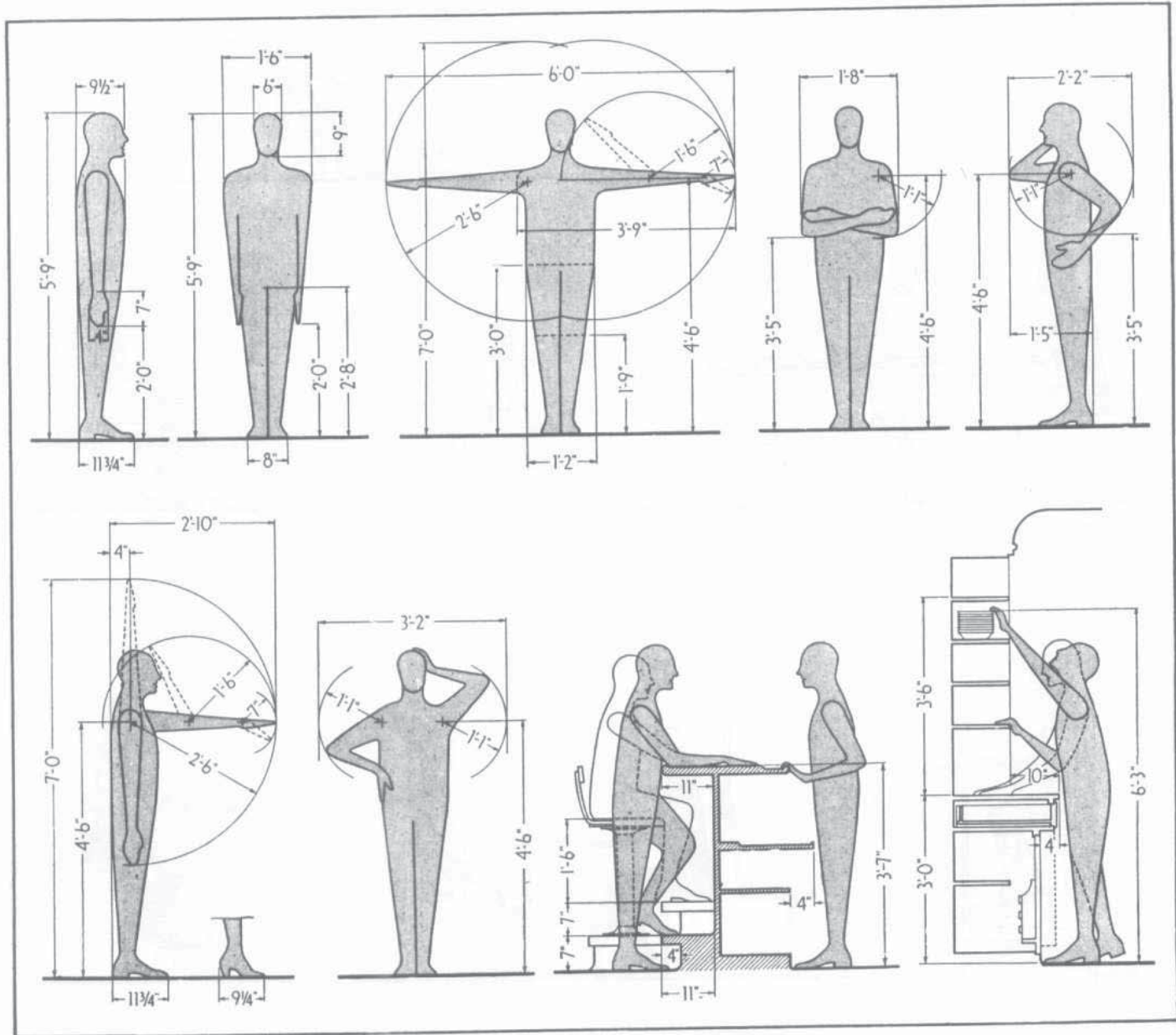


Fig. 2 Dimensions and clearances for adults. Source: "Time-Saver Standards," 1st ed., F. W. Dodge Corp., New York, 1946.

Residential

DIMENSIONS OF THE HUMAN FIGURE

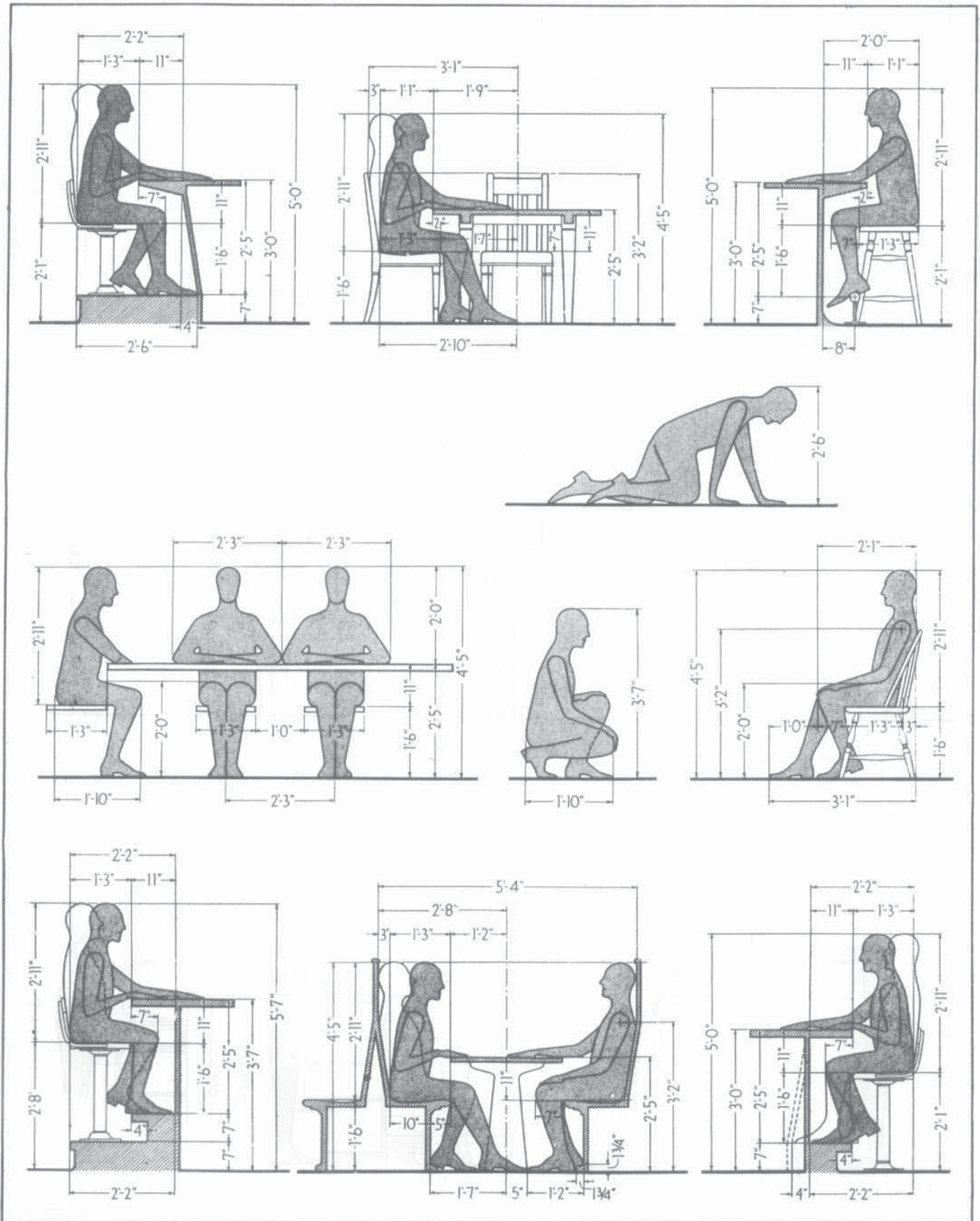


Fig. 2 (cont.)

LIVING AREAS

Planning Considerations

- Through traffic should be separated from activity centers.
- Openings should be located so as to give enough wall space for various furniture arrangements.
- Convenient access should be provided to doors, windows, electric outlets, thermostats, and supply grills.

Furniture Clearances

To assure adequate space for convenient use of furniture in the living area, not less than the following clearances should be observed.

- 60 in between facing seating
- 24 in where circulation occurs between furniture
- 30 in for use of desk
- 36 in for main traffic
- 60 in between television set and seating

Seating arranged around a 10-ft diameter circle (Fig. 1) makes a comfortable grouping for conversation. Figure 2 indicates clearances, circulation, and conversation areas.

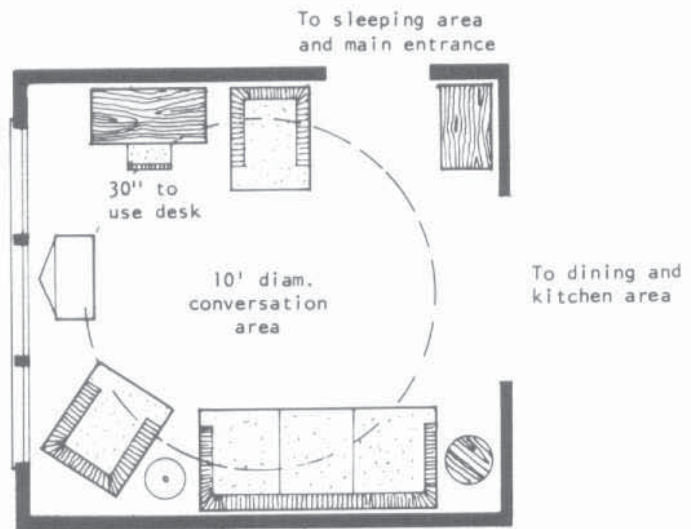


Fig. 1 Plan. Source: "Manual of Acceptable Practices," Vol. 4, U.S. Dept. of Housing and Urban Development, 1973.

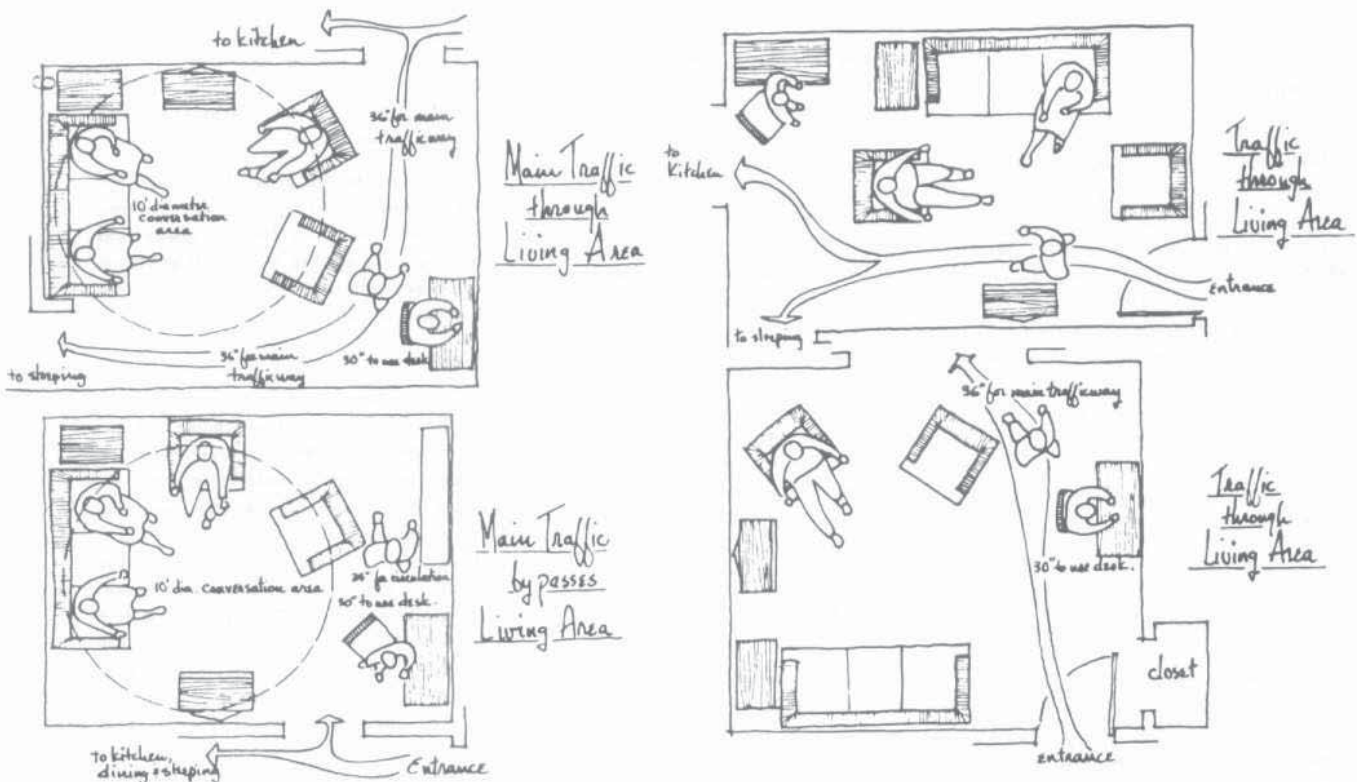


Fig. 2 Minimum clearances, circulation and conversation areas for living rooms.

FURNITURE

GENERAL

Typical furniture-group units

While the typical furniture arrangements presented in the following pages by no means cover the entire range of possibilities, they do cover the fundamental uses to which living, dining, and sleeping spaces are put. From the suggested schemes furniture arrangements can be developed to suit any particular problem or set of problems with which a designer may be confronted.

Furniture sizes may vary slightly; those indicated are the averages commonly met with in upper middle-class homes, and are little affected by changes in style or similar matters of individual preference.

Specific space allowances

In studying furniture groupings, it becomes obvious that certain clearances are required. Spaces, lanes, or paths of different types develop naturally between furniture-group units. Minimum distances for comfort have been established by numerous planners. These, and in some cases, maximum distances based upon requirements for human intercourse, have been incorporated in the diagrams. A listing of those generally applicable to all rooms follows:

1. *Single passage* (not a traffic lane) between low objects, such as a sofa and coffee table: 18 in. is the minimum.
2. *Single passage* (not a traffic lane)

between tall objects, hip height or over: 2 ft to 2 ft 6 in. is the minimum.

3. *General traffic lane*: 3 ft 4 in. is the practical minimum. As rooms increase in size, this minimum increases, in order to preserve the space scale of the room. The traffic lane between an entrance door and a major group unit is preferably generous in width. It is desirable to place doors so that the central portions of rooms do not become major traffic ways between different parts of the house.

4. *Seating areas, confined* (for instance, between a desk and a wall): 3 ft is a minimum tolerance, which permits one person to pass back of an occupied chair. This minimum does not constitute a major traffic lane.

LIVING ROOM

Typical furniture groups in the living room are as follows:

1. *Primary conversation group*: chairs and sofa normally grouped around the fireplace
2. *Secondary conversation group*: chairs and love seat at end of room or in corner
3. *Reading group or groups*: chair, ottoman, lamp, table
4. *Writing or study group*: desk, lamp, one or two chairs, bookcases
5. *Music group*: piano, bench, storage space

6. *Game group*: game table and four chairs

7. *Television group*: television set and seating for several people

According to the price of a house and the cubage allotted to the living room, two or three or all of the furniture-group units may be included. The fireplace is so closely associated with living room furniture that it has been included in all schemes.

Clearances

Traffic tolerances in living rooms are important, since numbers of people use the room, and narrow lanes between furniture-group units are uncomfortable. An adequate traffic lane between the main entrance and the major seating group is 3 ft 4 in. wide; 4 ft 6 in. is preferred. The minimum clearance between facing pieces of furniture in a fireplace group is 4 ft 8 in. for a fireplace 3 ft wide. For every inch added to the size of the fireplace, 1 in. is added to the minimum clearance space.

If a wide sofa is placed directly opposite the fireplace, this group is often spread. A 6-ft tolerance is usually considered the maximum because it is difficult to carry on a conversation over a greater distance.

A considerable flexibility in location of doors and windows is possible, and all wall pieces can be shifted. Doors flanking a fireplace are to be avoided in order that the furniture group may be concentrated around the fireplace opening.

FURNITURE SIZES

SOFAS



"SHERATON" TYPE
 LENGTH 6'-0"
 DEPTH 2'-6"
 HEIGHT 3'-0"

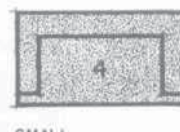


"CHIPPENDALE" TYPE
 L 6'-6"
 D 2'-6"
 H 3'-0"



PLAIN UPHOLSTERED
 L 7'-0"
 D 3'-0"
 H 3'-0"

LOVE SEATS



SMALL
 L 3'-6"
 D 2'-0"
 H 2'-3"

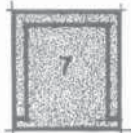


LARGE
 L 4'-6"
 D 2'-6"
 H 3'-0"

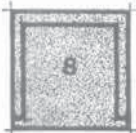
CHAIRS



CLUB
 LENGTH 2'-6"
 DEPTH 3'-0"
 HEIGHT 3'-0"



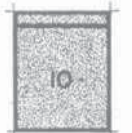
OCCASIONAL
 L 2'-3"
 D 2'-6"
 H 3'-0"



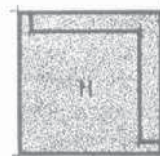
WING
 L 2'-6"
 D 2'-6"
 H 3'-0"



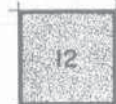
SIDE OR
 DESK
 L 1'-6"
 D 1'-6"
 H 2'-6"



UPHOLSTERED
 ARMLESS
 L 2'-0"
 D 2'-6"
 H 2'-6"



UPHOLSTERED
 CORNER CHAIR
 L 3'-0"
 D 3'-0"



BRIDGE
 ARM
 L 2'-0"
 D 2'-0"
 H 2'-6"



BRIDGE
 ARMLESS
 L 1'-6"
 D 1'-6"
 H 2'-6"

DESKS



FLAT TOP... SMALL
 LENGTH 4'-0"
 DEPTH 2'-0"
 HEIGHT 2'-6"



FLAT TOP... LARGE
 L 5'-0"
 D 2'-6"
 H 2'-6"



FLAT TOP... VERY LARGE
 L 6'-0"
 D 3'-0"
 H 2'-6"



GOVERNOR
 WINTHROP
 L 3'-0"
 D 2'-0"
 H 3'-6"



SECRETARY
 L 3'-0"
 D 2'-0"
 H 7'-0"

BREAKFRONT BOOK CASES

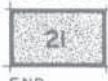


SMALL
 LENGTH 4'-0"
 DEPTH 1'-6"
 HEIGHT 6'-6"



LARGE
 L 5'-0"
 D 1'-6"
 H 7'-0"

TABLES



END
 L 2'-0"
 D 1'-3"
 H 2'-0"



END
 L 1'-8"
 D 1'-8"
 H 2'-0"



COFFEE
 L 3'-0"
 D 2'-0"
 H 1'-6"



BRIDGE
 L 3'-0"
 D 3'-0"
 H 2'-6"



CONSOLE
 L 3'-0"
 D 1'-6"
 H 2'-6"

LOWBOYS



AVERAGE
 LENGTH 2'-6"
 DEPTH 1'-6"
 HEIGHT 2'-6"



LARGE
 L 2'-8"
 D 1'-8"
 H 3'-2"

HIGHBOYS



SWAN TOP
 L 3'-0"
 D 1'-6"
 H 7'-0"



FLAT TOP
 L 3'-0"
 D 1'-6"
 H 5'-0"

CIRCULAR PIECES



LOW COFFEE TABLE
 DIAM. 3'-0"
 HEIGHT 1'-6"



DRUM TABLE
 DIAM. 3'-0"
 H 2'-6"



PIECRUST TABLE
 DIAM. 3'-0"
 H 2'-6"



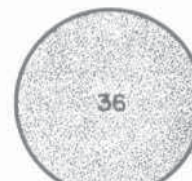
DUMBWATER
 LARGEST DIAM. 2'-0"
 H. 2'-6"



STAND,
 DIAM. 1'-0"
 H 2'-6"



LAMP TABLE
 DIAM. 2'-0"
 H. 2'-6"



ROUNDOABOUT SEAT
 DEPTH OF SEAT 1'-6"
 DIAM. 4'-0"

PIANOS



37. CONCERT GRAND
 L 9'-0"
 D 5'-0"
 H 3'-4"

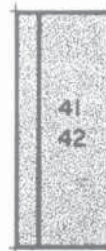
38. MUSIC ROOM GRAND
 L 7'-0"
 D 5'-0"
 H 3'-4"

39. PARLOR GRAND
 L 6'-0"
 D 5'-0"
 H 3'-4"

40. BABY GRAND
 L 5'-6"
 D 5'-0"
 H 3'-4"

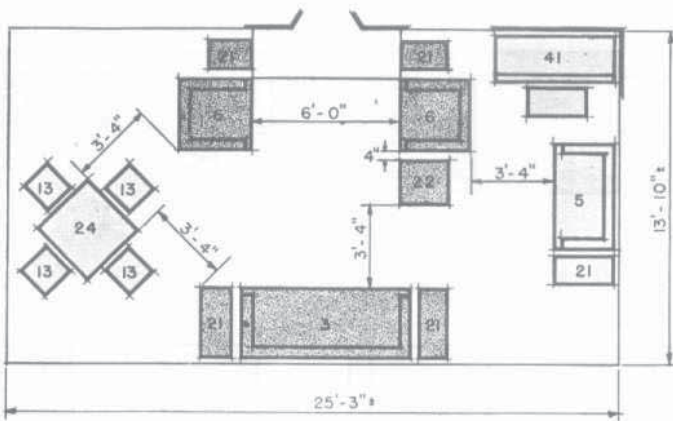
41. CONSOLE
 L 5'-0"
 D 2'-0"
 H 4'-3"

42. MINATURE
 L 4'-8"
 D 1'-7"
 H 3'-0"

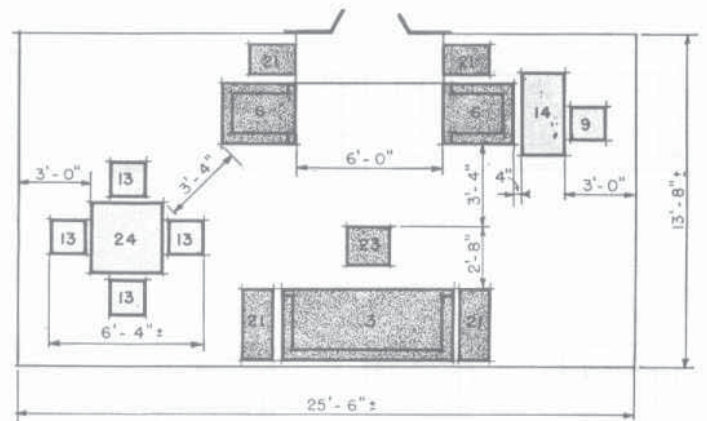


Residential

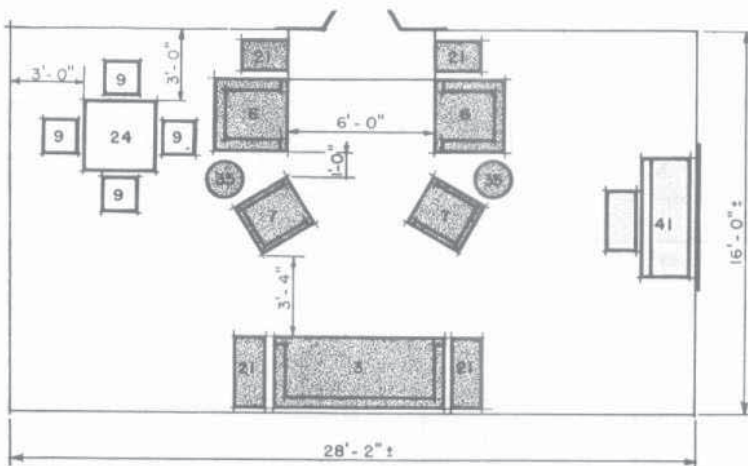
FURNITURE ARRANGEMENTS



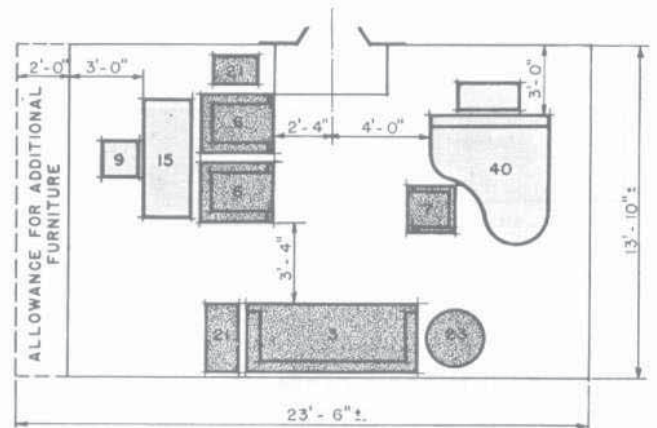
1. In all living rooms shown, main conversation group centered about fireplace is dark gray. Bay or picture windows may be used as focal points, instead of fireplaces.



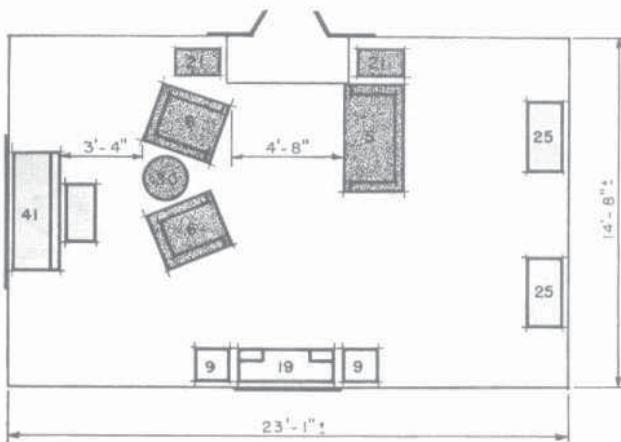
2. Clearance between low coffee table (23) and easy chairs (6) ought to be maintained at 3'-4" even though table is low, because the aisle here constitutes a major traffic way.



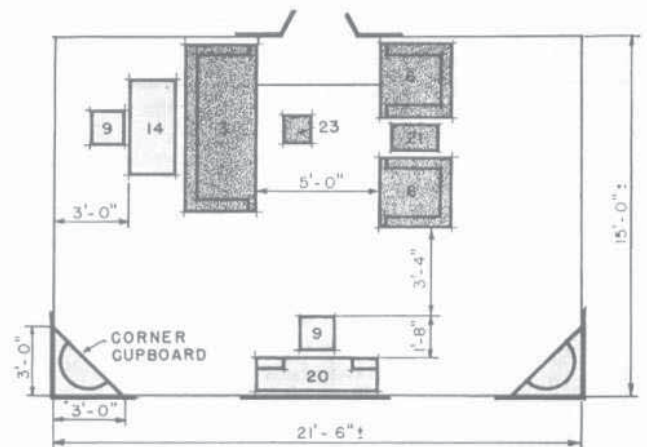
3. For larger families, or for those who entertain often, seating for 7 to 8 persons in the primary group is a reasonable design limitation. Off-center location of game group provides for a corner entrance door.



4. Minimum length for a room which must contain a baby grand piano is approximately 20'. If minimum clearances of 1' between piano and wall, and 3' between desk (15) and wall, are to be maintained, room length must be increased.

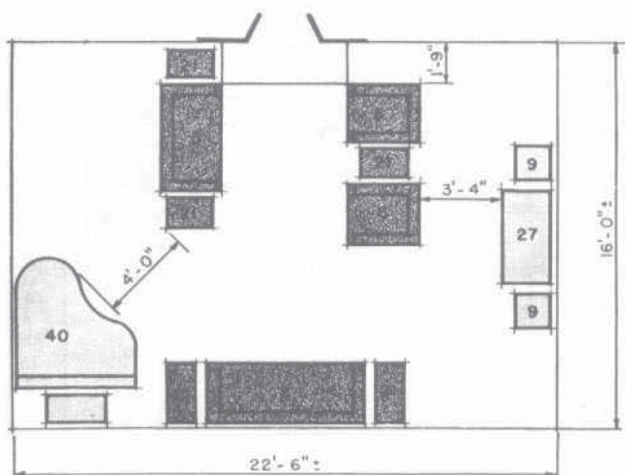


5. If sofa opposite fireplace is omitted, primary group can be brought closer together. In schemes 1 to 4, note that wide groups permit conversation without twisting to see speakers seated on sofa; here this restriction is removed.

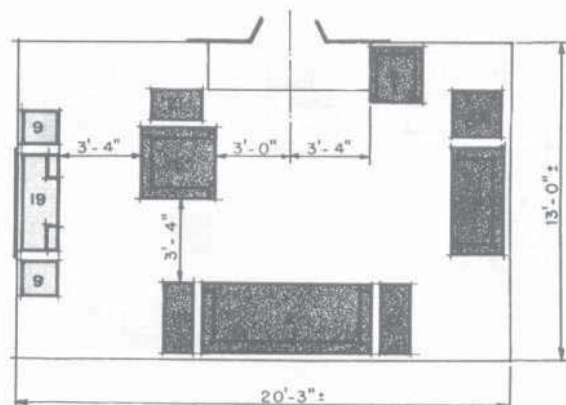


6. Here, presumably, doors at ends of room indicate use of one side of room as a traffic route. Primary furniture is grouped closely about fireplace; wall pieces are all that can be used on opposite side.

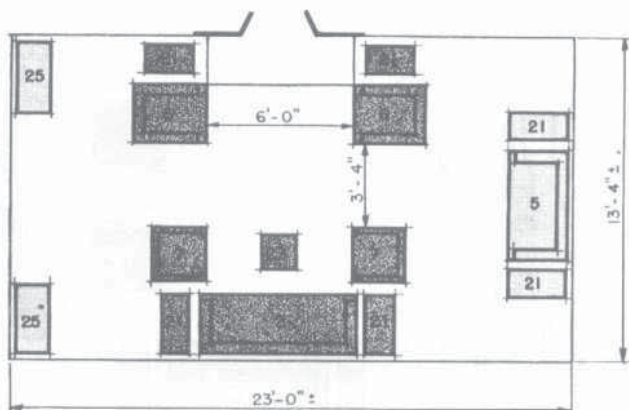
FURNITURE ARRANGEMENTS



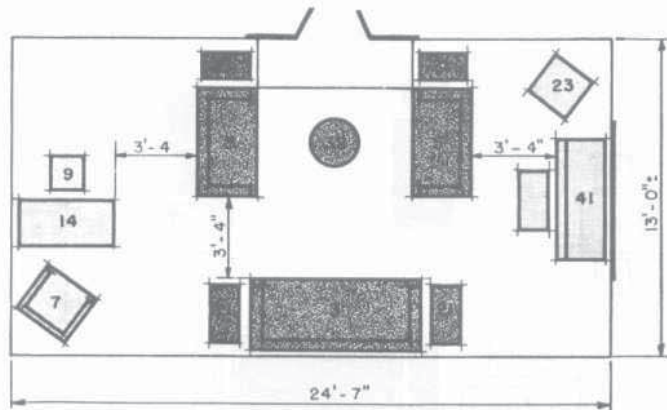
7. Grouping for door locations at both ends of room; ideally, 1-ft clearance is desirable between piano and wall. Chairs (6) are smaller than those previously listed, 2'-6" x 3'-0".



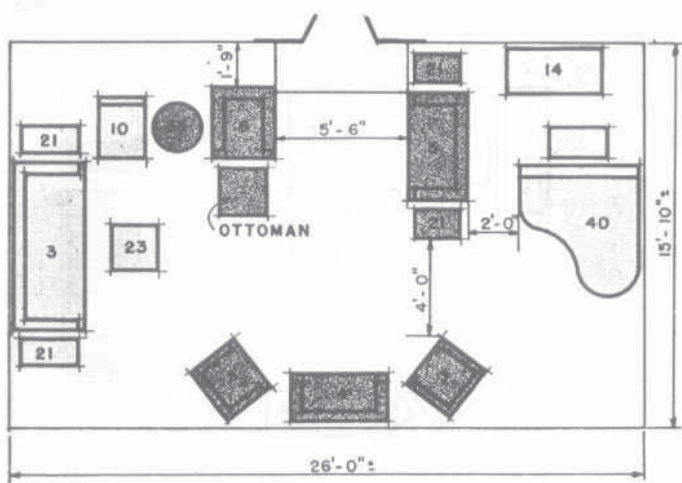
8. If living room has a "dead end" (no doors), primary unit may be spread to include entire end of room. Inclusion of music or game group would demand more area.



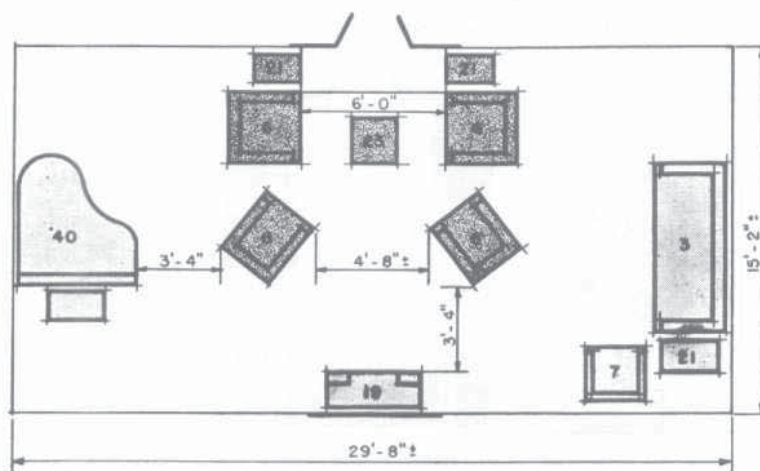
9. Primary group shown is one of most popular arrangements. Unit placing suggests entrance at left end. Secondary conversation unit often becomes music or game group.



10. Writing or study group at left, music or game group at right, and center primary group, need minimum passages only when room is narrow.



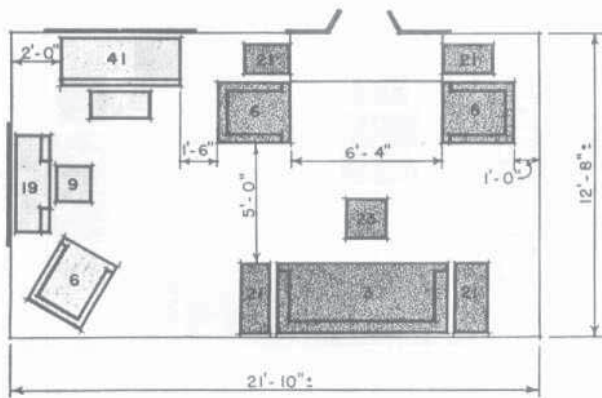
11. Ten persons can be comfortably seated in this type of arrangement, in which primary and secondary conversation groupings almost merge into one.



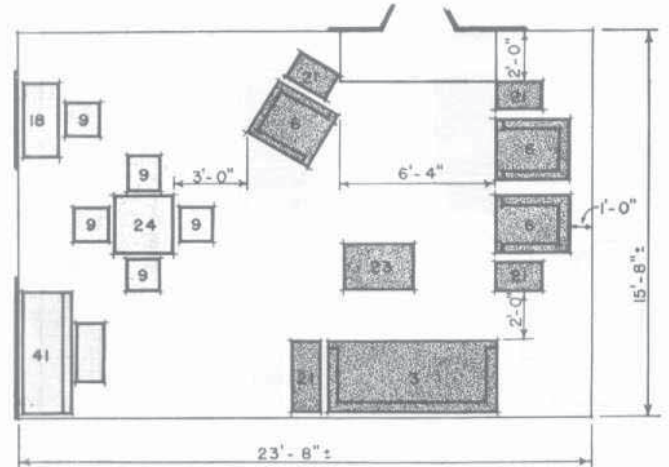
12. Arrangement designed to permit door locations on side walls rather than ends. Angled chairs (6) are small size noted in Fig. 7, and often used in other arrangements.

Residential

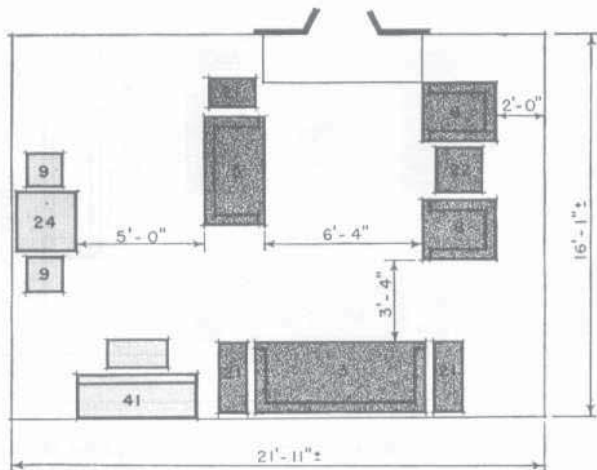
FURNITURE ARRANGEMENTS



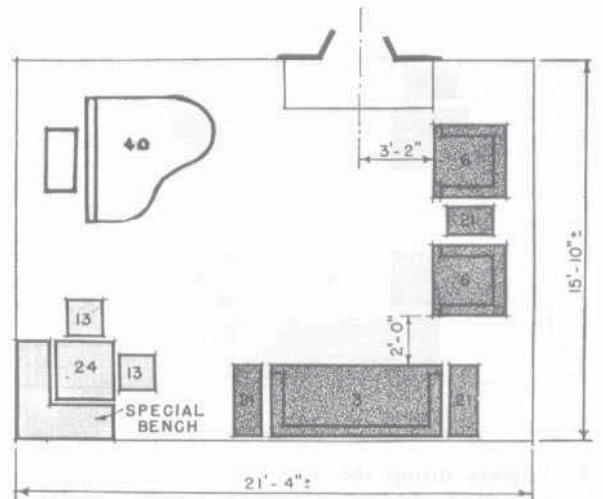
13. Previous diagrams have shown schemes arranged symmetrically about centered fireplaces; on this and the following page are schemes for cases when foci cannot be centered.



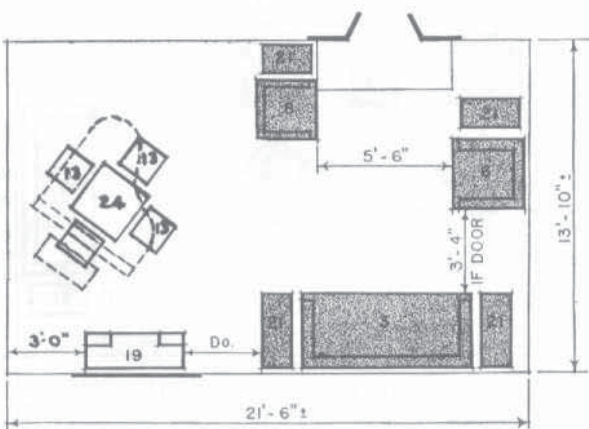
14. Off-center rooms often divide naturally into two parts: primary group, and other groups combined. Clearance no greater than 2' will not accommodate a major traffic lane.



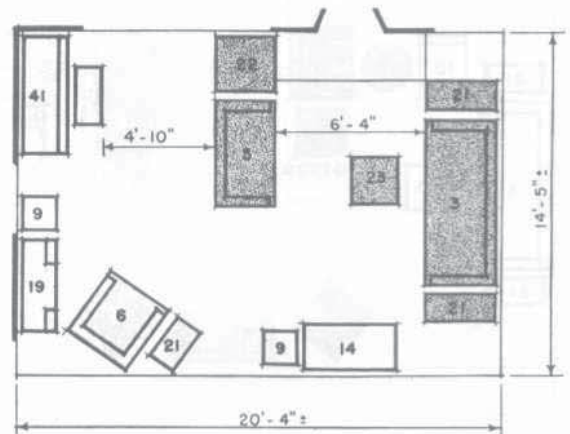
15. If primary, music, and game groups are all to be contained in a small area, one must be curtailed. Here game group consists of table and only two chairs.



16. In this case the primary conversation group is curtailed to permit inclusion of a grand piano; use of corner bench for game group may result in some loss of comfort.

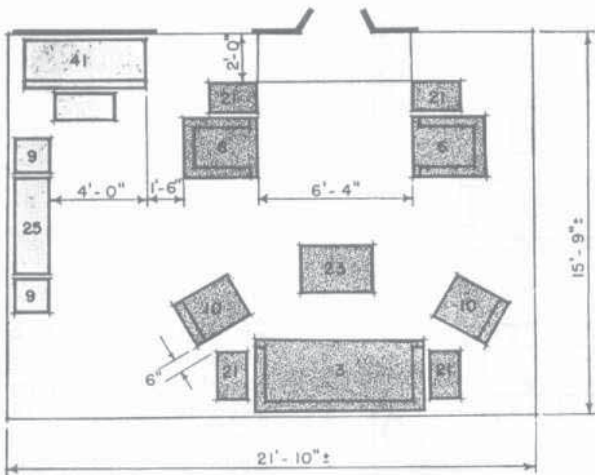


17. Two smaller upholstered chairs (6), each 2'-6" x 3'-0" might be accommodated at the right of the fireplace in this room with only a slight increase in room width.

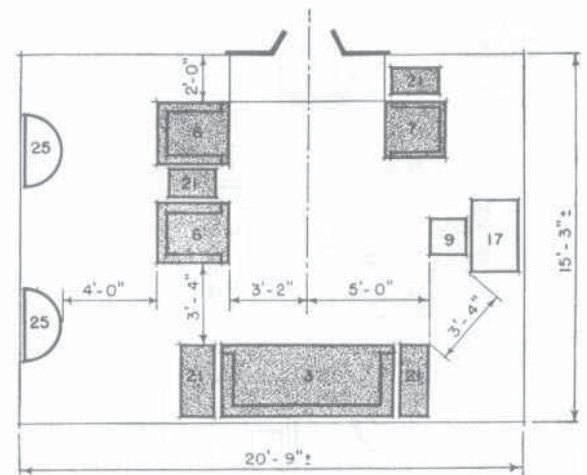


18. In a room with only one door the minimum traffic lane of 3'-4" needs to be increased to at least 4'-10", which will accommodate two persons side by side, without crowding.

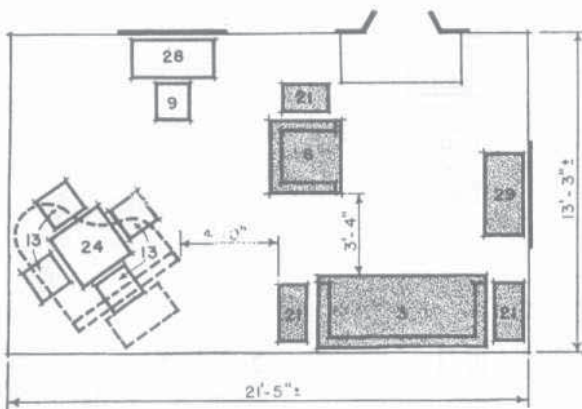
FURNITURE ARRANGEMENTS



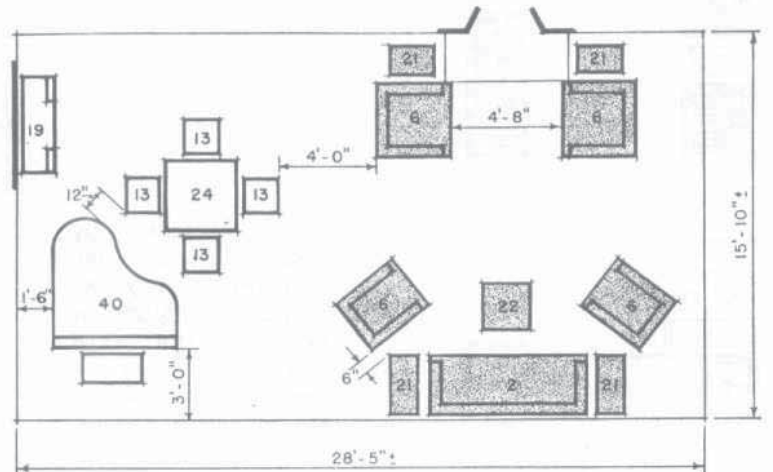
19. Another example of wide entrance lanes. Placement of doors so that at least 10" is allowed between room corners and door trim will permit installation of "built-in" bookcases.



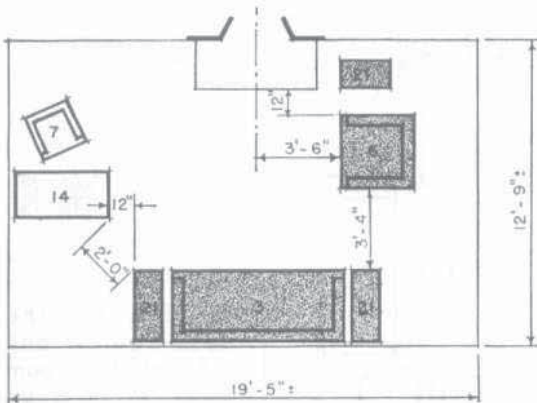
20. Several doors may be accommodated with this type of furniture-group unit arrangement. A traffic lane is assumed to exist at the left end of the room.



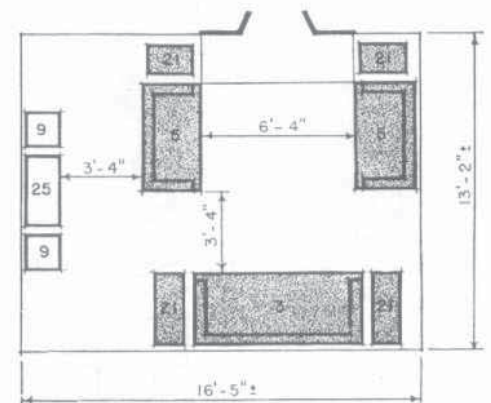
21. Notice that a game-table group occupies almost the same floor area as a baby grand piano. Placement at an angle is intended for informal rooms.



22. Larger rooms may contain four or more furniture-group units; it may be desirable to increase clearances. Use of chairs set at angles requires increased areas.



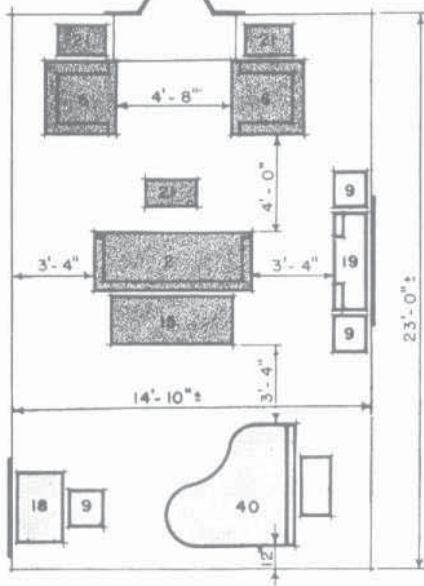
23. Fireplace chairs set 3'-6" back from center line of fireplace permit occupants to gaze at the fire comfortably. General traffic cannot be accommodated in a 2-ft lane.



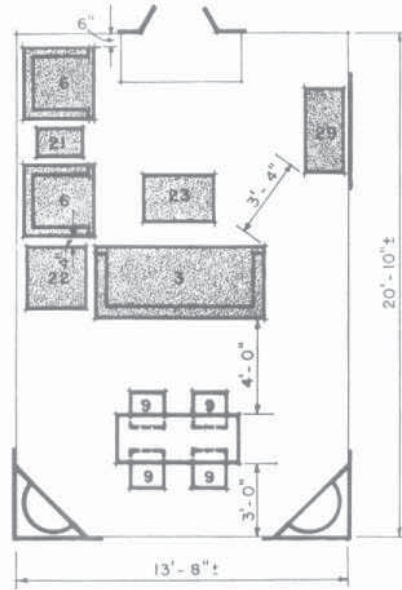
24. By using love seats instead of pairs of chairs at sides of fireplace, considerable space can be saved even though seats are not placed the minimum distance apart.

Residential

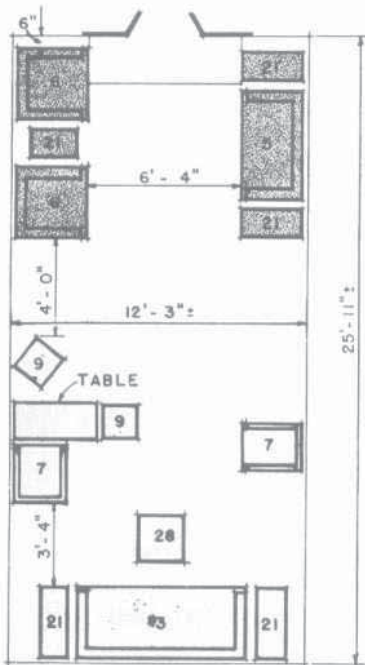
FURNITURE ARRANGEMENTS



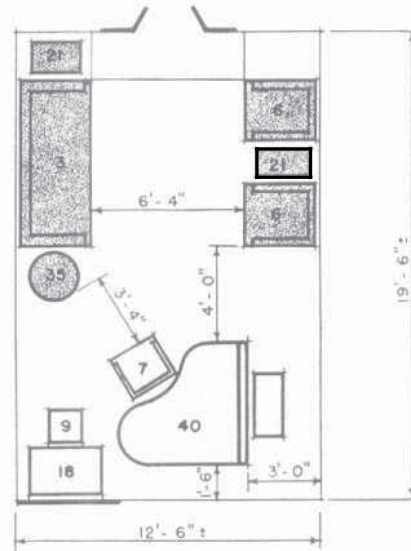
25. In rooms with fireplaces in end walls, as in the schemes immediately preceding, furniture arrangements often fall naturally into two distinct groups.



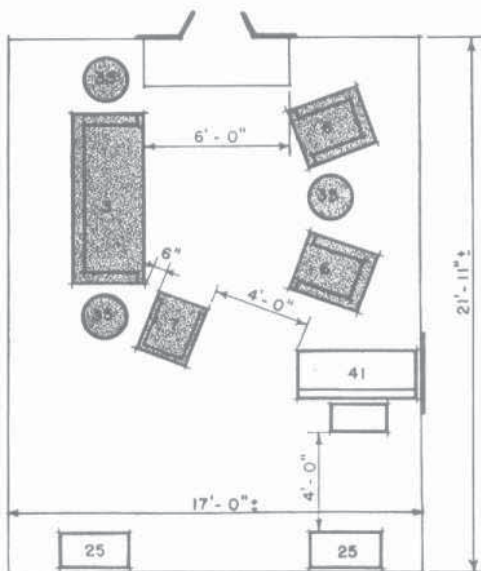
26. One of the two groups may be adapted for dining, eliminating need for a separate dining room. Minimum clearance around dining table should be 3'-0".



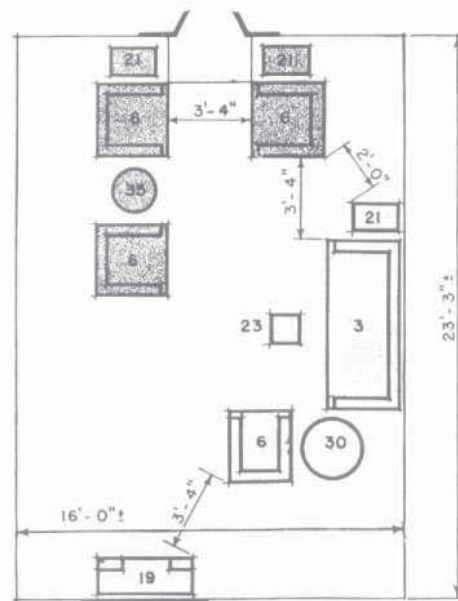
27. In this scheme, by placing the sofa on the long axis opposite the fireplace, furniture is held together as a single unit. There are two obvious positions for an entrance door. It is possible to back the sofa against a group of windows.



28. Backing the primary-group furniture against walls eliminates passage behind them and reduces room width to a minimum.

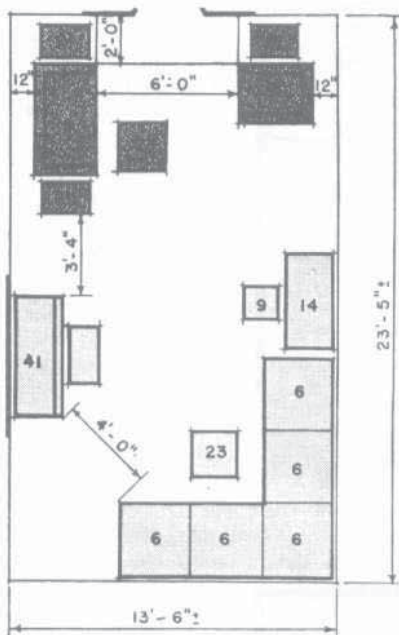


29. Here the left side and end opposite the fireplace are available for doors. Piano should, if possible, be placed against an inside wall.

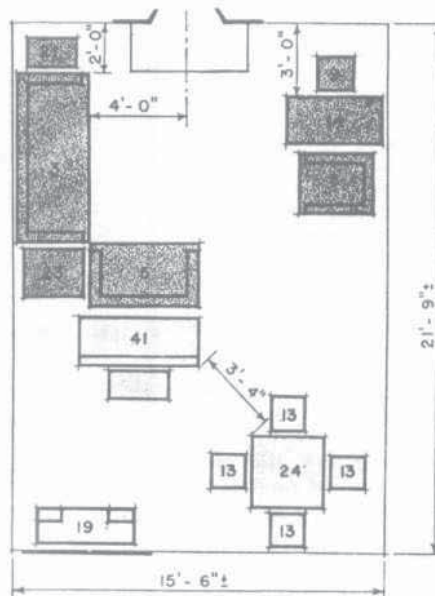


30. Placing the sofa against one side of the room tends to open up the primary group—in effect, to merge with it the secondary conversation-group furniture.

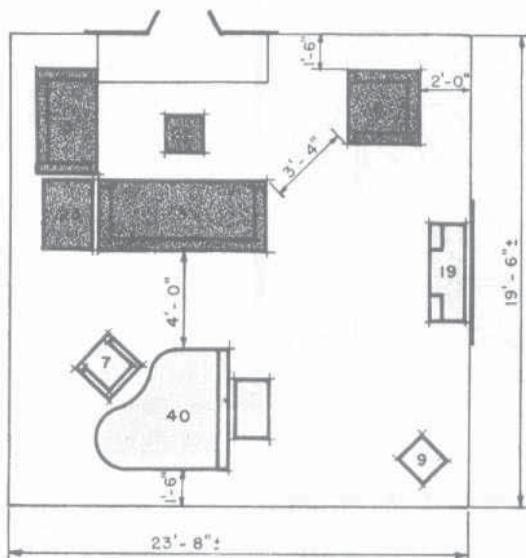
FURNITURE ARRANGEMENTS



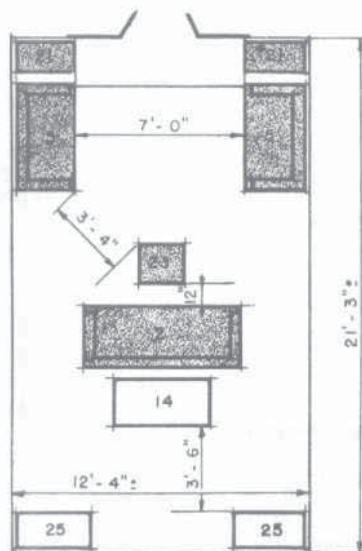
31. The entire area may be treated as a single unit, all furniture being brought into the principal group.



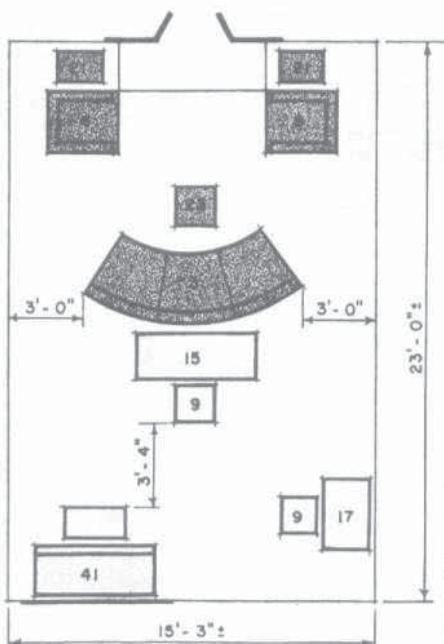
32. Here the placing of the desk group (14) allies it closely with the fire-place unit. Four units are included.



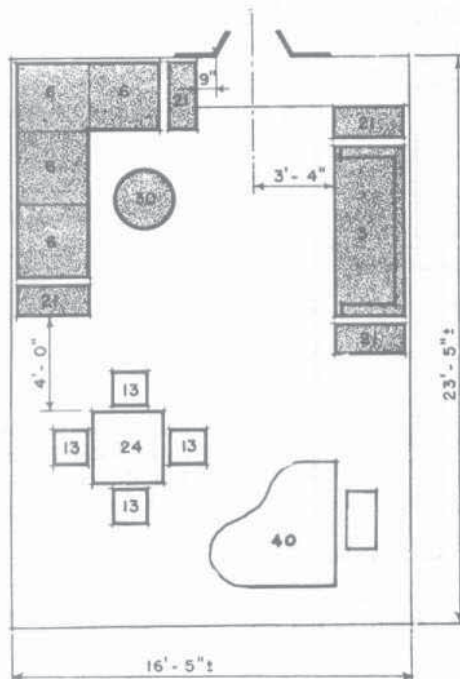
33. By inter-changing the positions of the fireplace furniture in Fig. 32, a grand piano can be accom-mo-dated.



34. Completely symmetrical ar-rang-ement in com-pa-ratively small space; music group might replace items 14 and 25.



35. Type of sofa shown is becoming in-creasingly popu-lar. Chairs (6) may be units which can be added to sofa, if desired.



36. "Unit" types of sofas are particu-larly suited to cor-ner groupings. Scheme shown contains three group units.

Residential

LIVING ROOM—FURNITURE SIZES AND CLEARANCES

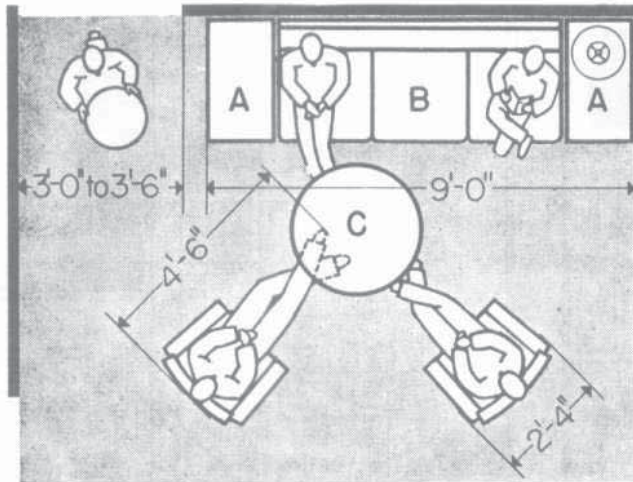
SPACE in the small house for general living activities must often serve a wide variety of functions. Thus, furniture can add greatly to the usefulness of living area if it is adaptable in type and size to a number of different purposes.

Accompanying data give a working basis for providing sufficient space for general living activities. Dimensional information includes only a few of many available sizes and types of furniture. Dimensions of groups refer to clearances necessary for comfortable and convenient use.

Necessary planning considerations include: provision of adequate floor and wall space for furniture groupings; segregation of trafficways from centers of activities; ease of access; and a maximum of flexibility.

Doors in constant use should be placed so that traffic between them will not interfere with furniture groups.

Flexibility implies the varying uses to which space may be put. The lounging group at the right, for instance, requires approximately the same floor space as the card-playing group; the sofa, below, may be a convertible bed. Thus, functions of other areas—such as recreation, sleeping, dining and even storage—may be applicable equally to living rooms.

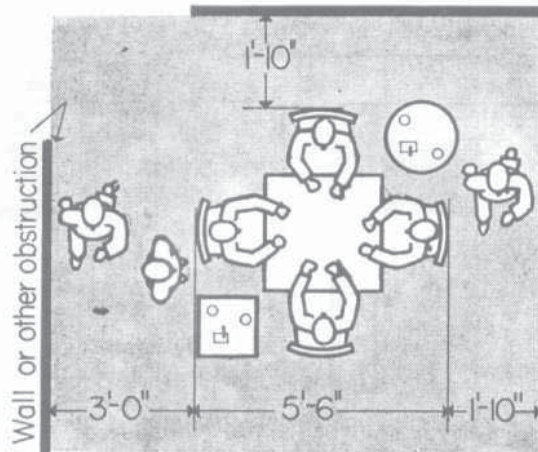


Sofa Sizes (B):
2'-8" to 3'-6" deep
6'-0" to 7'-2" long

Love Seats:
2'-0" to 2'-10" deep
3'-6" to 4'-6" long

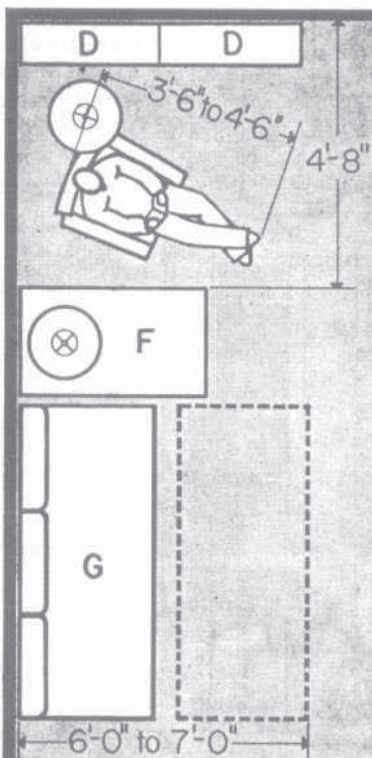
End Tables (A):
10" to 1'-2" wide
1'-6" to 3'-0" long

Occasional Tables (C):
2'-0" to 2'-4" square, round, oval, draw-top, etc.

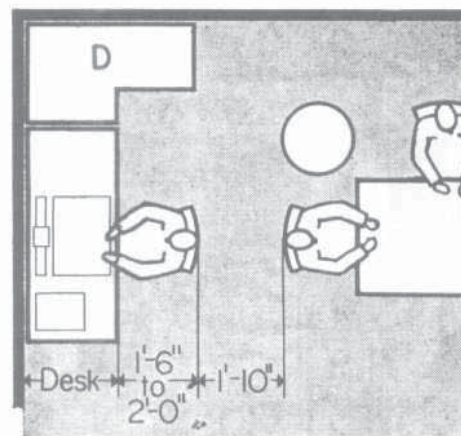


Card Tables:
2'-6" to 3'-0" square; folding type 1 1/2" thick folded (average)

Side Chairs:
1'-6" to 2'-0" wide
1'-6" to 1'-10" deep



Double Bed Studio Couch



Desks, Sloping Top:
3'-0" to 3'-8" wide
1'-6" to 2'-0" deep

Writing Desks:
2'-8" to 3'-6" wide
1'-6" to 2'-6" deep

Secretaries:
3'-0" to 5'-0" wide
1'-6" to 2'-8" deep

Convertible Sofa-Beds (G): 2'-9" to 3'-3" deep, 6'-2" to 6'-8" long

Living Room Tables (F): 1'-8" to 3'-0" wide, 3'-6" to 10'-0" long

Easy Chairs: Wing, 2'-4" to 2'-10" square; Club, 2'-4" to 3'-3", 3'-9" square

Book Cases (D): 2'-6" to 3'-0" wide, 10" to 12" deep

By GLENN H. BEYER AND ALEXANDER KIRA, *Housing Research Center, Cornell University*

DINING ROOM

The principal factors to be considered in planning the dining area are as follows: (1) Number of persons to be seated; (2) Space used at the table; (3) Space for chairs and for passage behind them; (4) Seating arrangement; (5) Size and type of furniture; and (6) Storage space for china, glassware, silver, and linen.

Recommended space dimensions, based on recent research, are provided below.

SIZE OF PLACE SETTING

The minimum width needed for each place setting is 21 in.; however, a width of up to 29 in. is desirable for greater freedom of movement. A 25-in. width is usually adequate; this permits chairs 19 in. wide to be placed 6 in. apart. The minimum depth for a place setting is 14½ in. These dimensions allow space for china, glassware, silver, and elbow extension (See Fig. 1).

PASSAGE BEHIND CHAIRS

The minimum space recommended for passage behind chairs is 22 in.; a satisfactory range is 22 to 25 in. If passage behind the chairs is not required, a minimum of 5 in. plus the depth of the chair must be provided for pushing back the chair when leaving the table (See Fig. 3).

Size of table

The minimum width recommended is 36 in.; a satisfactory width is 36 to 44 in.

If 25-in.-wide place settings are provided and if one person is seated at each end of the table, then minimum and recommended table lengths are as follows:

Persons	Minimum, in.	Recommended, in.
4	54	60
6	79	84
8	104	108
10	129	132
12	154	156

Table 1. Inside dimensions of drawers for storage of silverware

Adapted from Indoor Dining Areas for Rural Homes in the Western Region, Report 118, University of Arizona Agricultural Experiment Station, Tucson (June 1955).

Item	Width, in.	Depth, in.	Height, in.
8 each forks, knives, soup spoons; 12 teaspoons, 6 tablespoons, 4 serving pieces	11	18½	2¾
12 each forks, knives, salad forks or others, butter spreaders, soup spoons; 18 teaspoons, 6 tablespoons, 3-piece carving set, 3 serving pieces	14½	20	3
12 each forks, knives, soup spoons, salad forks or butter spreaders; 24 teaspoons, 6 tablespoons, 6 serving pieces	17	19¾	2¼

Table 2. Dimensions of stacks of folded table linens

Adapted from Storage Space Requirements for Household Textiles, A. Woolrich, M. M. White, and M. A. Richards, Agricultural Research Bulletin 62-2, U.S. Department of Agriculture, Washington, D.C. (1955). Dimensions given are front-to-back, side-to-side, and height.

Item	Space 16 in. deep		Space 20 in. deep	
	Minimum, in.	Maximum, in.	Minimum, in.	Maximum, in.
2 large tablecloths, guest use	14x19x3	14x36x2	19x14x3	19x28x2
2 medium tablecloths, everyday use	15x19x1	13x28x1	19x10x1	18x28x1
4 small tablecloths, everyday use	14x10x3	14x28x1	10x14x3	15x14x2
3 small tablecloths, guest use	14x10x2	14x28x1	10x14x2	15x14x2
12 small napkins (2 stacks of 6)	7x10x3	7x10x3	10x 5x3	10x 9x2
12 large napkins (2 stacks of 6)	8x10x2	8x10x2	10x 6x2	10x10x1
6 place mats, everyday use	13x19x1	13x19x1	19x13x1	19x13x1
1 table pad	13x21x3	13x21x3	13x21x3	13x21x3

If no one is seated at either end of the table, the length may be reduced by approximately 4 in.

Space for total dining area

With the same conditions noted above and with an ample 42-in. space for passage on all sides of a 42-in.-wide table, required sizes are as follows:

Persons	W × L ft	= Area sq ft
4	10½ × 12	= 126
6	10½ × 14	= 147
8	10½ × 16	= 168
10	10½ × 18	= 189
12	10½ × 20	= 210

If no one is to be seated at either end of the table, the length may be reduced by 2 ft (21 sq ft).

Storage space

Linear feet of shelf space required for medium-income families, for both moderate and liberal supplies of dishes and glassware, for everyday and guest use, is as follows:

	12-in. shelves, ft-in.	20-in. shelves, ft
Moderate	21-0	2
Liberal	36-9	2

Drawer space for storage of silver is shown in Table 1. Space for storage of table linens is shown in Table 2.



Fig. 1. Size of place setting

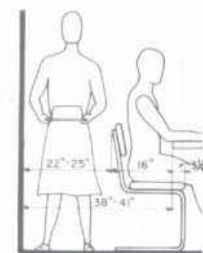


Fig. 2. Passage behind chairs

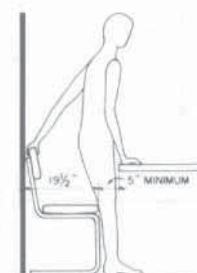


Fig. 3. Leaving the table

Residential

DINING AREAS

DINING AREAS must accommodate furniture—either portable or built-in—for eating, sitting, serving and possible storage. Equipment for these dining functions may also be adapted to meet other possible requirements for this space—as studying, game-playing, etc.

Table space requirements per person are as follows: for crowded seating, 1'-10" on the table's perimeter; for comfort, 2'-0". Adequate clearances for use are indicated on diagrams.

Furniture Sizes:

Portable Tables, round (A):
2'-7" to 5'-10" diam.

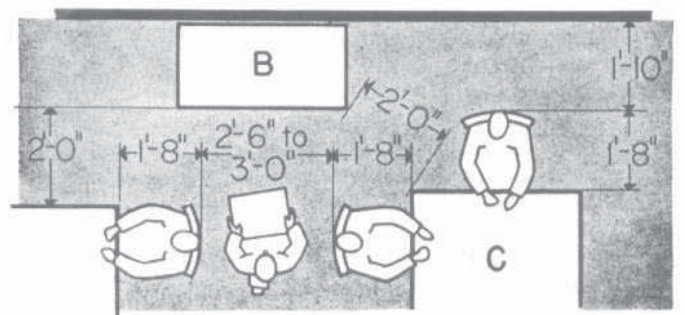
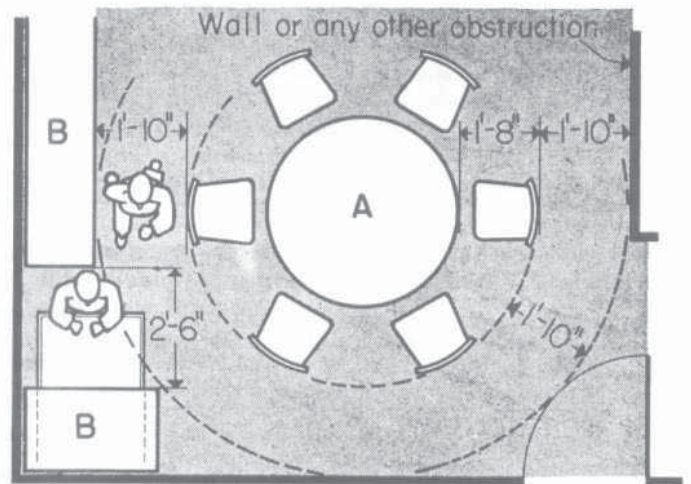
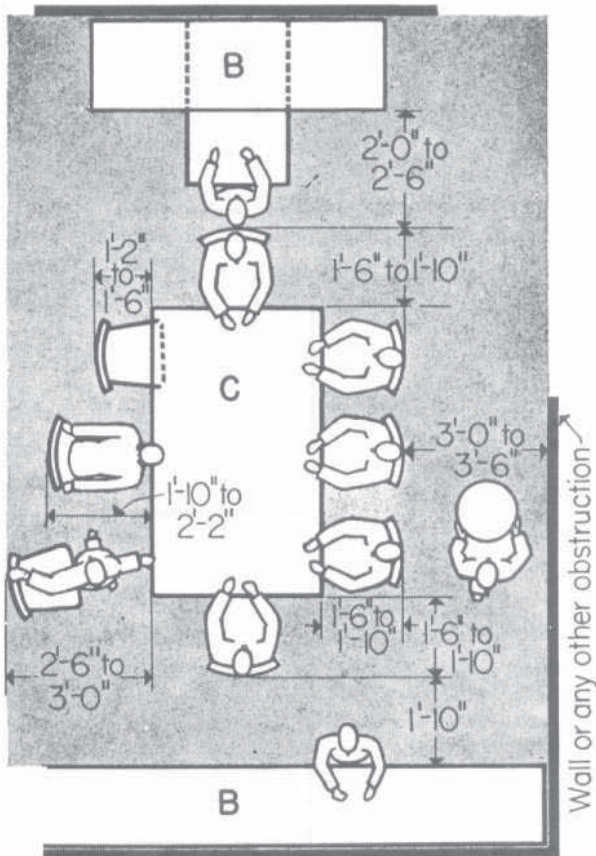
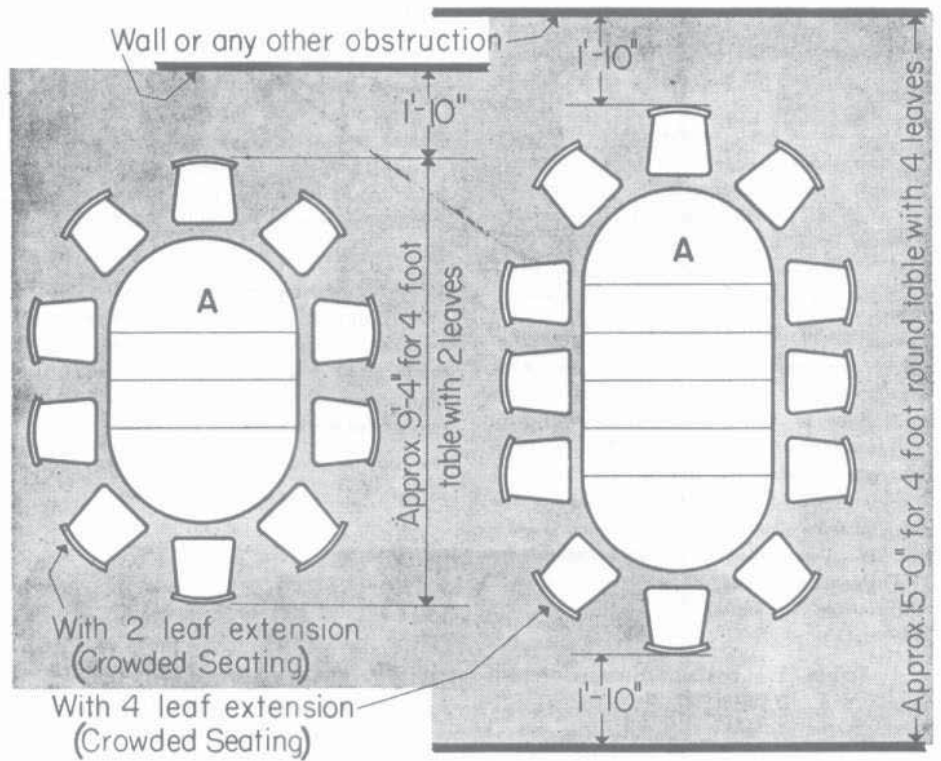
Portable Tables, rectangular (C):
2'-6" to 4'-0" by 3'-6" to 8'-0";
or 2'-0" to 4'-0" square

Dining Chairs, portable:
1'-6" to 2'-0" by 1'-6" to 1'-10"

Serving Table (B):
2'-6" to 3'-6" by 1'-2" to 1'-9"

Sideboard or Buffet (B):
4'-0" to 6'-6" by 1'-5" to 2'-1"

China Cabinet (B):
2'-8" to 3'-8" by 1'-2" to 1'-9"



Furniture Clearances

To assure adequate space for convenient use of the dining area, not less than the following clearances from the edge of the dining table should be observed.

- 32 in for chairs plus access thereto
- 38 in for chairs plus access and passage
- 42 in for serving from behind chair
- 24 in for passage only
- 48 in from table to base cabinet (in dining-kitchen)

Figures 4, 5, and 6 illustrate proper clearances. Various arrangements appear on the next page.

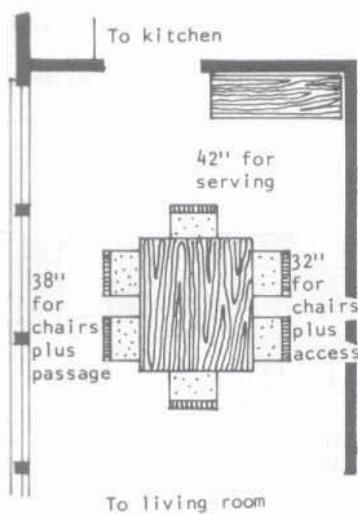


Fig. 4 Dining room for 6-person, 3-bedroom living unit.*

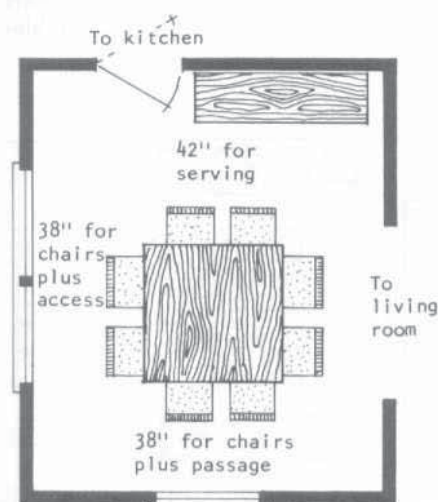
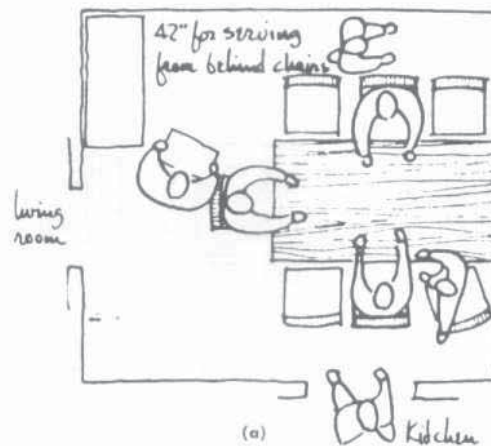


Fig. 5 Dining room for 8-person, 4-bedroom living unit.*

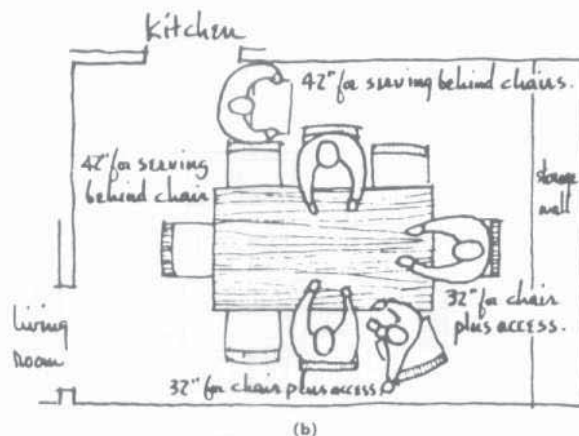
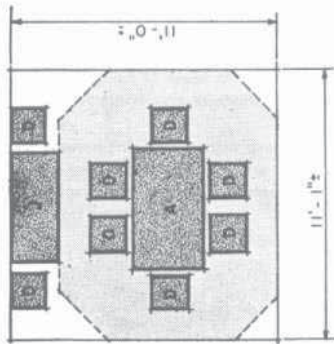


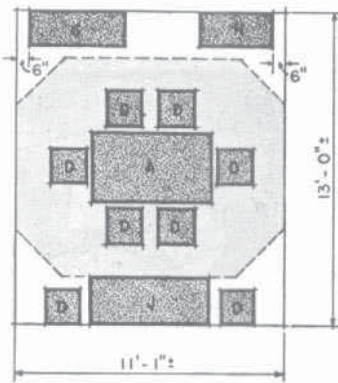
Fig. 6 Minimum clearances for dining areas. (a) one end of table against wall; (b) serving from one end and one side of table. Source: "Housing for the Elderly Development Process," Michigan State Housing Development Authority, 1974.

* From "Manual of Acceptable Practices," Vol. 4, U.S. Department of Housing and Urban Development, 1973.

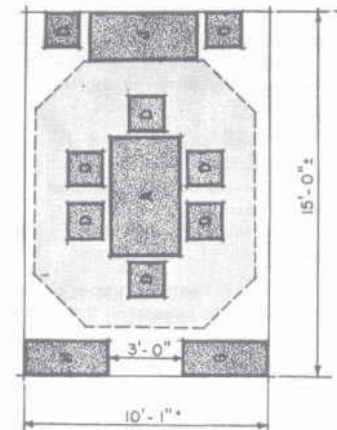
DINING AREAS



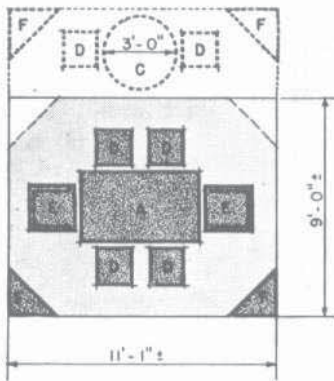
1. Minimum requires 2-ft buffet space on one side only; 3' more length is needed for extension table.



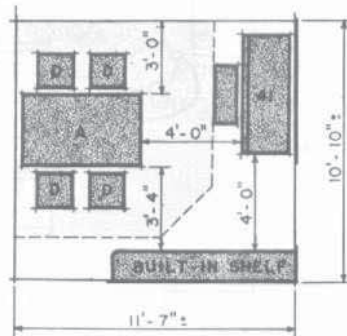
2. Typical dining-room suite, as used in East and on West Coast, requires furniture space on two sides of room.



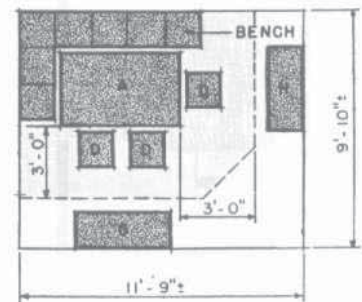
3. Long narrow area with some waste space results when wall pieces are at ends, and end entrance is needed.



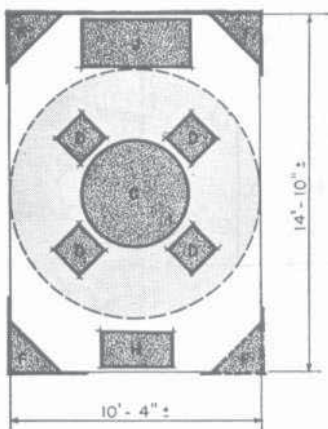
4. Solid lines indicate minimum room with corner cupboards, no wall furniture. Dotted lines indicate added space for 3' breakfast table.



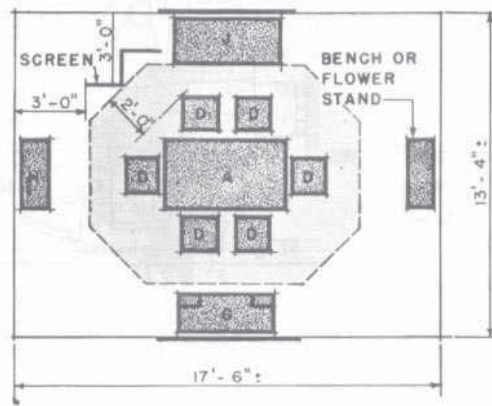
5. Table-and-passage unit in one corner permits use of minimum space for multiple activities; piano may be replaced by desk, love seat, etc.



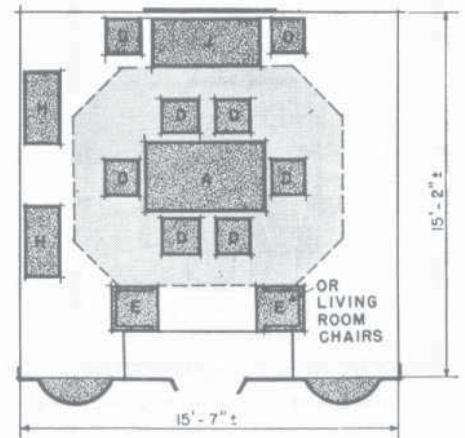
6. Spaces smaller than the usual minimum can be utilized if built-in seats are included; seating and table-service comfort are sacrificed.



7. The same set of clearances applies to the seldom used round table as to the more popular oblong table.

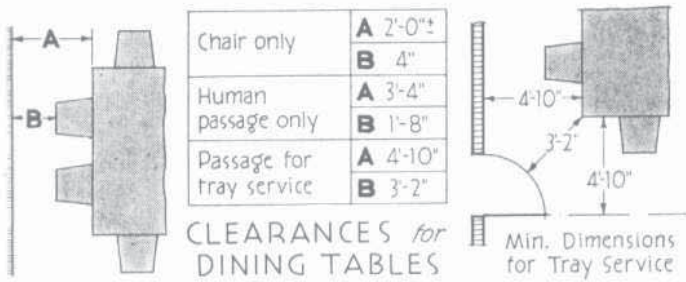


8. Arrangement of typical suite in larger-than-minimum space, when a screen is used at serving door.



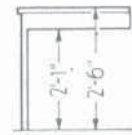
9. Dining rooms with fireplaces have to be larger than minimum for the comfort of those seated at table.

DINING AREAS



DINING ROOM TABLES
Allow 2 lineal feet per person

2, 2½, 3, 4 Feet square	Varies 2'-7" to 5'-10"	W 2'-6" to 4'-0" L 3'-6" to 8'-0"

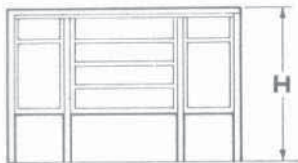


MINIMUM KNEE CLEARANCE DINING TABLES



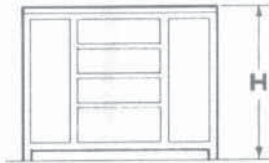
DINING ROOM CHAIRS

H 2'-10" to 3'-3"
W 1'-6" to 2'-0"
D 1'-6" to 1'-10"



BUFFET

H 2'-9" to 3'-3"
L 4'-10" to 6'-6"
D 1'-5" to 2'-1"

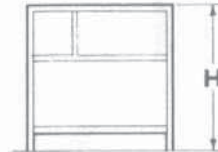


SIDEBOARD

H 2'-9" to 3'-2"
L 4'-0" to 5'-0"
D 1'-8" or 1'-9"

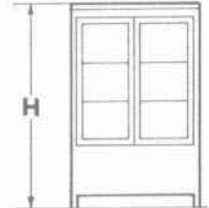


CORNER CUPBOARD



SERVING TABLE

H 2'-6" to 3'-0"
L 2'-6" to 3'-6"
D 1'-2" to 1'-9"



CHINA CABINET

H 4'-2" to 6'-2"
W 2'-8" to 3'-8"
D 1'-2" to 1'-9"

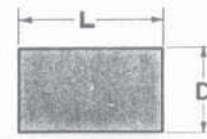
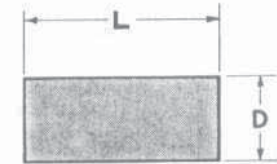
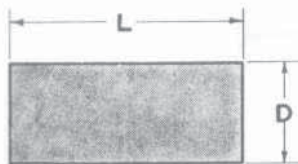


Table for two
2'-6" x 2'-6"

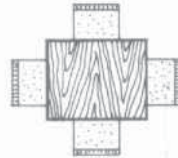


Table for four
2'-6" x 3'-2"

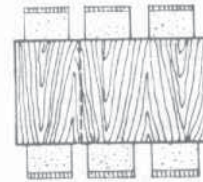


Table for six
3'-4" x 6'-0"

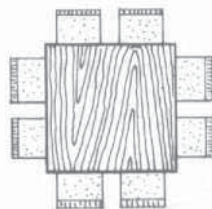


Table for eight = 3'-4" x 4'-0"

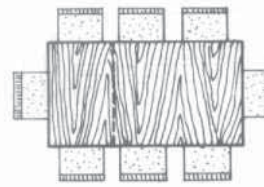


Table for eight = 3'-4" x 6'-0" or 4'-0" x 4'-0"

Fig. 7 Dining room furniture. Source: "Manual of Acceptable Practices," Vol. 4, U.S. Dept. of Housing and Urban Development, 1973.

COMBINED LIVING-DINING SPACES

COMBINED SPACES

Often several compatible living functions can be combined advantageously in a single room. Some of the benefits of such arrangements are that less space is used but it is used more intensively, its functions can be changed making it more flexible and serviceable space, it is adaptable to varied furniture arrangements, while visually it can be made more interesting and seem more gener-

ous than if the same functions were dispersed into separate rooms.

For adjacent spaces to be considered a combined room, the clear opening between them should permit common use of the spaces. This usually necessitates an opening of at least 8 ft. Figures 8 and 9 show combined living-dining rooms.

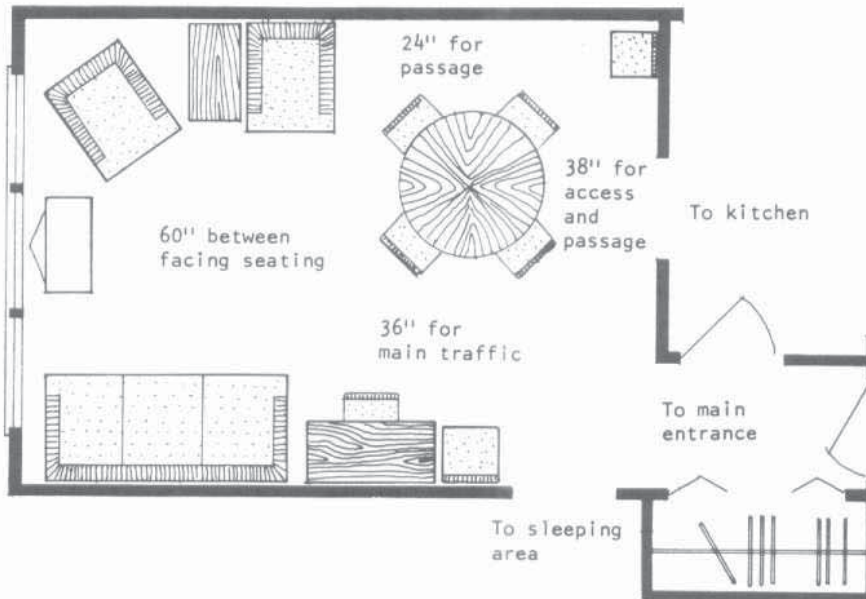


Fig. 8 Combined living-dining room.*

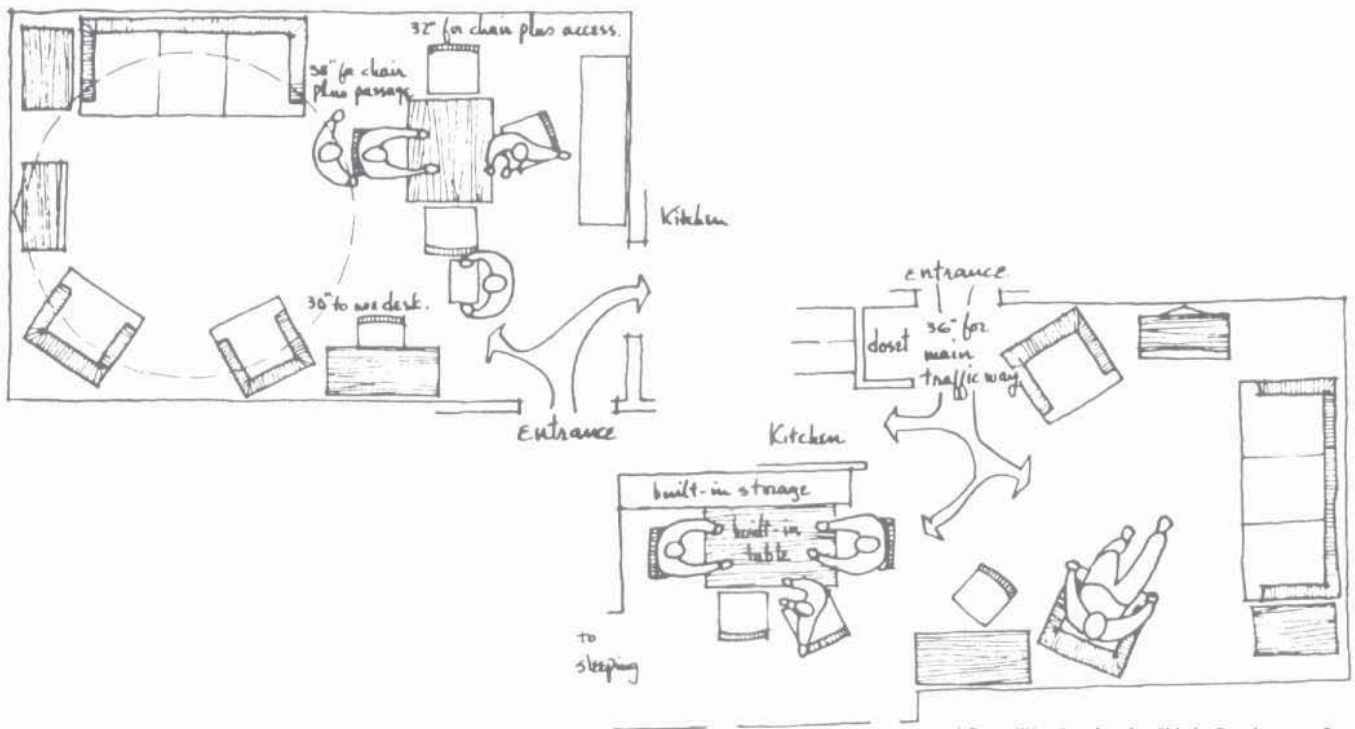


Fig. 9 Minimum clearances and circulation for combined living-dining areas.*

* From "Housing for the Elderly Development Process," Michigan State Housing Development Authority, 1974.

COMBINED DINING AREA-KITCHEN

A combination dining area-kitchen is preferred by some occupants of small houses and apartments. This arrangement minimizes housekeeping

chores and provides space which can be used as the family's day-to-day meeting place.

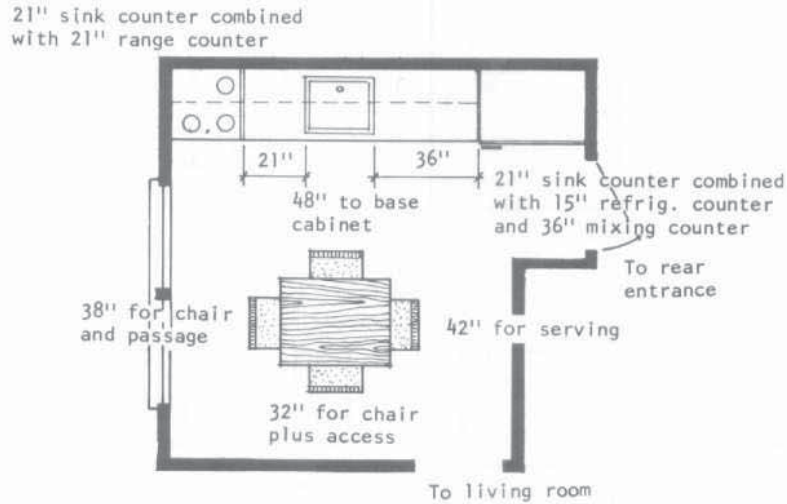


Fig. 10 Combined dining area-kitchen, 2-bedroom living unit. Source: "Manual of Acceptable Practices," Vol. 4, U.S. Dept. of Housing and Urban Development, 1973.

One of the primary functions of the kitchen has been to provide a place for informal or family eating. This is different than guest or formal dining in a separate dining room or area. The informal dining generally consists of breakfast, lunch,

snacks, or just serving coffee to a neighbor. This eating area should be clearly defined as a separate functional area.

A frequent and desirable arrangement is the combined kitchen-dining area. The following

sketches (Fig. 11) show the various possible arrangements. Another arrangement is the kitchen-family room.

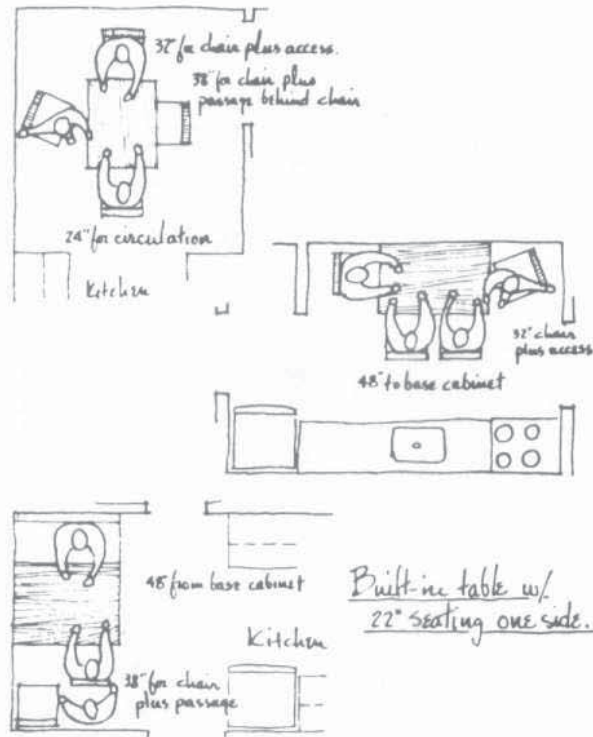
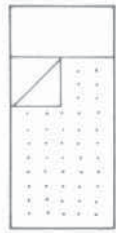


Fig. 11 Minimum clearances for dining area in kitchen. Source: "Housing for the Elderly Development Process," Michigan State Housing Development Authority, 1974.

**Residential
BEDROOMS**

BEDS



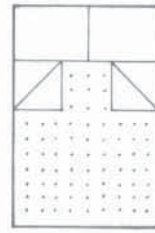
Single bed
3'-0" x 6'-10"



Twin bed
3'-3" x 6'-10"

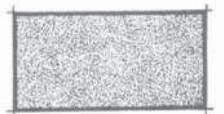


Three-quarter
4'-0" x 6'-10"



Double bed
4'-6" x 6'-10"

CHESTS



CHEST
4'-0" x 2'-0"

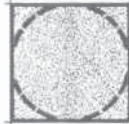
TABLES



KIDNEY
3'-0" x 1'-6"



LARGE DRESSING
4'-0" x 2'-0"



SMALL OCCASIONAL
2'-6" x 2'-6"



SMALL NIGHT
1'-2" x 1'-6"



MEDIUM NIGHT
1'-6" x 1'-6"



SMALL CHEST
3'-0" x 1'-6"

CHAIRS



Easy chair
2'-6" x 3'-0"



Chair
1'-6" x 1'-6"



SIDE
1'-6" x 1'-6"



BENCH
2'-0" x 1'-6"



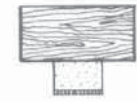
DRESS'G TABLE
1'-6" x 1'-6"



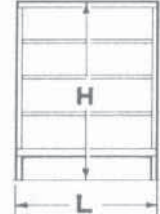
Dresser
1'-6" x 3'-6"
or
1'-6" x 4'-4"



End table
1'-6" x 2'-6"

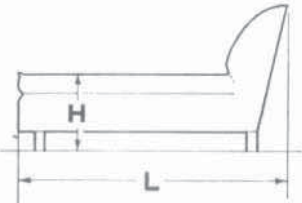


Desk 1'-8" x 3'-6"
with chair



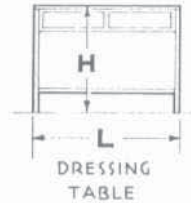
CHEST OF DRAWERS

H 3'-5" to 4'-8"
L 2'-8" to 3'-4"
D 1'-6" to 1'-10"



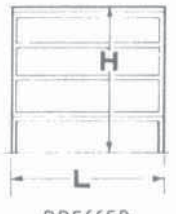
CHAISE LONGUE

H 1'-4" to 1'-7"
L 4'-0" to 5'-6"
D 2'-0" to 2'-4"



DRESSING TABLE

H 2'-2" to 2'-6"
L 3'-0" to 4'-2"
D 1'-3" to 1'-10"



DRESSER



H 2'-8" to 3'-1"
L 3'-0" to 4'-0"
D 1'-6" to 1'-10"



Crib
2'-6" x 4'-6"

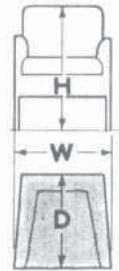


Television set
1'-4" x 2'-8"



NIGHT TABLE

H 1'-9" to 2'-6"
W 1'-2" to 2'-0"
D 1'-0" to 2'-0"



BOUDOIR CHAIR

H 2'-8" to 3'-4"
W 2'-6" to 2'-10"
D 2'-8" to 3'-2"

Fig. 1 Typical average furniture sizes.

BEDROOM

DIAGRAMS indicate minimum clearances that should be provided for use of the bedroom furniture shown, dimensions for which are listed below. Many types and sizes of furniture are available; but those listed are most common and can serve as a basis for bedroom design. At least 2 in should be allowed as clearance between walls and furniture; 3 in between furniture units.

Beds:

Single (C), 3'-0" to 3'-3" wide; 6'-10" long.
Twin (F), 3'-3" wide; 6'-10" long.
Three-quarter (E), 4'-0" wide; 6'-10" long
Three-quarter (B), large, 4'-2" to 4'-6" wide; 6'-10" long
Double, 4'-6" wide; 6'-10" long.
Roll-away beds, (A): 2'-0" by 5'-0" on edge, 3" clearance on all sides

Bed Tables (G):

1'-2" to 2'-0" by 1'-0" to 2'-0"

Bedroom Chairs (H):

Small, 1'-8" by 1'-8"; larger, 2'-6" to 2'-10" by 2'-8" to 3'-2"

Dressers (3-drawer) (D):

3'-0" to 4'-0" by 1'-6" to 1'-10"

Chest of Drawers (4-drawer) (D):

2'-8" to 3'-4" by 1'-6" to 1'-10"

Chaise Longue:

2'-0" to 2'-4" by 4'-0" to 5'-6"

Day Bed:

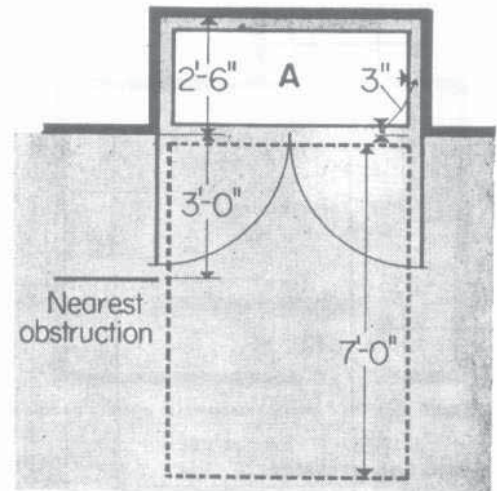
2'-9" to 3'-3" by 6'-2" to 6'-8"

Dressing Table:

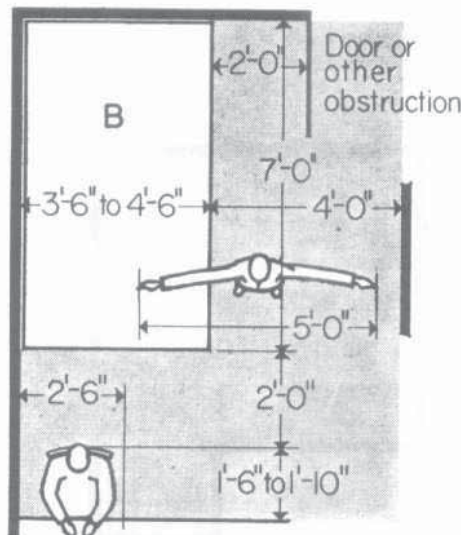
1'-3" to 1'-10" by 3'-0" to 4'-2"



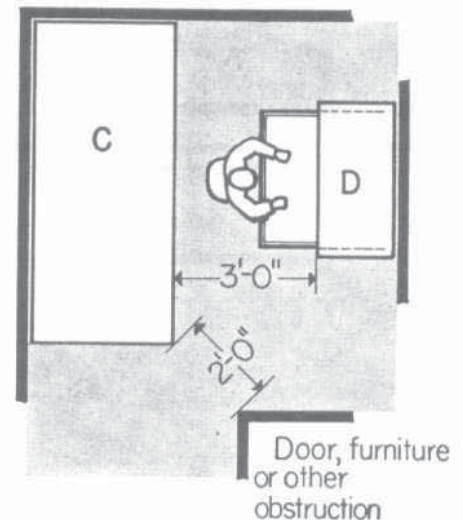
Double-deck bed



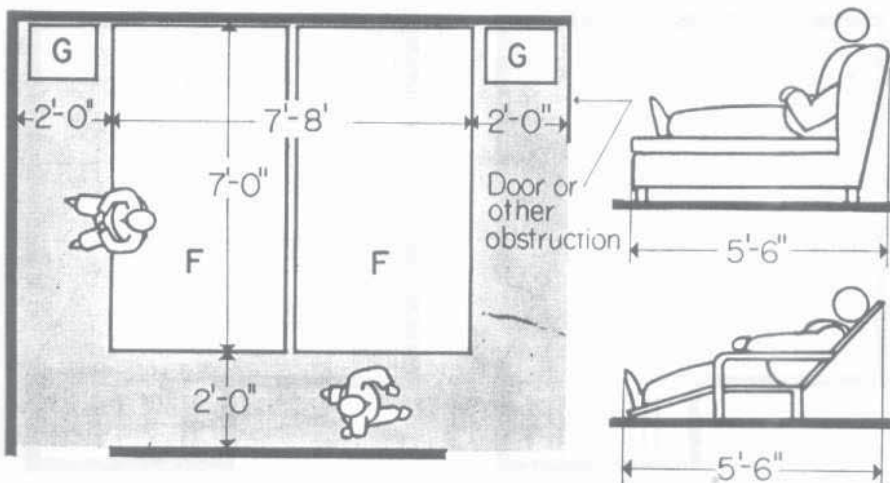
Roll-away bed



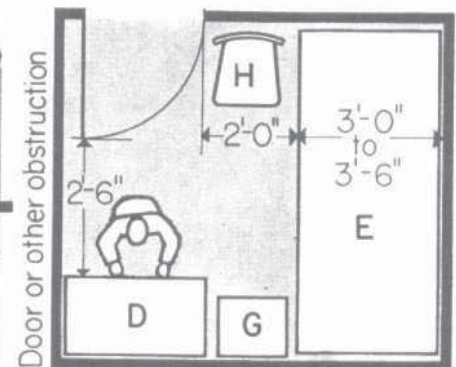
Large three-quarter bed



Clearance for dresser



Minimum clearances for twin-bed group



Minimum clearances for single bed and dresser group

Residential
BEDROOMS

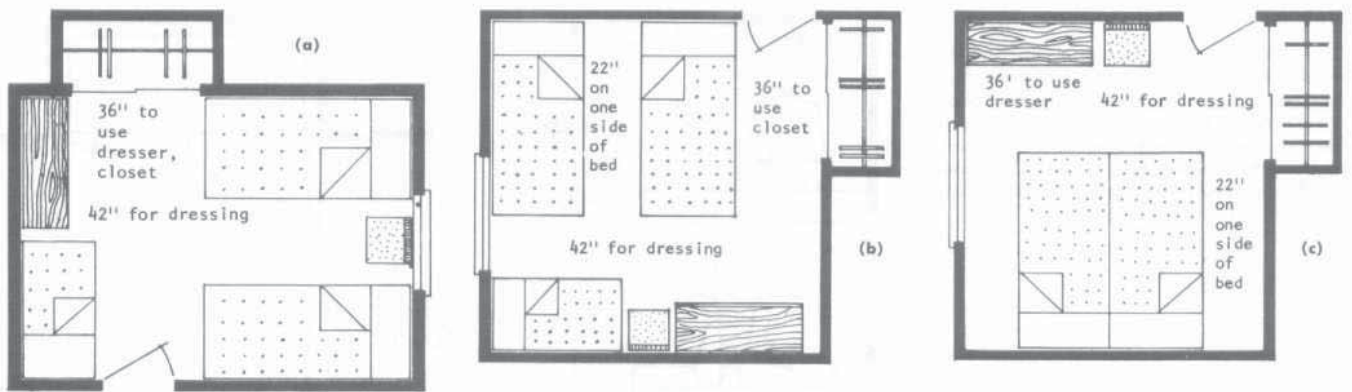


Fig. 2 (a), (b) Primary bedroom, (c) primary bedroom without crib.*

FURNITURE CLEARANCES

To assure adequate space for convenient use of furniture in the bedroom, not less than the following clearances should be observed (Figs. 2 and 3).

- 42 in at one side or foot of bed for dressing
- 6 in between side of bed and side of dresser or chest

36 in in front of dresser, closet, and chest of drawers

24 in for major circulation path (door to closet, etc.)

22 in on one side of bed for circulation
12 in on least used side of double bed. The least-used side of a single or twin bed can

be placed against the wall except in bedrooms for the elderly (Fig. 4).

* From "Manual of Acceptable Practices," Vol. 4, U.S. Department of Housing and Urban Development, 1973.

FURNITURE ARRANGEMENTS

The location of doors and windows should permit alternate furniture arrangements.

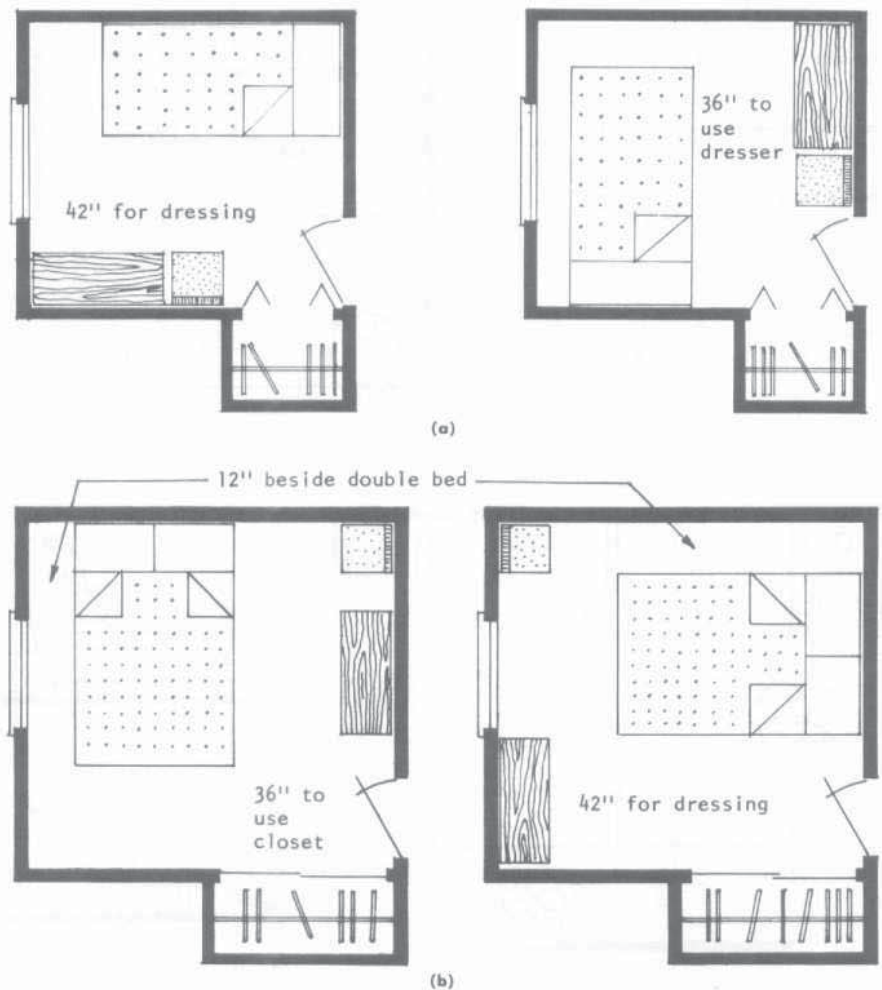


Fig. 3 (a) Single-occupancy bedroom; (b) double-occupancy bedroom.*

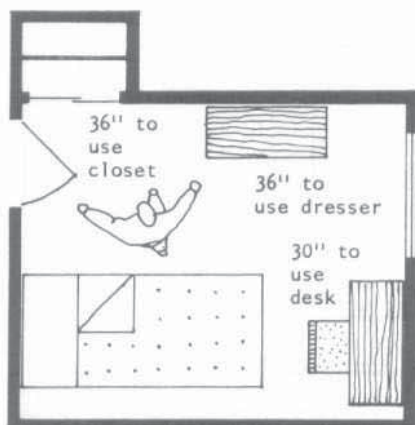


Fig. 4 Single-occupancy bedroom for elderly; there is a 12-in allowance to make the bed.*

Where at least two other sleeping spaces are provided, a dormitory is sometimes preferred by larger families (Fig. 5).*

* From "Manual of Acceptable Practices," Vol. 4, U.S. Department of Housing and Urban Development, 1973.

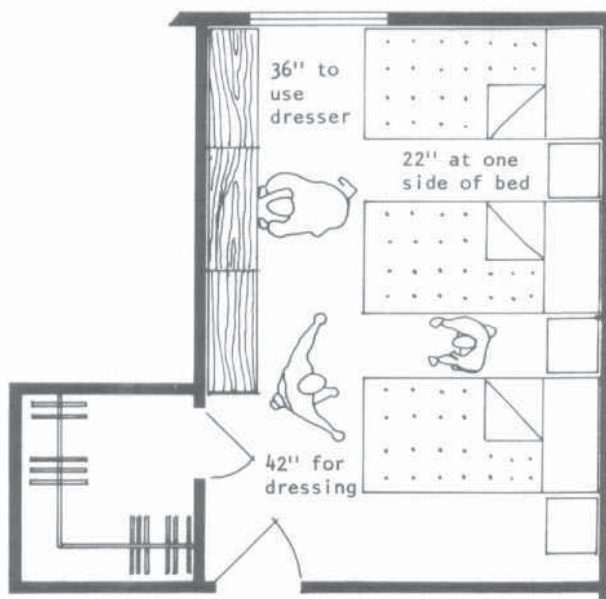
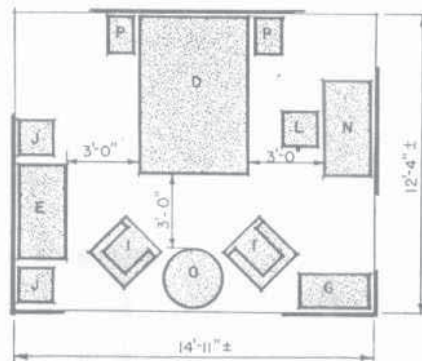
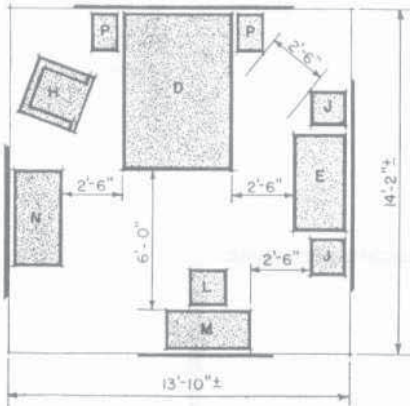


Fig. 5 Dormitory bedroom.

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BEDROOMS

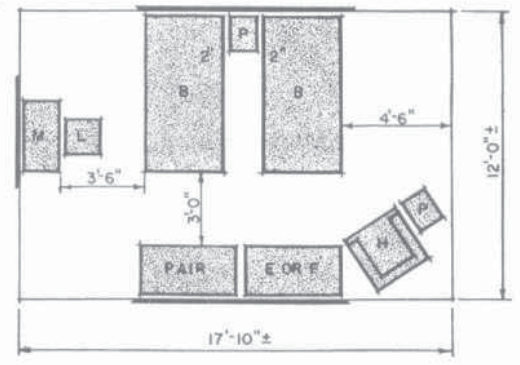
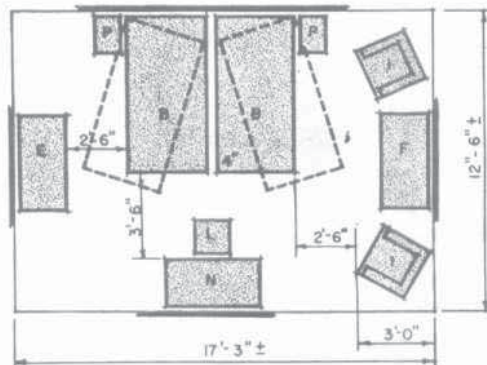
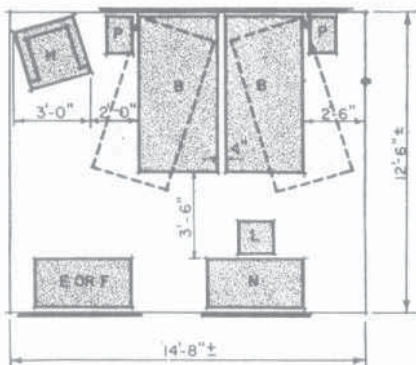
TYPICAL UNIT ARRANGEMENTS



1. For comfort, 2 night tables are desirable with a double bed. A minimum double-bed unit arrangement may be achieved by omitting arm chair and one side chair, and reducing to 3'-6" the traffic lane at foot of bed.

2. Use of small chairs and chest makes possible the addition of conversation or lounging furniture (2 chairs and table) to a typical suite, without increasing square footage. Use of 3-ft passages eliminates crowding.

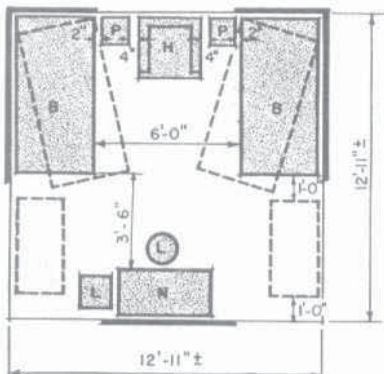
3. Other types of arrangements beyond the minimum include addition of a chaise longue (shown dotted above), which is usually placed at an angle to walls, requires a table, and necessitates ample passages.



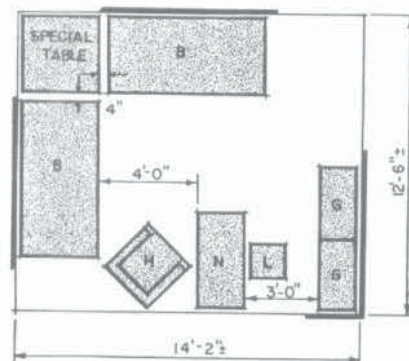
4. Minimum twin-bed group (2 night tables) needs 9'-6" wall.

5. Increased requirements for addition of dressing table and boudoir chair.

6. Twin beds with single night table require 8' of wall space.

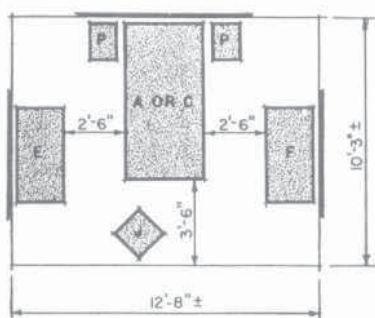


7. Variations on this plan may be developed by replacing the chair between the beds with a dressing table which serves also as a night table. This would free other walls for twin chests, shown dotted.

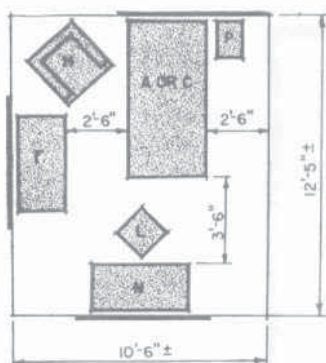


8. Twin beds heading toward a common corner may require less space than is indicated if dressing table and boudoir chair are omitted.

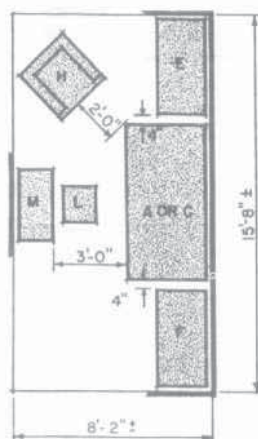
COMBINED LIVING-SLEEPING AREAS



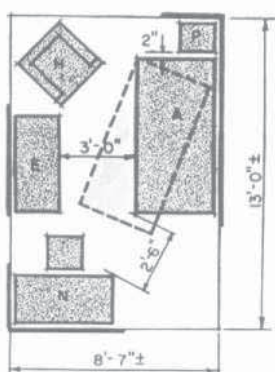
9. Single-bed unit with two night tables requires 6'-6" wall.



10. Minimum dimensions for passage both sides of bed.



11. Unusual but satisfactory arrangement or long, narrow space; if units E and F are reduced 2'-0" in length, room length may be decreased 2'-0".



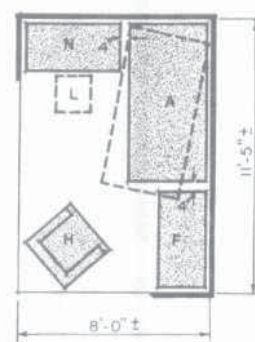
12. Minimum for couch or single bed placed sideways to wall.



13. If position of chest is changed room width may be reduced 6".



14. Door-swings may require increased clearance at foot of bed.



15. Slightly more comfortable than Fig. 14, but bed making is difficult.

COMBINED SPACES

A bed alcove with natural light and ventilation and which can be screened from the living area is desirable in a 0-bedroom living unit (Figs. 1 and 2).

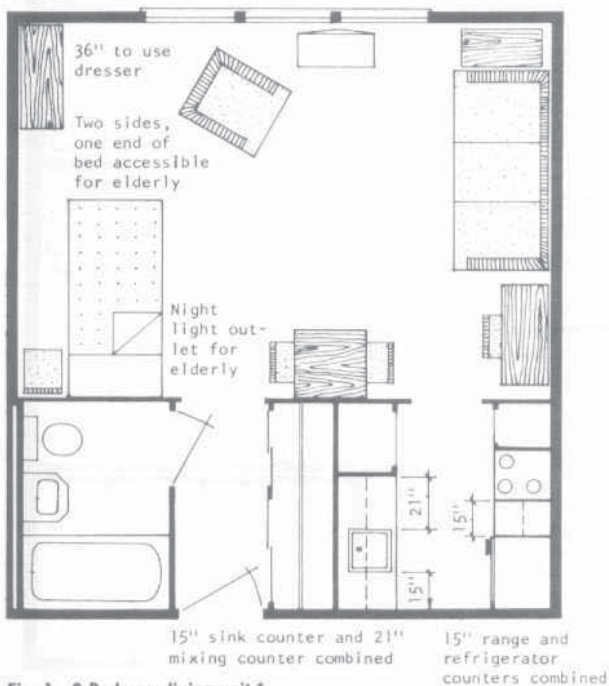


Fig. 1 0-Bedroom living unit.*

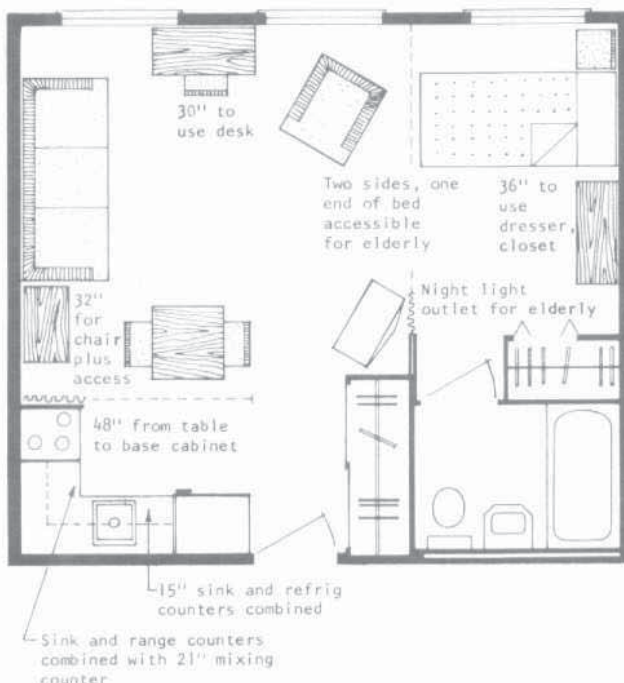
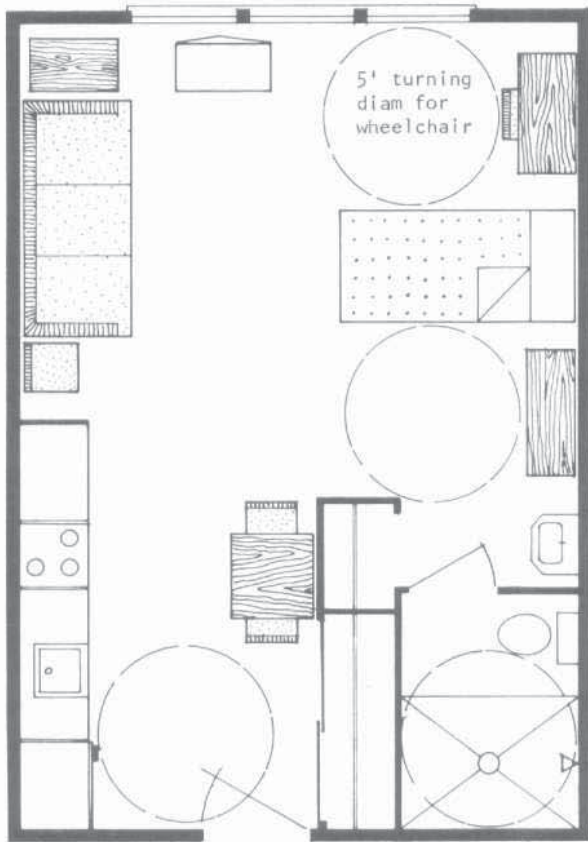


Fig. 2 0-bedroom living unit with sleeping alcove.*

* From "Manual of Acceptable Practices," Vol. 4, U.S. Department of Housing and Urban Development, 1973.

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COMBINED LIVING-SLEEPING AREAS



In housing for the elderly and handicapped, the units suitable for wheelchair users often can be placed advantageously on the ground floor (Fig. 3).

Night light outlet

Fig. 3 0-Bedroom living unit for wheelchair user.*

Omission of an easy chair is acceptable to give more space for occupant's wheelchair (Fig. 4).

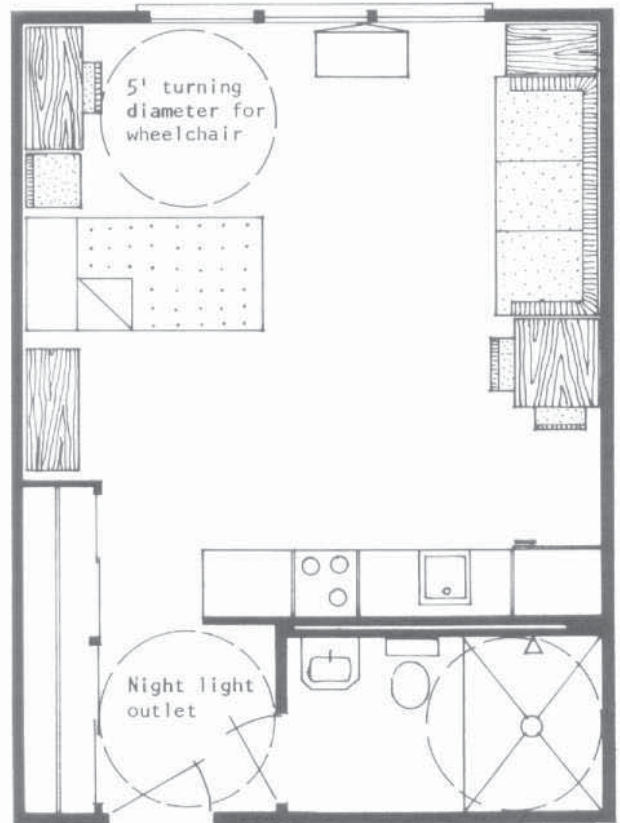


Fig. 4 0-Bedroom living unit for wheelchair user.*

* From "Manual of Acceptable Practices," Vol. 4, U.S. Department of Housing and Urban Development, 1973.

By GLENN H. BEYER AND ALEXANDER KIRA, *Housing Research Center, Cornell University*

KITCHENS

The kitchen is not a specialized workroom, for it has many uses. It is used for preparation of meals, food preservation, storage of food and utensils, and also, in many cases, for eating, laundering, entertaining, and child care. In it a woman uses her own labor and also makes full use of electric power, tap water, and manufactured or bottled gas; she uses refrigerators, stoves, dishwashers, mixers, toasters, and garbage-disposal units, as well as various kinds of storage compartments and work surfaces.

Since more time and effort are frequently spent in the kitchen than in any other area of the house, careful planning is especially important. This requires careful selection of appliances and storage units and convenient arrangement of the area. Some general planning guides are as follows:

FOOD PREPARATION

Arrangement

It is important to keep the basic work area compact, even if the kitchen is of the large "living" type. Consideration should be given, however, to the possibility of more than one person working there. The arrangement will vary according to the size and shape of space available, but we should always keep in mind relationships among functions in different areas of the kitchen.

Traffic lanes

Traffic lanes through work areas should be avoided. Arrange the service entrance and access to the basement so that traffic not essential to food preparation, service, or storage can by-pass the area.

Storage

Kitchen design should be functional in the sense of minimizing reaching and stooping. Storage facilities should be no higher than a woman can reach with both feet flat on the floor. There should be sufficient space to store items so that they may be easily seen, reached, grasped, and taken down and put back without excessive strain. With proper planning, stored items can be located close to where they are first used, and unattractive items can be kept out of sight. Storage space should be sufficiently flexible to permit its adjustment to varying amounts, sizes, and kinds of food, supplies, and utensils. Shelving should be adjustable.

Counters and working surfaces

The height of counters and working surfaces should permit a comfortable working posture. The worker should be able to sit, if she wishes, while doing certain kitchen tasks, such as working at the sink. Continuous lines and surfaces permit ease of movement, and are easier to keep clean.

Servicing and replacement of appliances

Consideration should be given to ease of servicing and replacement of major appliances, especially built-in units.

Materials

Materials and finishes that minimize maintenance and cleaning should be used, and they should be sufficiently light in color to create a pleasant work atmosphere.

Lighting

Good lighting helps to prevent fatigue, as well as promoting safety and a pleasant atmosphere. Comfortable levels of light,

with a minimum of shadows, should be planned throughout the kitchen. Adequate daylight or artificial lighting makes the room more agreeable and attractive than a dark or poorly lighted room.

Ventilation

The kitchen should be well ventilated, with an exhaust fan to remove objectionable kitchen odors.

Safety

Burns, scalds, falls, and explosions should be "designed out" of the kitchen. Sharp corners, exposed handles, and control knobs on kitchen equipment should be avoided, and there should be safety catches on doors and drawers to limit the exploratory activities of young children.

Accessibility

There should be easy access to front and back doors, laundry area, telephone, and bathroom.

Decoration

Color, texture, and decoration should be used to create an atmosphere that is attractive, cheerful, and restful.

OTHER KITCHEN ACTIVITIES

Nonworking areas

Nonworking areas should be segregated from working areas. Avoid interruption of work areas by breakfast nooks, general storage closets, rest areas, and other areas not essential to normal food preparation activities.

Eating facilities

Most families want to eat some meals in the kitchen. Provision should be made for this, if possible, even if a separate dining room is also provided.

Child's play

In younger families, especially, there is likely to be one or more children who want to be near their mother. Provision should be made for a play area out from underfoot, but where adequate supervision is possible. Storage space should be provided for toys and games.

Infant care

It is a well-known fact that many kitchens are used for care of infants. If provision is not made in the bathroom for infant care and related supplies, then it should be made in the kitchen.

Grooming

Washing hands and some personal grooming frequently take place in the

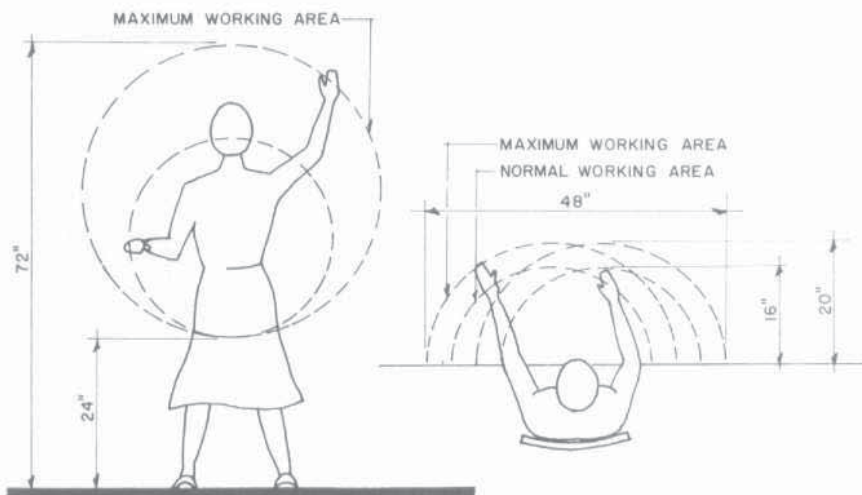


Fig. 1 Vertical and horizontal limits of reach.

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KITCHENS

kitchen, especially if there is not ready access to the bathroom. A mirror is desirable.

CRITICAL DIMENSIONS

The "critical dimensions" for working space are illustrated in Figs. 1-4. These

dimensions are recommended on the basis of research and do not necessarily coincide with either current practice or currently available cabinets and equipment. Width requirements for counter space, in particu-

lar, are based on research covering operations at individual work centers. Overlapping is permissible if work at adjacent centers is not being carried on simultaneously.

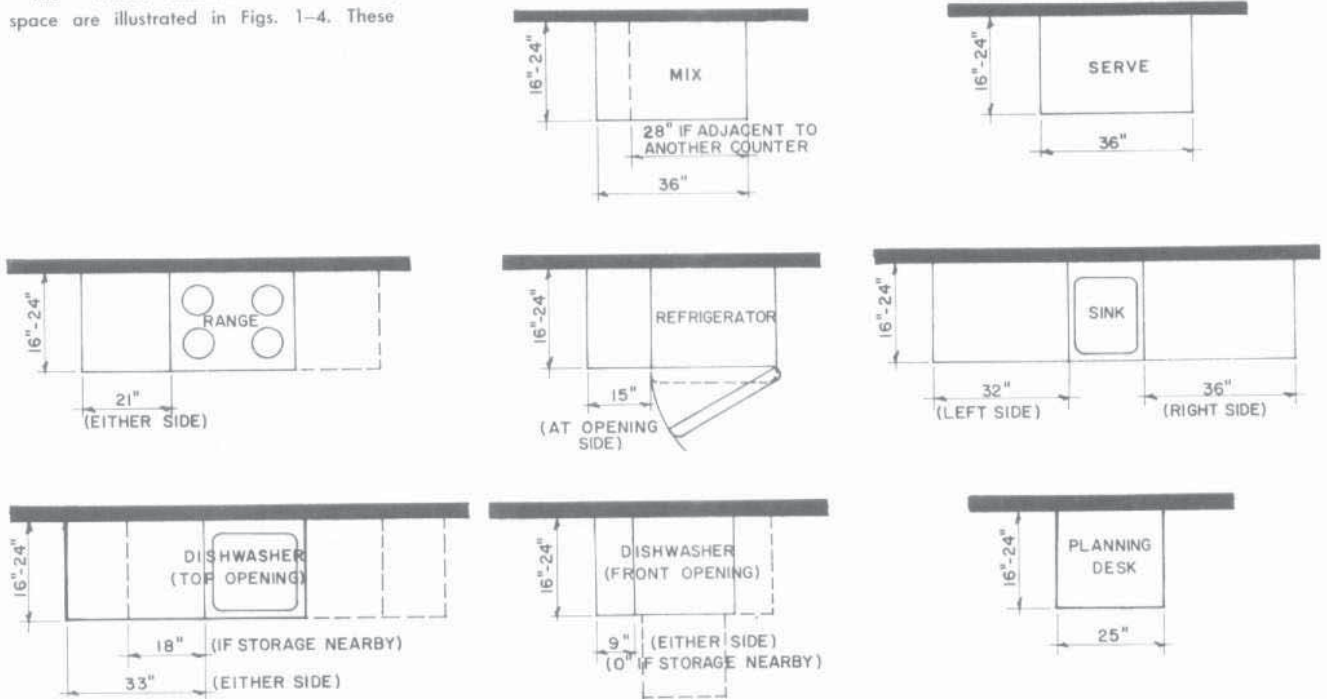


Fig. 2 Minimum counter-width dimensions.

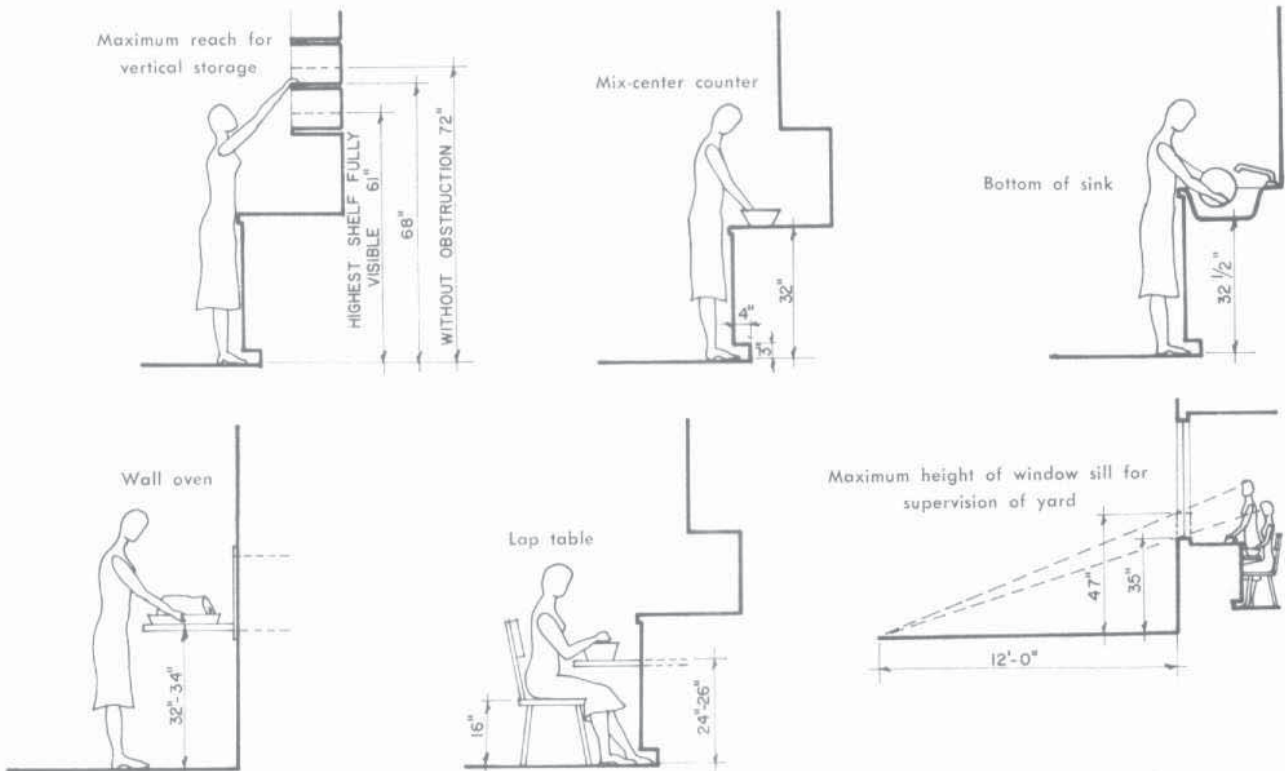


Fig. 3 Comfortable working heights.

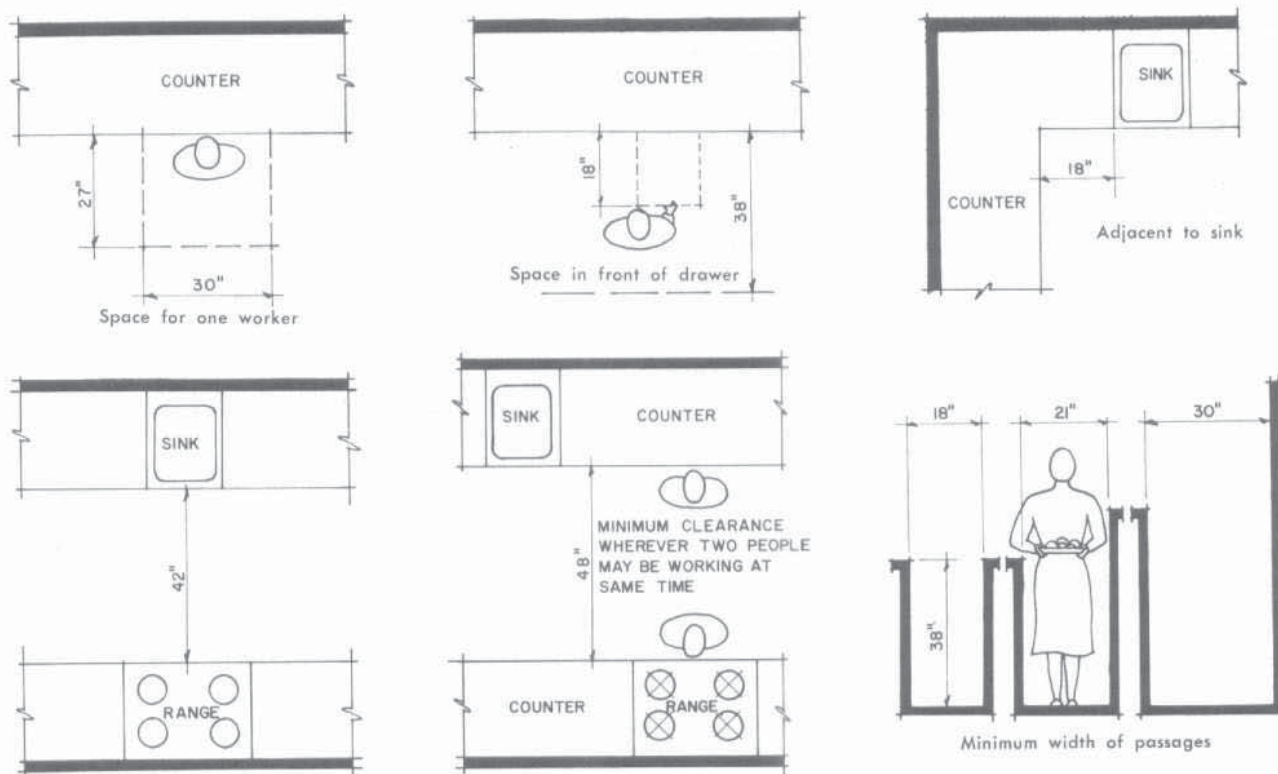


Fig. 4 Minimum clearances—horizontal and vertical.

BASIC WORK AREAS

The work center concept, favorably supported by a great deal of research data from many sources, emphasizes the planning of the kitchen in terms of its major centers of activity. These work centers, in turn, are planned in terms of their constituent parts, their proper functions, and their ideal relationships, one to another. The actual design of the work centers will vary with the size and shape of space available in each project. Four work centers must be considered: sink, range, mix, and serve. In addition, there is the refrigerator (which functions as a closely related storage center) and the oven, if it is not an integral part of the range.

Each work center should have three components: (1) Adequate storage space for the various items used there; (2) Adequate counter space for the work to be accomplished; and (3) Necessary utilities and facilities, such as water at the sink, heat at the range, outlet and space for the mixer at the mix center, and adequate lighting at each center.

Equip each work center for the storage of utensils, supplies, and dishes according to their frequency and order of use.

Tables 1-4 list the number of items and the space dimensions required for equipment and food supplies commonly stored

Table 1. Equipment and food supplies stored at range center

Item	Number stored		Storage space per item, in.*		
	Limited	Liberal	Side to side	Front to back	Height
Equipment					
Potato masher	1	1	3½	13	4½
Knives, forks, spoons	3	3	3½	13	3
Frying pan, 10½-in.	1	1	11	17½	5½
Frying pan, 9-in.	1	2	9½	16	5
Frying pan, 6-in.	0	1	6	12	5
Pot lids	2	4	10½	10½	1
Potholders	4	8	7	7	2†
Food supplies					
Rice, 1-lb pkg.	1	1	2½	4	6½
Spaghetti, 1-lb pkg.	1	1	2½	11½	6
Coffee, 1-lb can	1	1	5½	5½	4
Oatmeal, 3-lb box	1	1	6	6	11
Macaroni, 1-lb pkg.	1	1	2	5½	9
Tea, 8-oz pkg.	1	1	2½	4½	7

*Dimension of the item (including lid, if any) plus clearance for handling.
†Provides for stack of 6 potholders.

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at each of the four centers. These lists represent the storage space requirements for the average family, but they may be adapted to the needs of particular families. The storage space dimensions are based on the most recent information available.

KITCHEN ARRANGEMENT

The relative location of work centers should permit a continuity of kitchen activities as follows: (1) Storage (gathering materials needed for the performance of the task); (2) Cleaning and mixing (or initial preparation); (3) Cooking; (4) Serving, or storing for future use; and (5) Cleaning up. (See Fig. 5.)

In principle, any plan that interrupts this continuity with doors, or with non-working areas or facilities, is faulty because extra steps are required every time the gap is crossed, and, consequently, convenience and working efficiency are reduced.

The actual plan may be U-shaped or L-shaped, or it may be of the corridor type.

The "U" arrangement affords the most compact work area. Frequently, however, this arrangement is impossible to achieve because of the necessity of having a door on one of the three walls. The resulting "Broken U" arrangement still permits compactness, but traffic is allowed through the area. Therefore, special consideration should be given to the arrangement of the work centers in order to minimize the effect of through traffic.

The "L" arrangement is ideally suited where space along two walls is sufficient to accommodate all of the necessary work areas. This arrangement has the advantage of concentrating the work area in one corner, thus minimizing travel, but it has the disadvantage of necessitating longer trips to the extremities of the "L."

The "Corridor" arrangement is satisfactory where doors are necessary at each end of the space. This arrangement frequently has the advantage of the parallel walls being closer together than in the typical "U," but the disadvantage of a greater distance along the corridor.

An important factor in determining the location of specific work areas within any of these over-all arrangements is frequency of use, which in Fig. 6 is expressed as the percentage of trips to and from each area.

Figures 7-9 provide floor plans illustrating some possible arrangements of the basic work centers within each of the plan types. If the space for the kitchen is already established, the number of possible satisfactory arrangements obviously will be limited. If the space is being planned,

however, greater choice of arrangements is possible. In either event, the advantage of a shorter distance between some related areas must be balanced against the resulting increase in distance between other related areas. An end-to-end alignment or a right-angle arrangement between areas of close relationship can eliminate trips and reduce the over-all travel distances. Functional relationships between key work centers are, of course, accommodated more ideally in some of the plans than others.

FHA REQUIREMENTS FOR KITCHEN STORAGE¹

Total shelf area: 50 sq ft minimum; not

¹From Minimum Property Standards for One and Two Living Units, Federal Housing Administration, Washington, D.C. (Revised, July 1959).

less than 20 sq ft in either wall or base cabinets.

Total countertop area: 11 sq ft minimum.

Total drawer area: 11 sq ft minimum. (If a 39-in. range is provided, it may be counted as 4 sq ft of base cabinet shelf area and 2 sq ft of countertop area.)

Wall shelving: 74 in. maximum height.

Countertop: 38 in. maximum height, 30 in. minimum height.

Height between wall cabinets and countertop: 24 in. minimum over range and sink, 15 in. minimum elsewhere. (Shelving may be closer if it does not project beyond a line drawn from the front edge of the wall cabinet at an angle of 60 deg to the bottom of the cabinet.)

Depth of shelving: wall shelving—4 in. minimum, 18 in. maximum; base shelving—

Table 2. Equipment and food supplies stored at sink center

In addition to the items listed below, allow space for hand tools (such as can opener, small vegetable brush, paring knives, rubber plate scraper), cleaning supplies (such as soap, soap powder, cleanser, paper towels), garbage and trash containers, and possibly a stool for sitting.

Item	Number stored		Storage space per item, in.*		
	Limited	Liberal	Side to side	Front to back	Height
Equipment					
Dishpans, nested	2	2	16½	18½	8
Dishdrainer	1	2	14½	18½	6
Double boiler	1	1	7½	12	10½
Pressure saucepan	0	1	9	17	7½
Saucepan, 6-qt	0	2	10½	10½	9
Saucepan, 4-qt	1	1	9	11	7½
Saucepan, 3-qt	2	2	8½	15	8
Saucepan, 2-qt	1	1	7½	14	7
Saucepan, 1-qt	1	1	6½	13	6
Colander	1	1	11½	13	6
Coffee pot, 6-cup	1	1	6½	9	10
Dishtowels	8	12	12	11	5(8)
Handtowels	8	12	12	10	5(8)
Aprons	4	6	11	10	5(4)
Dishcloths	6	12	8	8	4(6)
Food supplies					
Potatoes, lb	10	10	9	11	8
Onions, lb	3	3	9	7	8
Fruit, lb	3	3	9	7½	5
Lentils and peas, 2-lb pkg.	1	1	3½	5	9½
Dry beans, 2-lb pkg.	1	1	3½	5	8½
Prunes, 1-lb pkg.	1	1	3	5	8
Canned food, No. 2 can	6	8	4	4	5½

*Dimensions include clearance for handling.

†Number in parentheses refers to number of items in stack for which storage space dimension is given.

Table 3. Equipment and food supplies stored at mix center

In addition to equipment and supplies listed below, allow space for such miscellaneous items as cookbooks, wax paper, and certain essential hand tools (hammer, pliers, screw driver, and knife sharpener).

Item	Number stored		Storage space per item, in.*		
	Limited	Liberal	Side to side	Front to back	Height
Equipment					
Electric mixer	1	1	7½-12	10-14	10-17
Flour sifter	1	1	6½	9	7
Mixing bowl, 3½-qt	1	1	12½	12½	6
Mixing bowl, 2-qt	1	2	9½	9½	5½
Mixing bowl, 1-qt	1	1	7½	7½	5
Pint measure	1	1	4½	6½	5½
Cup measure, set	1	1	4	5	5
Baking dish, 10½-in. diam	0	1	11	12½	4½
Baking dish, 9½-in. diam	1	1	10	11½	4½
Loaf pan	1	2	6	10½	3½
Biscuit pan	1	1	10	13½	3
Pie pans	1	3	10	10	2½
Cake pans	2	2	12	12	2½
Muffin pan	1	2	11	14	2½
Cookie (baking) sheet	1	2	12½	16	2
Egg beater	1	1	4	12½	4
Cookie cutter	1	1	3	3	3½
Rolling pin	1	1	3	19	3½
Mixing and blending forks	2	6	3	12½	2½
Measuring spoons, 4 sets	1	2	3	6	2½
Egg whisk	0	1	4	12½	2½
Knives and spatulas	2	6	3	14	2
Food supplies					
Cornmeal, 5 lb	1	1	8	8	9
Flour, 5 lb	1	1	8	8	9
Sugar, 5 lb	1	1	8	8	9
Pancake flour, 2-lb pkg.	0	1	2½	6½	10½
Cake flour, 2½-lb pkg.	1	1	3	7	10½
Vinegar, 1-qt bottle	1	1	4	4	10
Powdered sugar, 1-lb pkg.	1	1	2½	4	8½
Brown sugar, 1-lb pkg.	1	1	2	4	8
Coconut, 7-oz pkg.	1	1	2	4	8
Shortening, 3-lb can	1	1	5½	5½	8
Cornstarch, 1-lb pkg.	1	1	2½	4	7½
Cocoa, 1-lb pkg.	1	1	3	4	7½
Raisins, 15-oz pkg.	1	1	2½	4½	7½
Flavorings, 6-in.-tall bottle	3	5	1½	2½	7
Salt, 1-lb 10-oz pkg.	1	2	4	4	7
Baking powder, 1-lb pkg.	1	1	3½	3½	6½
Baking soda, 1-lb pkg.	1	1	2½	4	6½
Package desserts, 3½-oz pkg.	1	3	2	4	5½
Spices, 4½-in.-tall can	2	3	2½	3½	5½
Spices, 3-in.-tall can	4	6	1½	2½	4

*Dimension of the item (including lid, if any) plus clearance for handling.

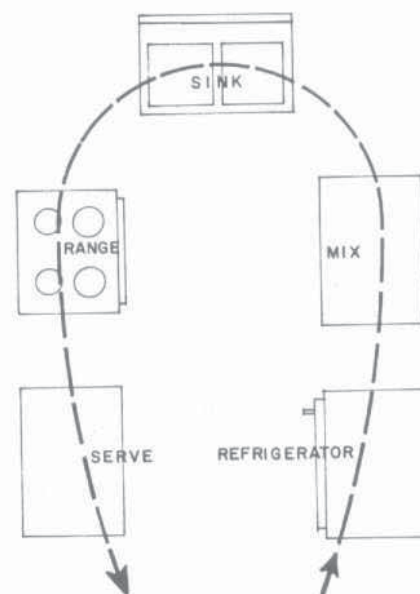


Fig. 5. Flow of work in food preparation

12 in. minimum, 24 in. maximum; countertop—15 in. minimum, 24 in. maximum.
 Spacing of shelving: if depth of shelf is 4-6 in., allow 5 in. minimum spacing, if 6-10 in. allow 6 in., if 10-15 in. allow 7 in., if 15-24 in. allow 10 in.
 Backsplash (required where countertop abuts walls): 4 in. minimum height.
 Steel cabinets: minimum gages—case and drawer slides, 16; gussets and cross rails, 18; bottoms, door and drawer fronts and sides, 20; elsewhere, 22.
 Exhaust fan (required in ceiling or wall near range, or in hood over range): minimum capacity—15 air changes per hour.

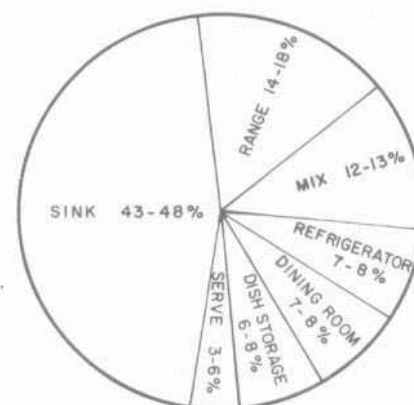


Fig. 6. Percentage distribution of trips in food preparation

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Table 4. Equipment and food supplies stored at serve center

In addition to the items listed below, provide miscellaneous items as lunch boxes, serving a drawer for silverware and space for such tray, and hot-plate pads.

Item	Number stored*		Storage space per item, in.†		
	Limited	Liberal	Side to side	Front to back	Height
Equipment					
Paper napkins, box	1	2	8	8	3½
Tablecloth, luncheon	0	1	10	14	2§
Tablecloth, dinner	1	2	10	19	3§
Cups	8(4)	12(6)	4½	5½	6
Cereal dishes	6(2)	8(2)	7½	7½	5
Dinner plates	8(1)	12(1)	11	11	4½
Salad or pie plates	8(1)	12(1)	9	9	4½
Fruit dishes	6(1)	12(1)	5½	5½	6
Saucers	8(1)	12(1)	7½	7½	4½
Juice glasses‡	6	8	3	3	5
Pitchers, large	1	2	7½	10½	10
Pitchers, medium	1	1	7	8	10
Water glasses‡	8	12	3½	3½	6
Bowls, oval	2(1)	3(2)	13½	9½	9½
Bowls, round	2(1)	4(2)	9½	9½	7½
Creamer	1(1)	1(1)	5	7	5
Gravy boat	0	1(1)	6	10½	5½
Jelly-relish dishes	2(1)	2(1)	7½	7½	2
Platter, large	1(1)	1(1)	16½	13	2½
Platter, medium	1(1)	2(1 or 2)	14	11	2½
Platter, small	0	1(1)	12	9	2½
Serving plates	0	2(1 or 2)	11	11	4½
Sugar	1(1)	1(1)	5½	6½	5½
Tray, medium	0	1(1)	15½	11½	3
Refrigerator dishes, set of 4	1(1)	1(1)	8	8½	7
Toaster	1	1	6-7	9-12	7-8
Waffle iron	0	1	10-14	8-14	3-5
Food supplies					
Prepared cereals, 11-in.-tall box	2	4	3	8	14
Cookies, 1-lb pkg.	1	2	3	6½	11½
Crackers, 1-lb pkg.	1	2	4½	10½	6½
Peanut butter, 1-lb 4-oz jar	1	1	3	3	6½
Mayonnaise, 1-pt jar	1	1	3½	3½	6
Jam and pickles, 1-pt jar	1	3	3½	3½	2
Bread	1	2	5½	12	6
Cake	1	1	9½	9½	2½

*Number in parentheses refers to number of stacks.

†One-half in. added to side-to-side and front-to-back measurement of item or stack and ½ to ¾ in. to height to permit safe handling. For stacked items, clearance is sufficient to remove single item from stack.

‡Glasses placed three rows to a shelf instead of stacking.

§Provides space for two tablecloths.

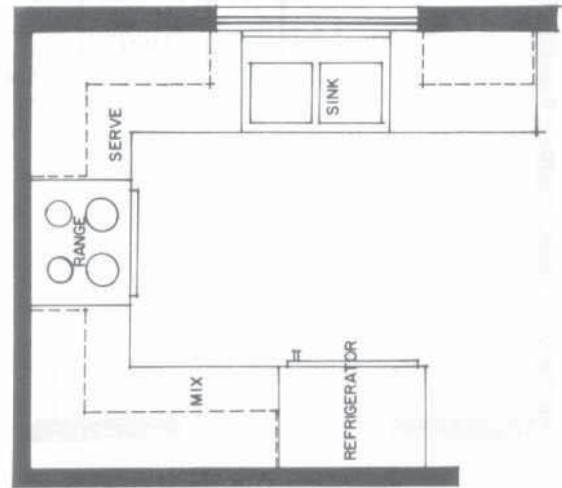
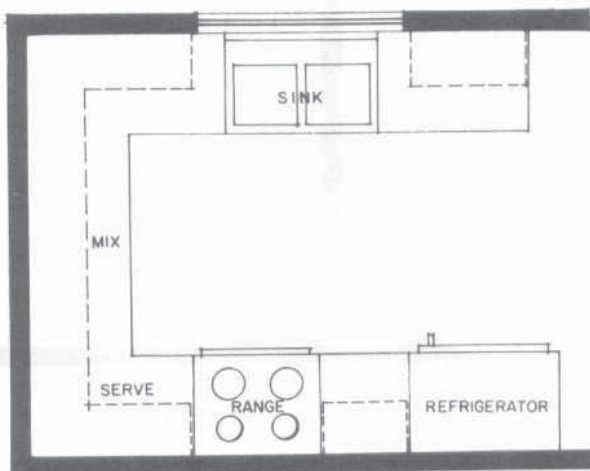
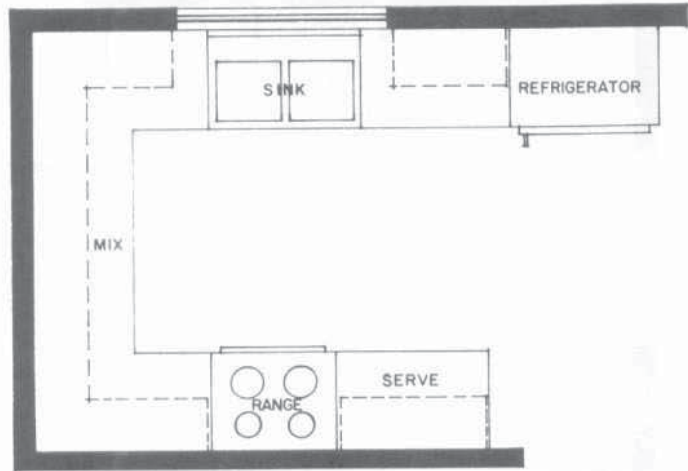
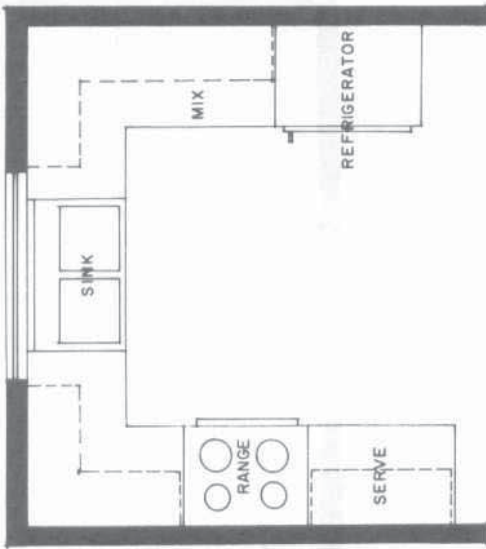


Fig. 7 U-shaped plans. If a dishwasher is desired, it should be located at the sink center.

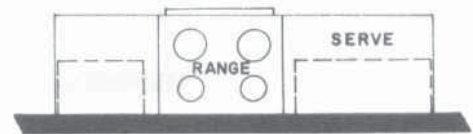
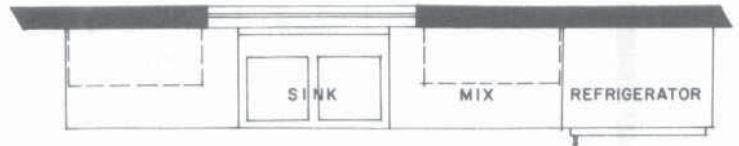
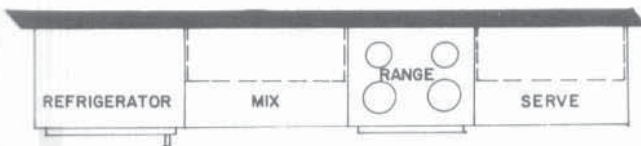


Fig. 8 "Corridor" plans. If a dishwasher is desired, it should be located at the sink center.

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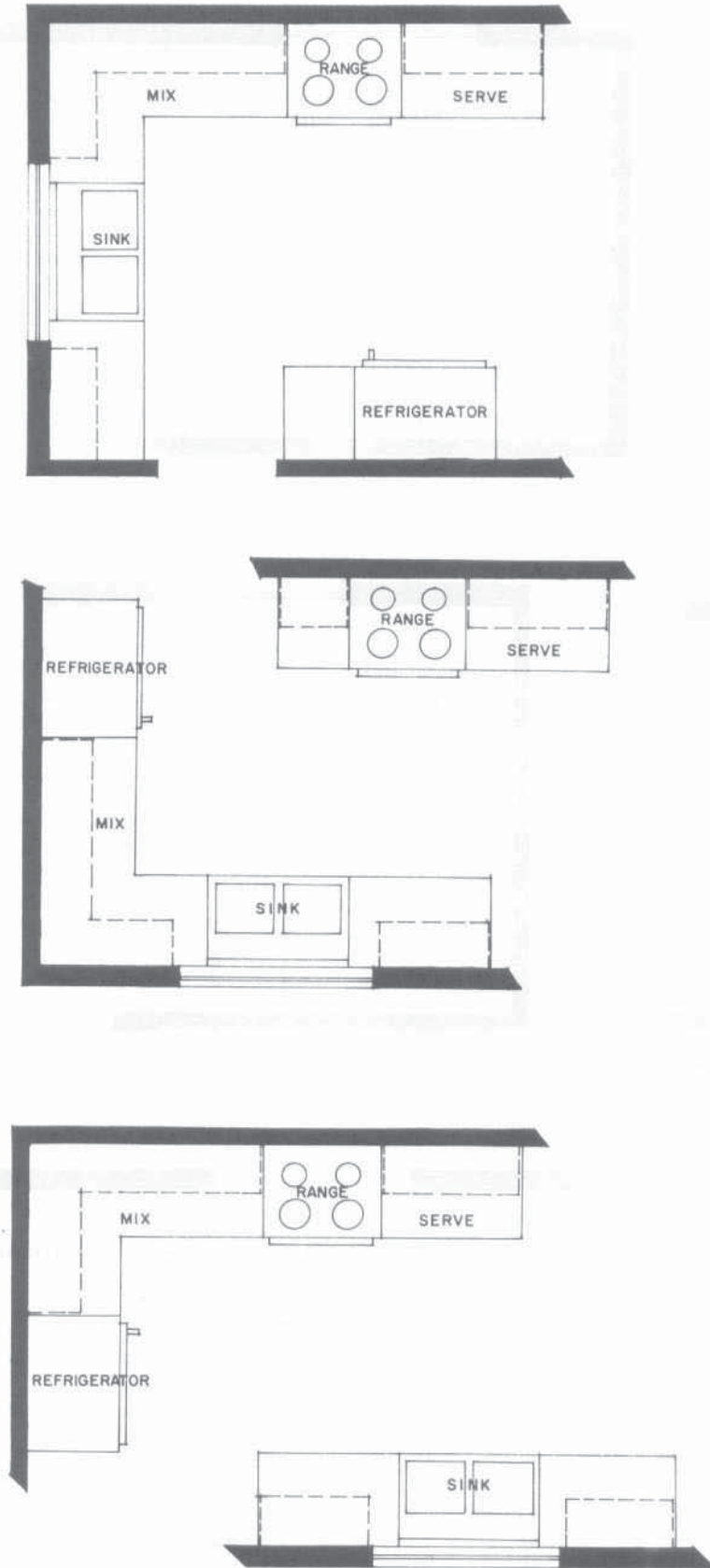


Fig. 9 "Broken-U" plans. If a dishwasher is desired, it should be located at the sink center.

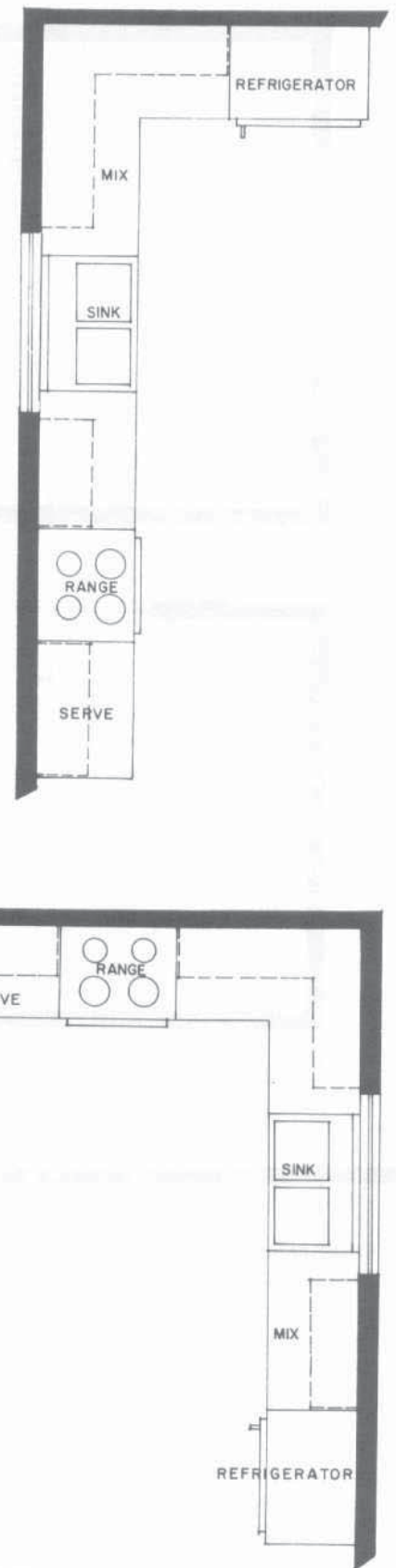


Fig. 10 L-shaped plans. If a dishwasher is desired, it should be located at the sink center.

A work triangle is an efficient kitchen arrangement (Fig. 11). Figures 11-16 are from "Manual of Acceptable Practices," Vol. 4, U.S. Department of Housing and Urban Development, 1973.

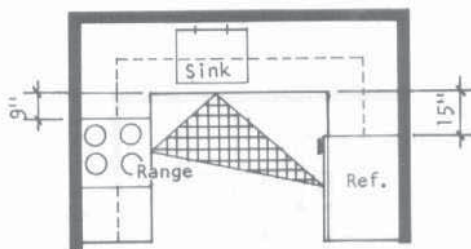


Fig. 11 Minimum distances from appliances to inside corners of base cabinets.

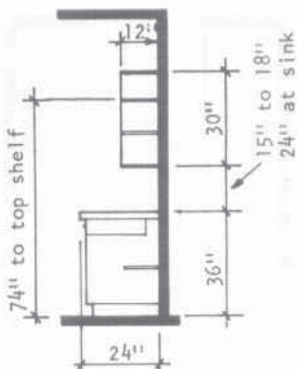
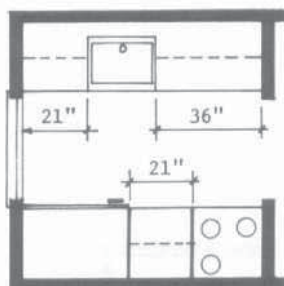


Fig. 12 Typical cabinet dimensions.

21" sink counter combined with 36" mixing counter



21" range counter combined with 15" refrig counter

Sink and range counters combined with 36" mixing counter



21" sink counter combined with 15" refrig counter

Fig. 13 Kitchens for 2-bedroom living unit (with minimum storage, counter area, fixtures).

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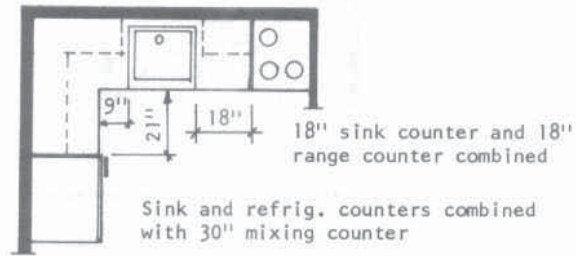
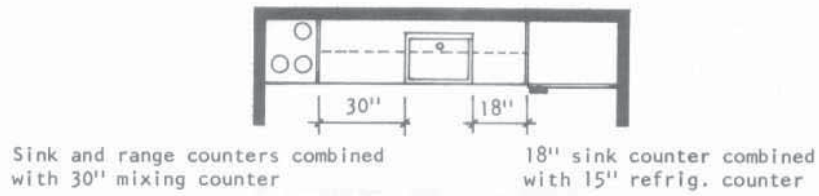


Fig. 14 Kitchens for 1-bedroom living units (with minimum storage, counter area, fixtures). For kitchens for 0-bedroom living units, see pp. 27-28.

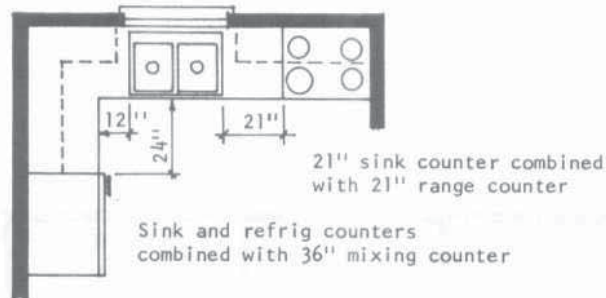


Fig. 15 Kitchen for 3-bedroom living unit (with minimum storage, counter area, fixtures).

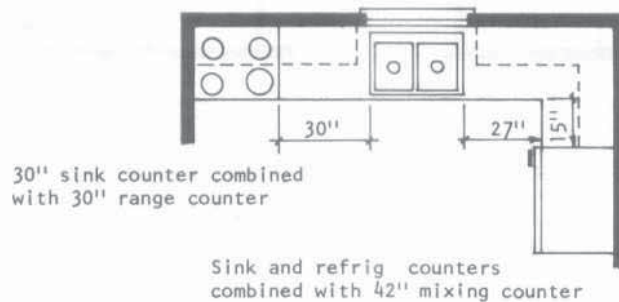


Fig. 16 Kitchen for 4-bedroom living unit (with minimum storage, counter area, fixtures).

Minimum Kitchen Storage Required

40 to 60 sq. ft. area—Kitchenette (2)

Item	0-BR Liv. Unit (1) (sq. ft.)	1-BR Liv. Unit (sq. ft.)
Total Shelving in Wall and Base Cabinets	24	30
Shelving in Either Wall or Base Cabinets	10	12
Drawer Area	4	5
Countertop Area	5	6

- (1) Kitchen unit assemblies serving the kitchen function and occupying less than 40 sq. ft. area in 0-BR Living Units shall not be less than 5 feet in length and shall provide at least 12 sq. ft. of total shelving in wall and base cabinets. Drawer and countertop space shall also be provided. No room count is allowable for this type facility.

60 sq. ft. area and over—Kitchen

Item	1-BR and 2-BR Living Units (sq. ft.)	3-BR and 4-BR Living Units (sq. ft.)
Total Shelving in Wall and Base Cabinets	48	54
Shelving in Either Wall or Base Cabinets	18	20
Drawer Area	8	10
Countertop Area	10	12

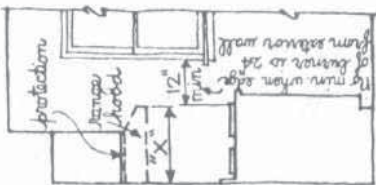
- An area occupied by sink basin(s) and by cooking units shall not be included in countertop area.
- Usable storage space in or under ranges, or under wall ovens, when provided in the form of shelving or drawers, may be included in the minimum shelf or drawer area.
- The shelf area of revolving base shelves (lazy susan) may be counted as twice its actual area in determining required shelf area provided the clear width of opening is at least 8-1/2 inches.
- Drawer area in excess of the required area may be substituted for required base shelf area up to 25 percent of total shelf area.
- At least 60 percent of required shelf space shall be enclosed by cabinet doors.

Minimum Property Standards, U.S. Department of Housing and Urban Development, Washington, D.C.

EXAMPLES: CLEARANCES OVER COOKING RANGES



elevation
free-standing range



elevation

plan
built-in cooking unit

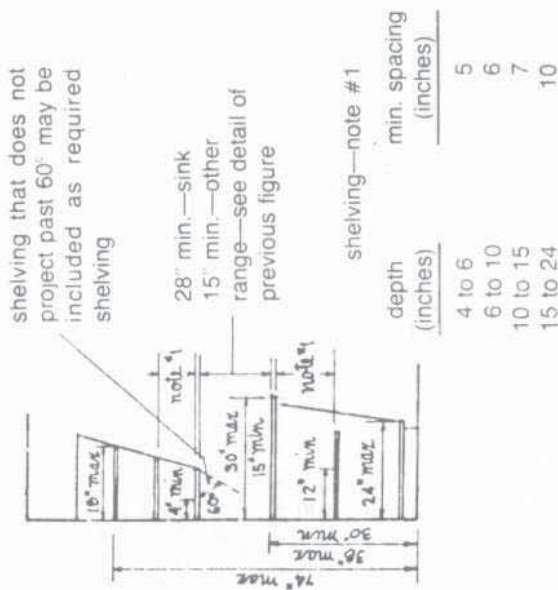
section

- 2'6" min. clearance between top of range and bottom of unprotected wood or metal cabinet, or—2'0" min. when bottom of wood or metal cabinet is protected.
- 2'0" min. when hood projection "X" is 18" or more, or—1'10" min. when hood projection "X" is less than 18".
- Not less than width of range or cooking unit.
- 10" min. when vertical side surface extends above countertops.
- When range is not provided by builder, 40" min.
- Min. clearance shall be not less than 3".

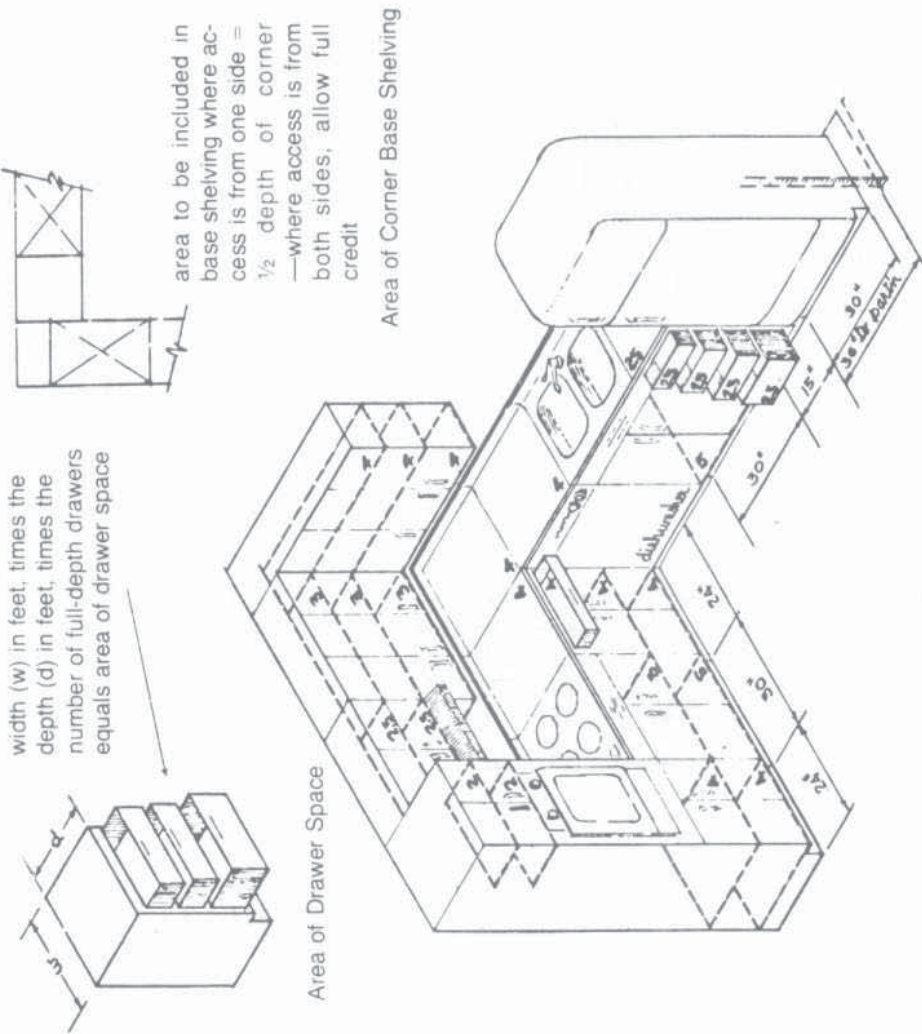
¹cabinet protection shall be at least 1/4" asbestos millboard covered with not less than 28 ga. sheet metal (.015 stainless steel, .024 aluminum, or .020 copper).
²clearance for D, E, or F shall be not less than listed UL or AGA clearances.

Kitchen Storage

Each kitchen or kitchenette shall have: (1) accessible storage space for food and utensils; (2) sufficient space for the average kitchen accessories; (3) sufficient storage space for those items of household equipment normally used and for which storage is not elsewhere provided.



Height, Depth, and Spacing of Shelving and Countertop



wall shelving	base shelving	countertop	drawers
2 s. ft. x 2 = 4 s. ft.	4 s. ft. x 4 = 16 s. ft.	4 s. ft. x 3 = 12 s. ft.	4 s. ft. x 1 = 4 s. ft.
2.5 x 2 = 5	5 x 3 = 15	2.5 x 1 = 2.5	2.5 x 4 = 10
3 x 3 = 9	2 x 2 = 4	total 14.5 s. ft.	total 14 s. ft.
4 x 3 = 12	total 35 s. ft.		
total 30 s. ft.			

EXAMPLE: MEASUREMENT OF SHELF AND COUNTERTOP AREAS

Minimum Property Standards, U.S. Department of Housing and Urban Development, Washington, D.C.