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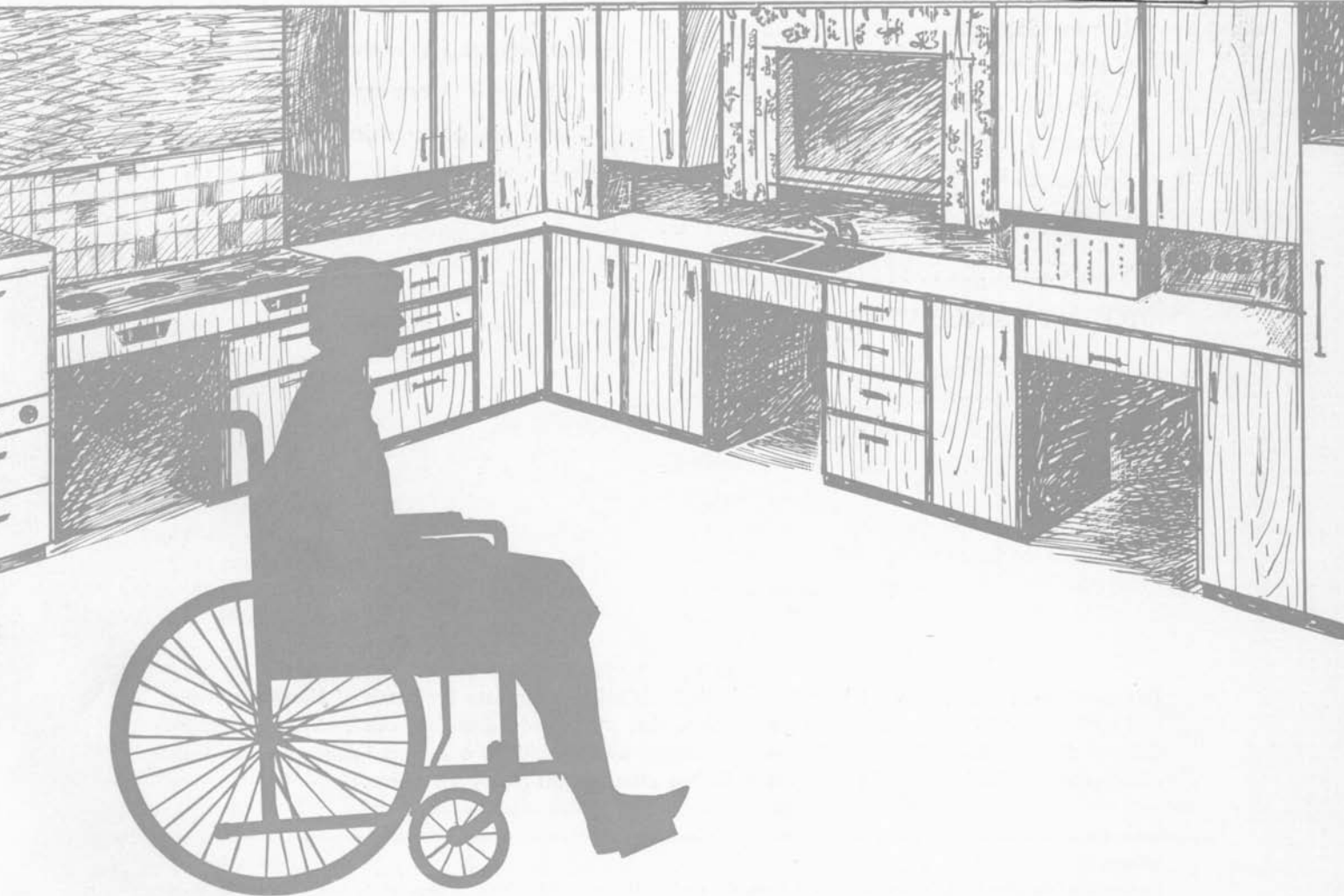
# KITCHENS FOR WOMEN IN WHEELCHAIRS

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HELEN E. McCULLOUGH and MARY B. FARNHAM

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**Although these kitchen designs were planned particularly for women in wheelchairs, the storage arrangements shown will be convenient for anyone.**

This publication was prepared by HELEN E. McCULLOUGH, Associate Professor of Home Economics, and MARY B. FARNHAM, Assistant in Home Economics. The authors gratefully acknowledge the cooperation of Sylvia Bellows, former student in psychology, who served as a subject in the research which culminated in this circular, and who posed for the photographs reproduced here.

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# KITCHENS FOR WOMEN IN WHEELCHAIRS

The kitchen units and arrangements shown in this circular are intended primarily to fit the needs of women who must work from wheelchairs. Included are specially designed work and storage units and suitable commercial appliances.

All recommendations are based on the results of a study of twenty-six women confined to wheelchairs, who were measured and tested in their use of kitchens. (Illinois Agricultural Experiment Station Bulletin 661, "Space and Design Requirements for Wheelchair Kitchens," reports this research.)

In general the design of wheelchair kitchens follows that of conventional kitchens, with base cabinets 24 inches deep (front-to-back measurement) and wall cabinets 12 inches deep. Wheelchair kitchen designs differ from the standard mainly in that they require knee space under major work surfaces and lower heights for counters, sinks, cooking units, and shelves in wall cabinets.

The measurements listed below are recommended for wheelchair kitchen designs. They are based on the averages of the women who took part in the research, with slight changes to meet construction requirements. Despite the many individual variations in space requirements, these measurements have been found suitable for many wheelchair homemakers.

- Reach to high shelves (maximum) . . . 52 inches
- Height of mix counter with electric  
or hand mixer . . . . . 27 inches
- Height of mix counter with  
indented bowls . . . . . 30-32 inches
- Height of sink and range . . . . . 30-32 inches
- Height of knee clearance (minimum) . . 24 inches
- Width of knee clearance (minimum) . . 24 inches

## WORK CENTERS

The design of the cabinets and counters for the three major work centers in the kitchen — sink, range, and mix (food preparation) — is of particular importance for women who work from a seated position. Open space for knees under counters is the first essential. Knee space should be a minimum of 24 inches wide and 24 inches high.

If a kitchen is planned for a specific person, these measurements can and should be adjusted to the individual.

The specially designed units shown on the following pages are illustrated by photographs and working drawings. A competent carpenter should be able to work from these drawings with little difficulty. Suggestions for adapting commercial cabinets to use by women in wheelchairs are also included.

The cabinets shown were custom built with the base and wall cabinets joined to form one unit, for laboratory purposes. Each unit has an overall height of 6 feet, since storage at a greater height would be inaccessible to a seated worker.

Toe space, useless for those in wheelchairs, is included for the convenience of standing persons who might work in the kitchen. The toe space is 3 inches high instead of the conventional 4 inches to allow as much space as possible for storage in base cabinets.

Wherever possible, adjustable shelves have been used. Shelf standards (the supports for adjustable shelves) make it possible to place these shelves at the most efficient and convenient height for the items stored.

The construction of drawers in all the cabinets is the same; working drawings of one such drawer are shown on pages 10 and 11. Drawers with a lip construction and pulls on the front are recommended.

In order to illustrate the uses of the kitchen units, food supplies were placed on shelves and in drawers, but no endorsement of any of the products is intended.

Each center should be as complete as possible, containing adequate storage space for all utensils and supplies related to the work, and with adequate counter space a part of or adjacent to the center. Counters 30 to 32 inches high are recommended, although for certain work, such as mixing and beating, a 27-inch height is useful.

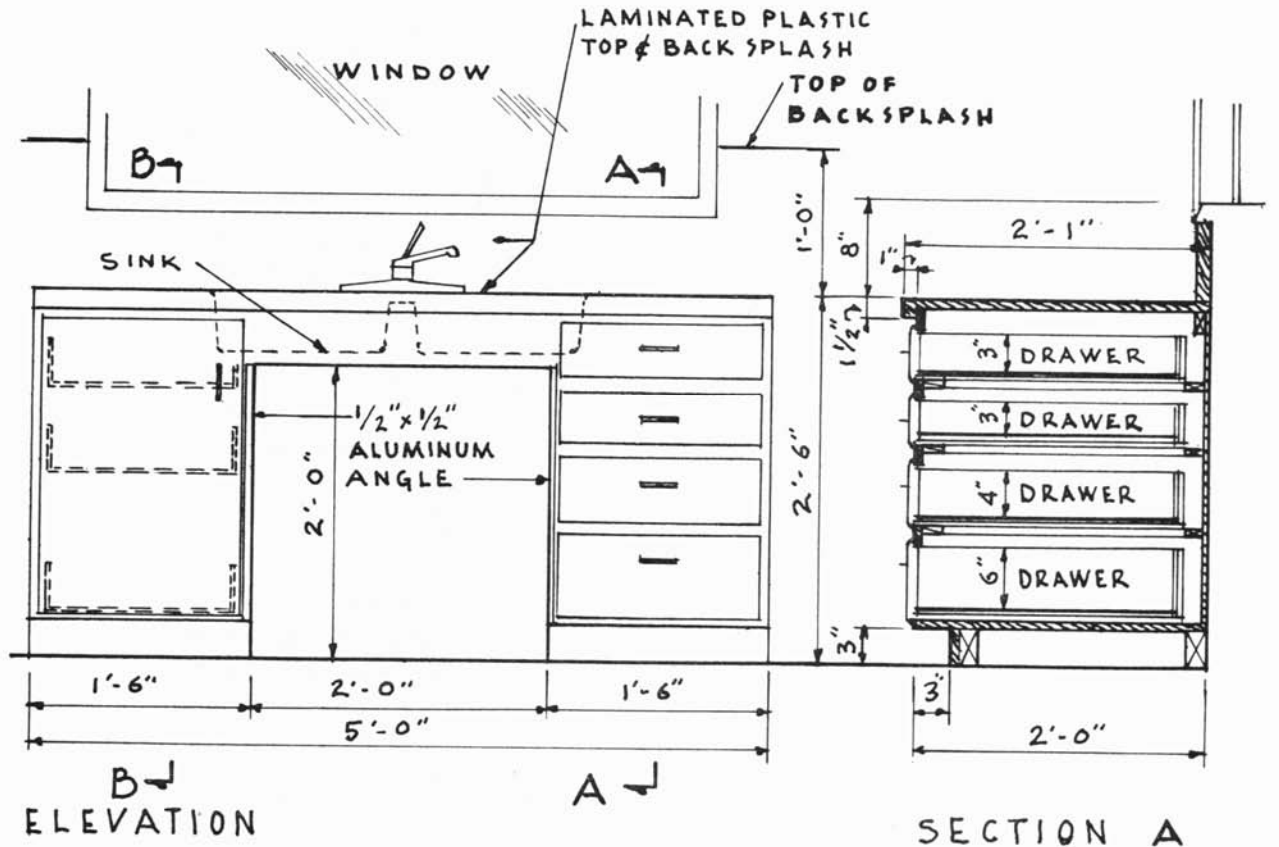
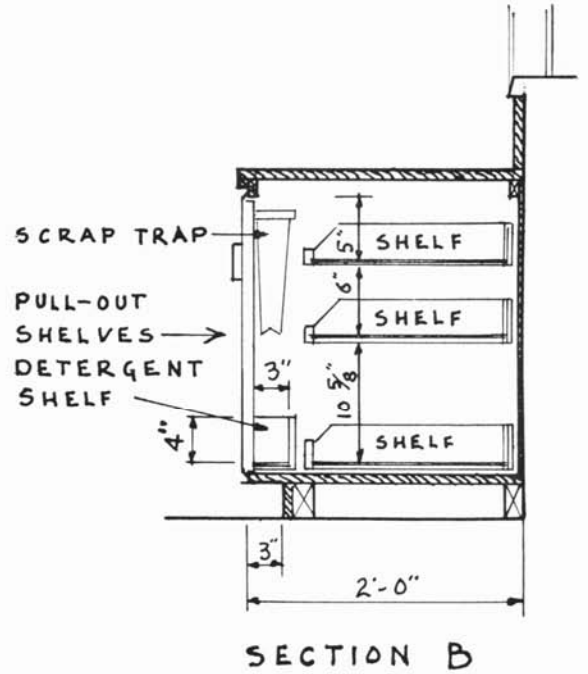
## Sink Center

A sink bowl 5 inches deep with drains at the back allows maximum knee clearance and lessens the danger of burns from hot pipes. The two-bowl steel sink shown here was stamped to order, but a similar one is now available commercially. The one-hand mixer faucet is easy to manipulate.

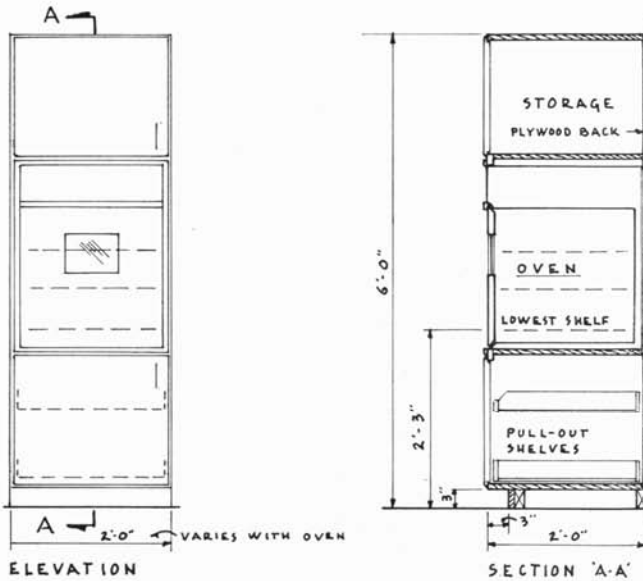
Metal angle is placed along the edges of the open knee space to protect the corners from damage by the wheelchair.

Four drawers under the counter at the right provide storage for small tools, dish towels, and canned foods. The three pull-out shelves on the left hold utensils and containers for vegetables. Door storage provides space for a garbage container and cleaning supplies. Pull-out rods under the sink bowl are used for dish towels.

The awning window with roto-lock hardware is easy to operate from a seated position.



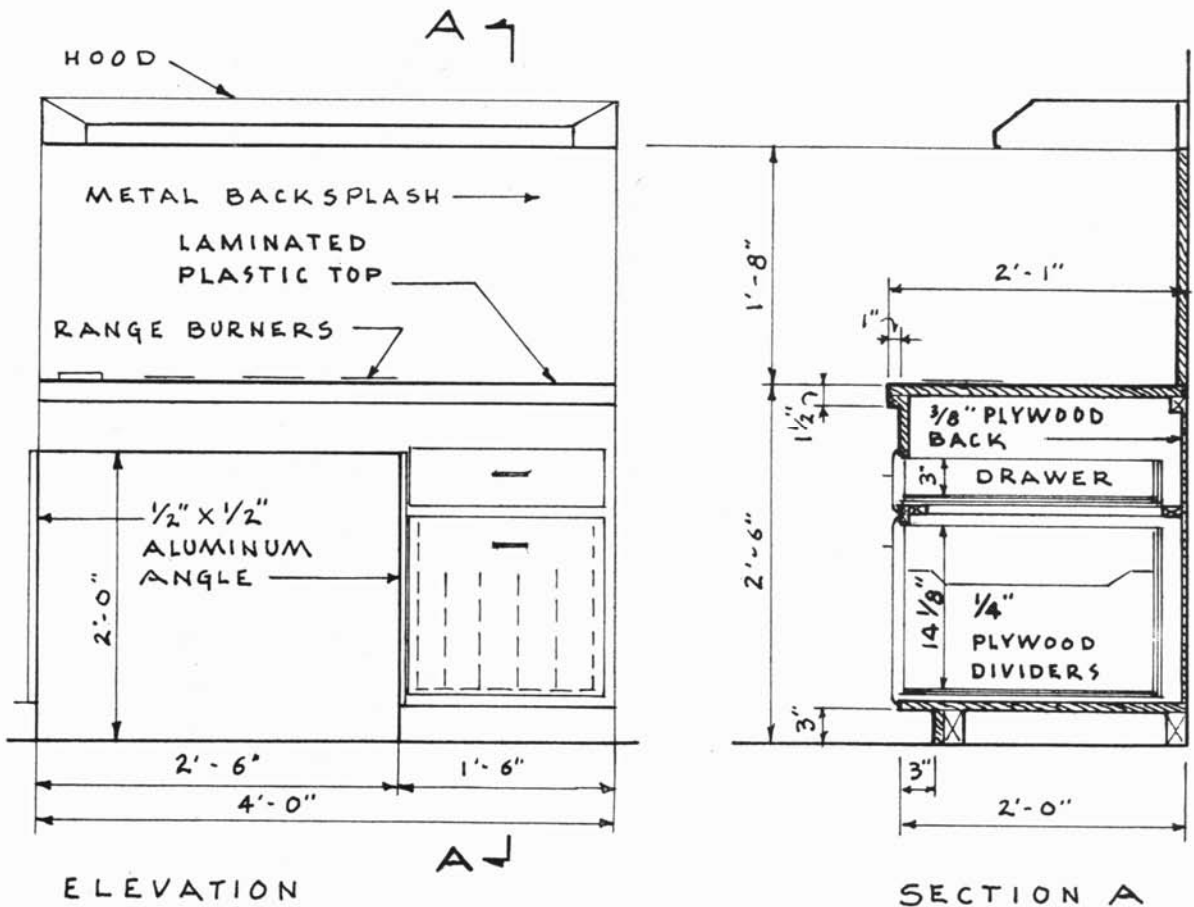




## Range Center

The four burners are placed at the front of the counter so that they are easy to see and to reach. The diagram shows three burners, which would be ample if supplemented with small electrical appliances. Controls may be placed either on the front panel or on the counter. They should be provided with a safety feature to protect children. The two drawers are designed with dividers to take care of the utensils used at the range.

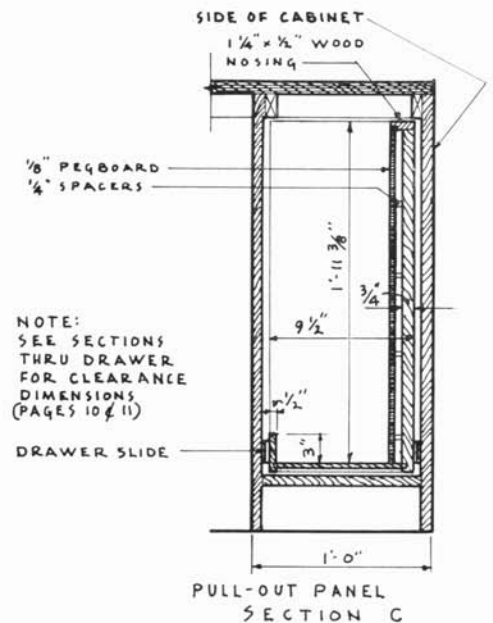
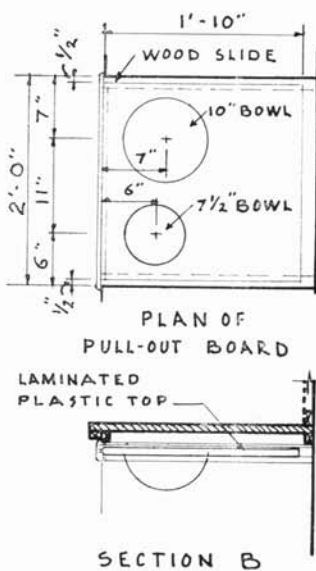
The most used shelf in the separate oven is placed at the same height as the counter for easy sliding of hot pans from the oven to the counter. Functional storage has been planned for the space below the oven.



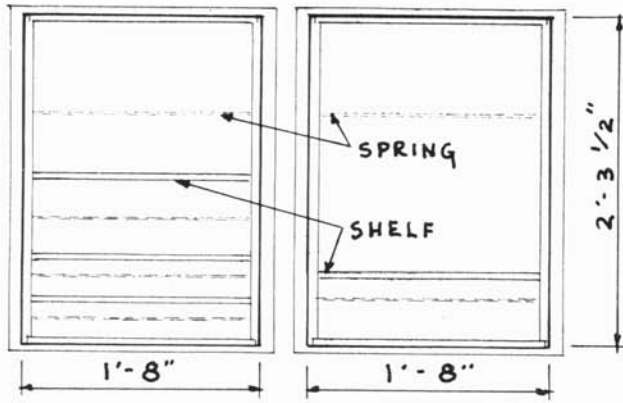


## Mix Center, 30-Inch-High Counter

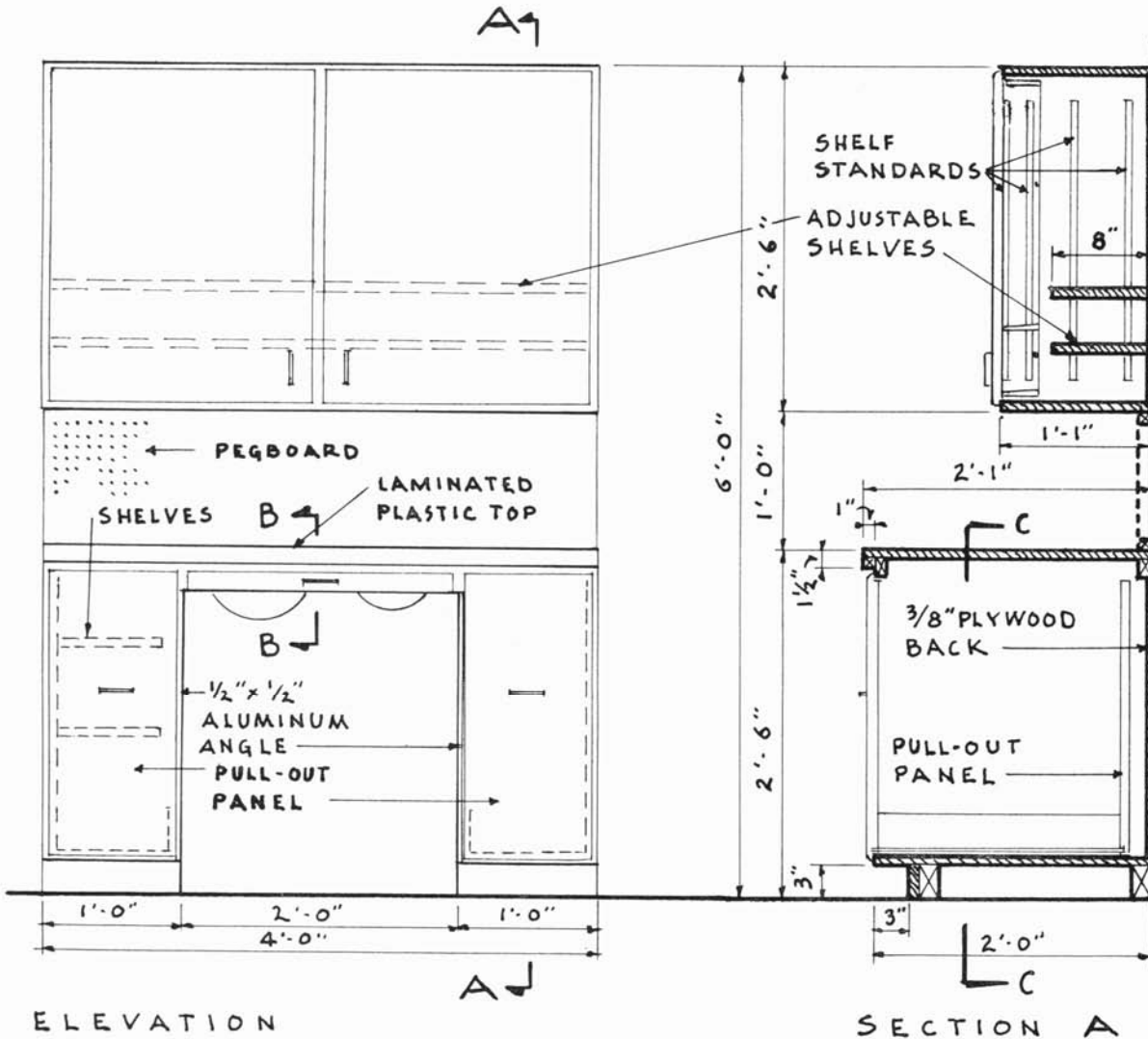
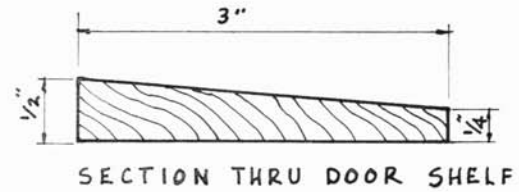
The 30-inch-high counter has pull-out panels 12 inches wide on each side of the 24-inch-wide knee space. One panel is fitted with pegboard for hanging equipment; the other has adjustable shelves for supplies. A pull-out board in the center holds two recessed removable mixing bowls for easy one-hand use. Adjustable shelves in the cabinet and on the doors make equipment and supplies easy to reach. Slanted door shelves prevent items from falling out when the door is opened.





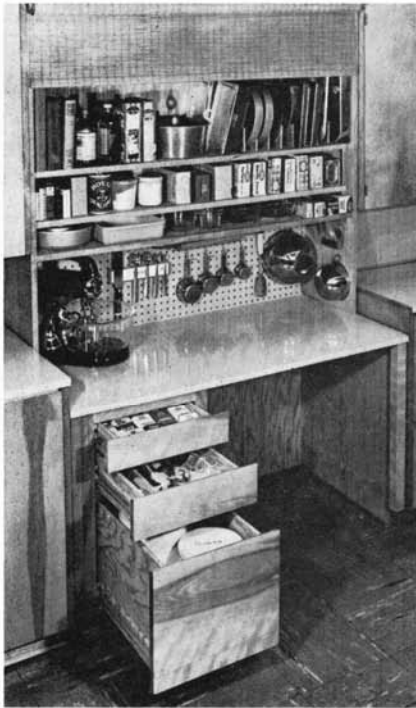


ELEVATION OF DOOR SHELVES



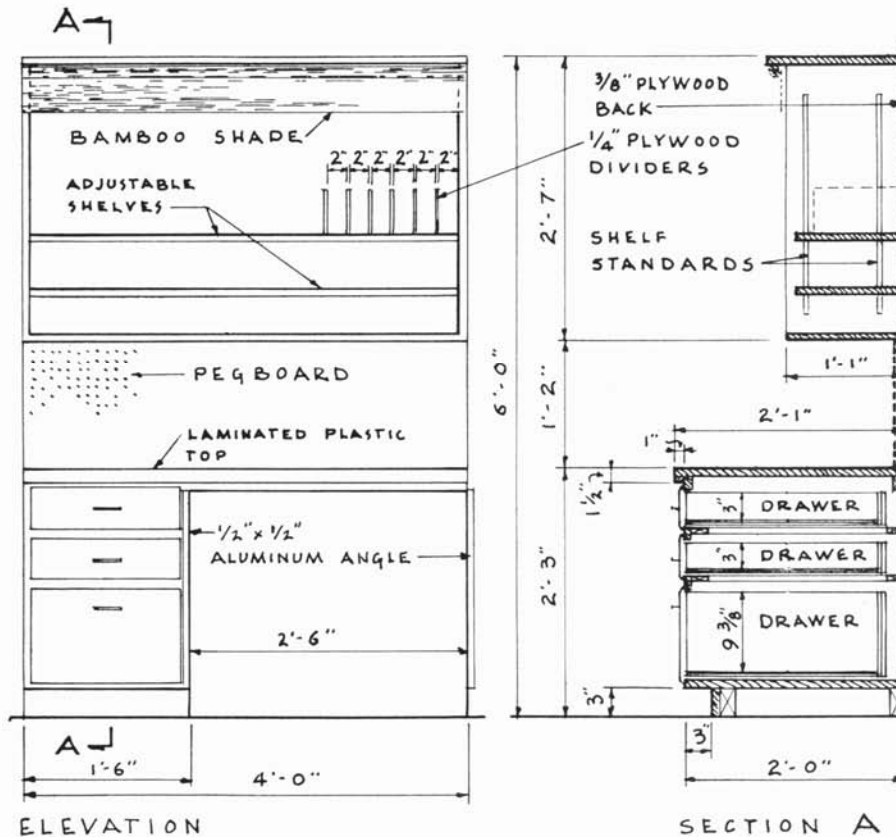
ELEVATION

SECTION A



### Mix Center, 27-Inch-High Counter

The 27-inch-high counter permits easy use of an electric mixer. By replacing the rubber feet of the mixer with ball casters it is easier to move the mixer. Three drawers in the base cabinet take care of spices, small tools, and large containers. Adjustable shelves in the upper cabinet and a vertical file bring utensils and food within easy reach. A bamboo shade instead of cabinet doors is shown here.



## STORAGE UNITS

Storage facilities in any kitchen should be easily accessible. In this circular easy accessibility for the seated worker is stressed, but, with the exception of heights, the designs are suitable for a standard kitchen as well.

Conventional wall-cabinet sizes, 12 inches deep and 24 or 30 inches high, are recommended. All the illustrated cabinets have provisions for adjustable shelves which make it possible to bring many articles within easy reach. Revolving shelves for corner cupboards have been used.

A variety of designs for base cabinets is shown, all based on the principle that stored items should be easy to see, easy to reach, and easy to grasp. Most of the base cabinets are adjusted in height to conform to the work surfaces, but, because it is assumed that in many kitchens planned for wheelchair homemakers others will work from a standing position, some units 36 inches high are also shown. The storage facilities in the high cabinets can be used from a sitting position while the counters meet the needs for standing work.

### Drawer Storage

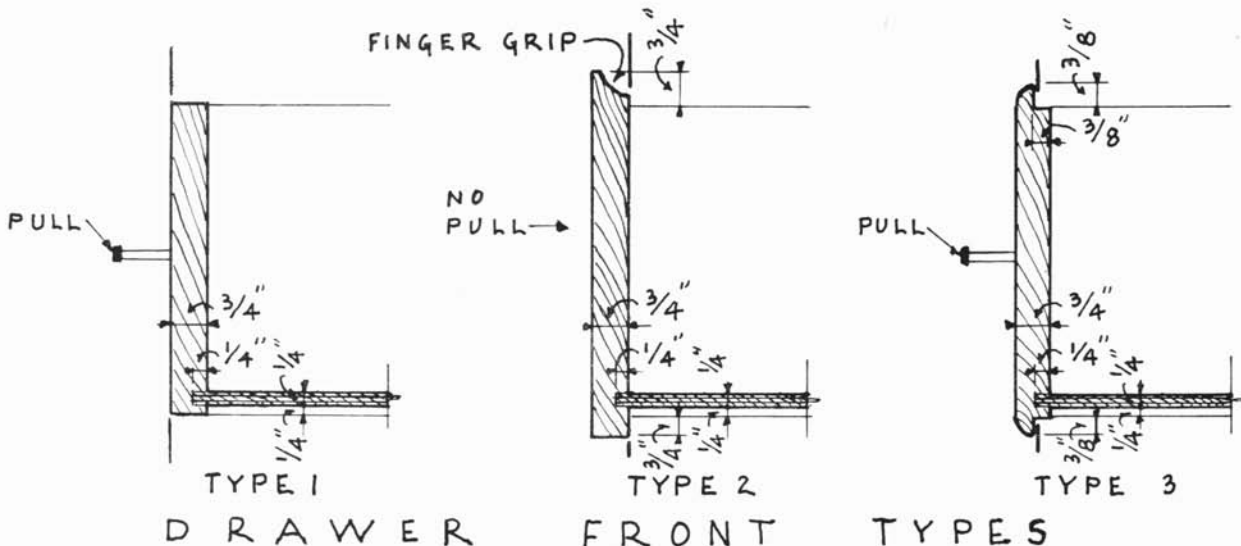
Drawers with smooth-sliding hardware and designed with the correct inside height afford the best storage for base cabinets. They conserve space and are easy to manipulate.

Recommended inside heights for various kinds of supplies are:

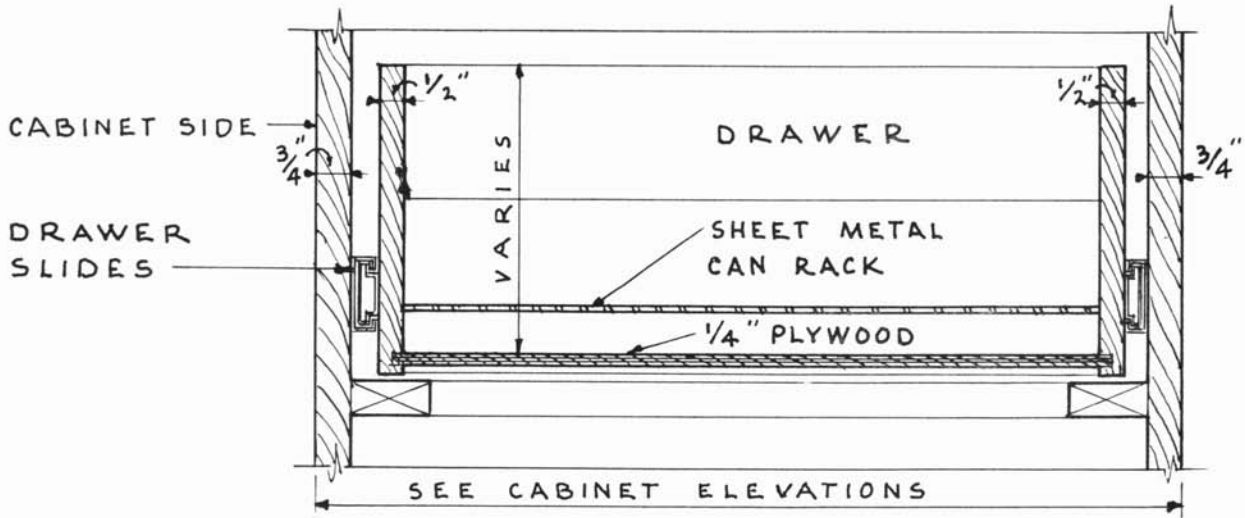
- 3 to 3½ inches. . . . . silver, small tools, spices
- 3½ to 4 inches. . . . . linens for sink and table
- 6 to 7 inches. . . . . saucepans, canned foods
- 10½ to 11½ inches. . canisters, large packaged foods
- 11½ to 12½ inches. . shallow utensils stored vertically.



The diagrams on this page and pages 10 and 11 show good construction for drawers. Type 1 with pulls is flush with the front of the cabinet. Type 2 with finger grips saves the cost of hardware, but does not give as good a balance when pulled. Type 3 with lip construction and pulls gives a tight seal and is preferred by many builders.

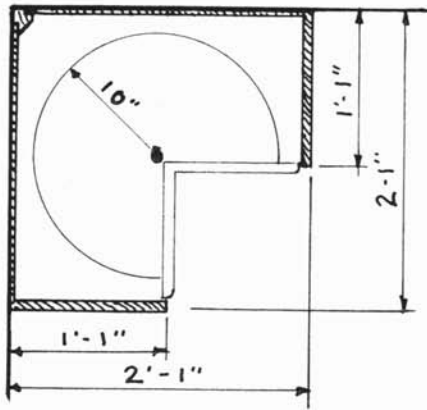






S E C T I O N   A

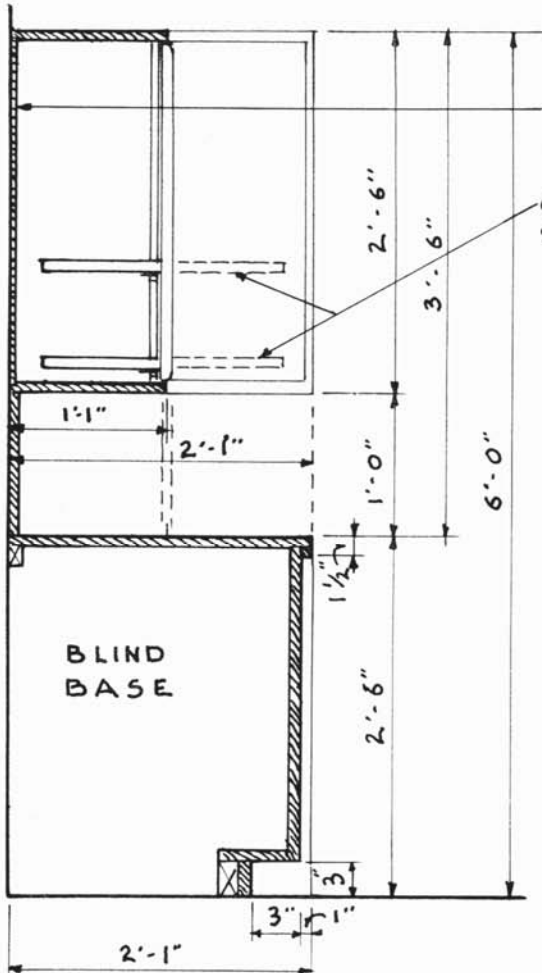
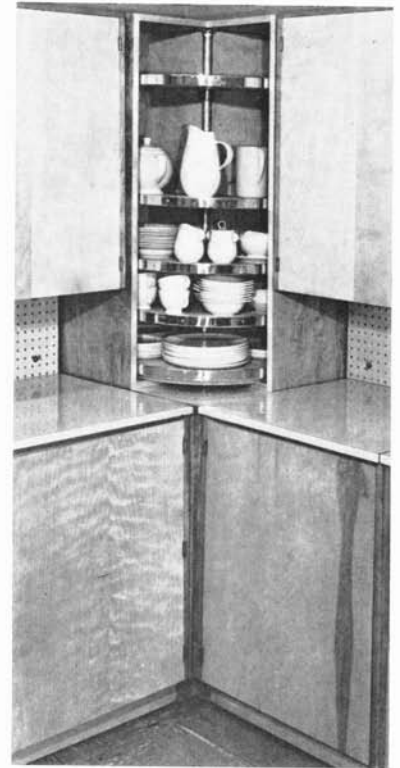




PLAN AT WALL  
CABINET

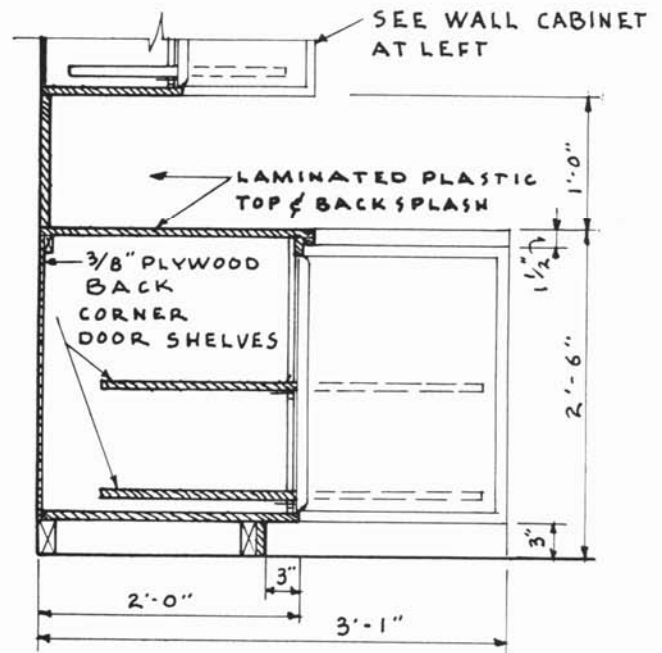
## Corner Cupboard

Corners are difficult to use from a seated position, but revolving shelves make contents more accessible. An upper cabinet which extends to the counter brings more shelves within reach, and eliminates an inaccessible corner counter. Open knee space adjacent to the corner makes the shelves even easier to reach.

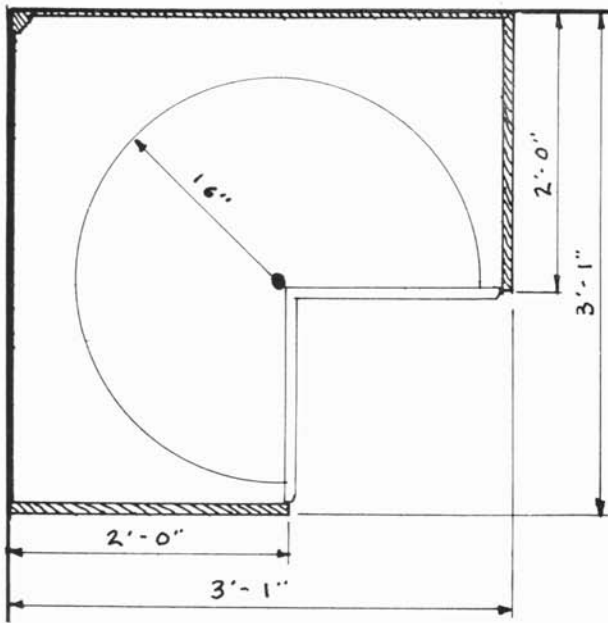


SECTION - ELEVATION

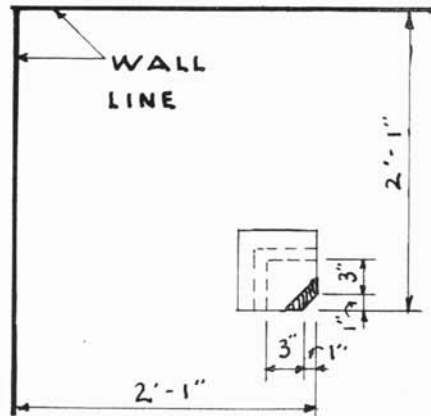
3/8" PLYWOOD  
BACK  
CORNER DOOR  
SHELVES



SECTION - ELEVATION



PLAN AT CORNER DOOR  
SHELF BASE



PLAN AT BLIND BASE

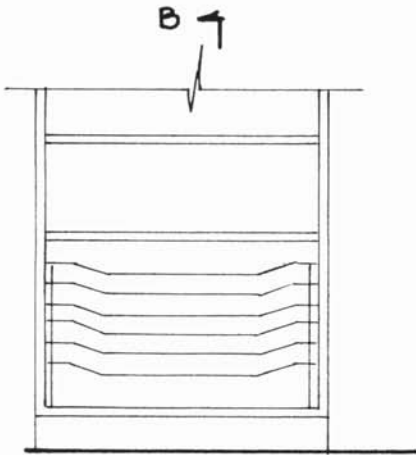


### Full-Height Cupboard

Shallow full-height cupboards, 12 inches deep, with adjustable shelves can be adapted to many uses. Slanting adjustable shelves permit storage of items greater in diameter than 12 inches.



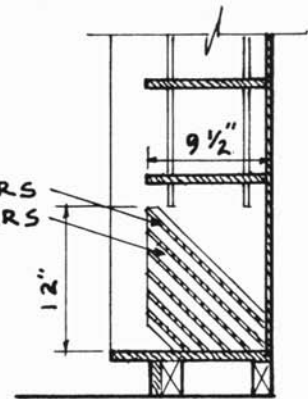




B1  
ELEVATION

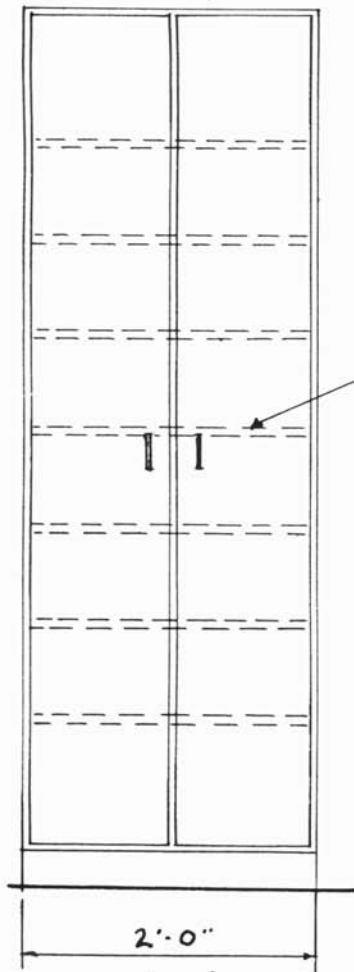
ALTERNATE FOR CABINET BELOW

1/4" PLYWOOD DIVIDERS  
3/4" x 1/2" WOOD SPACERS  
EACH SIDE OF CABINET



SECTION B

A1

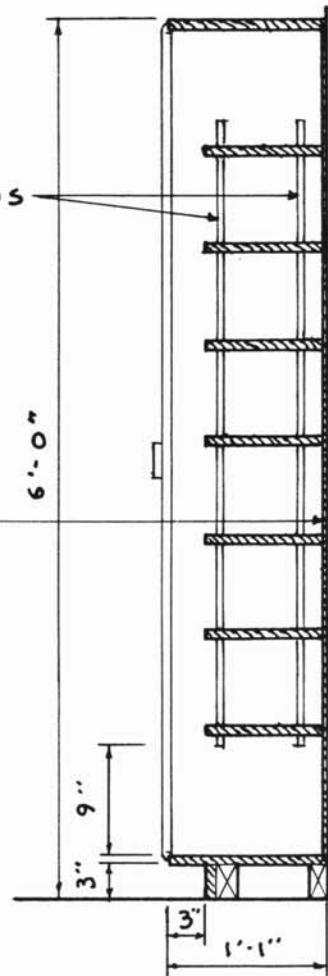


A1  
ELEVATION

SHELF STANDARDS

ADJUSTABLE  
SHELVES

3/8" PLYWOOD  
BACK



SECTION A

## Standard Cabinet

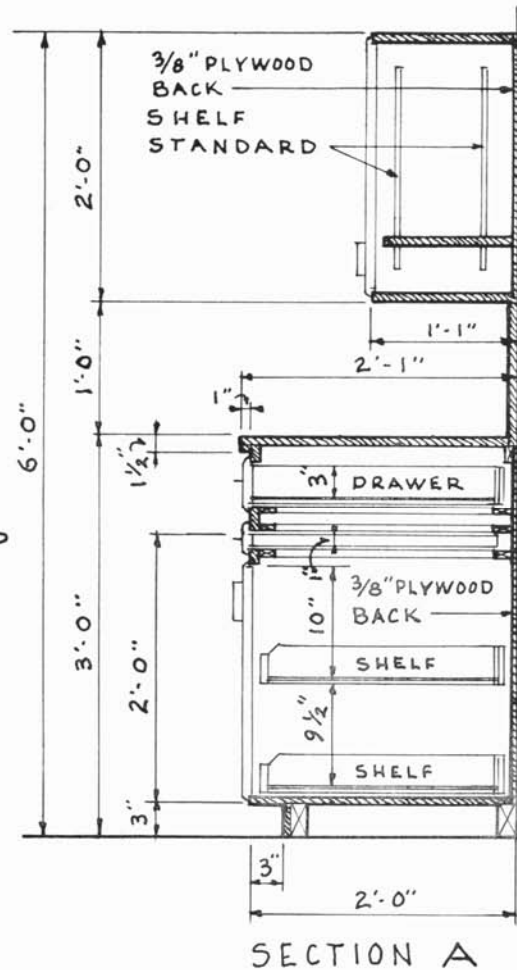
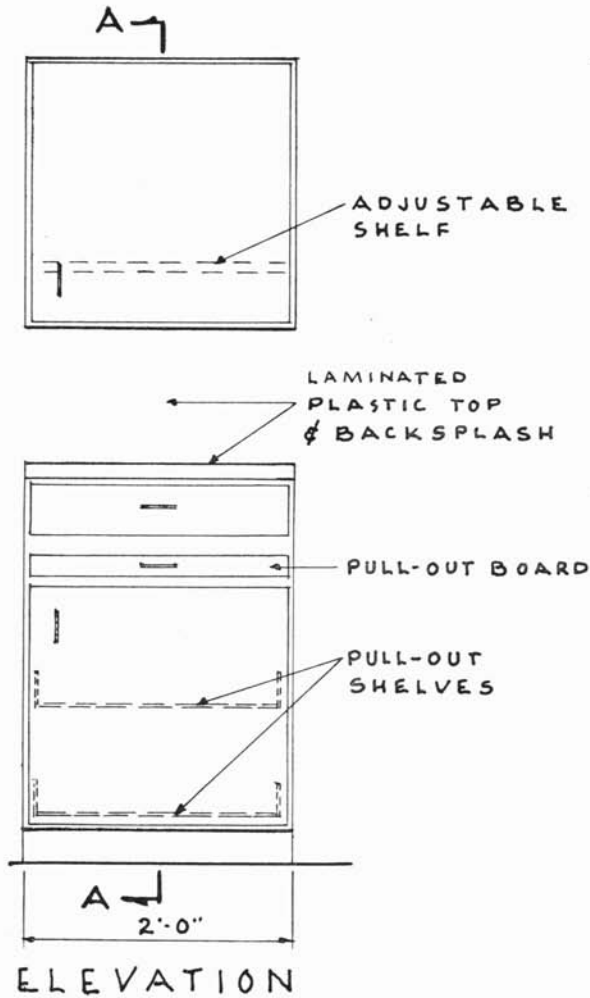
Counters on standard 36-inch-high base cabinets are too high for comfortable use from a wheelchair, but accessible storage in such cabinets can be planned. If counter space for a wheelchair worker is necessary, a pull-out board can be placed at a convenient height.

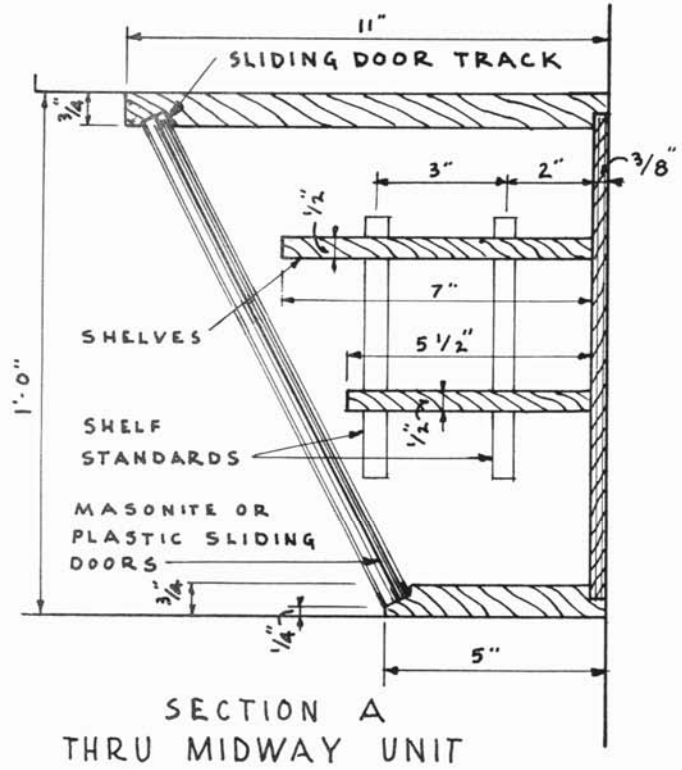
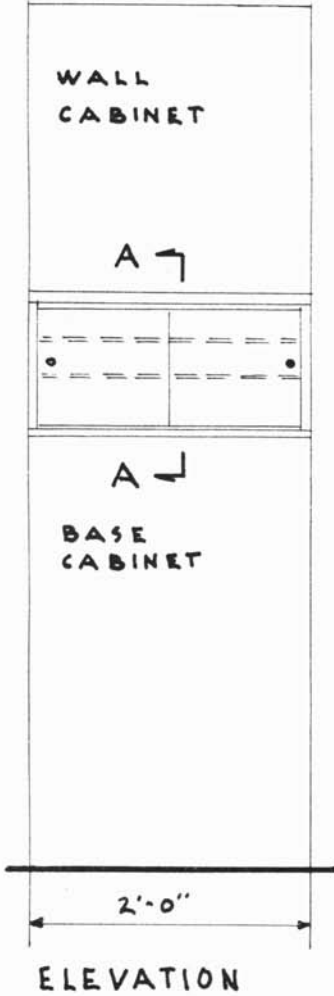
Vertical files on the lowest shelf of wall cabinets bring supplies within easy reach.

Midway units between the counter and upper cabinet also are easy to reach. The slanted design shown interferes very little with the use of the counter.

Pull-out shelves in base cabinets make large utensils easily accessible.

The special units shown on pages 18 to 20 illustrate other ways in which a standard 36-inch-high cabinet can be adapted to use from a wheelchair.

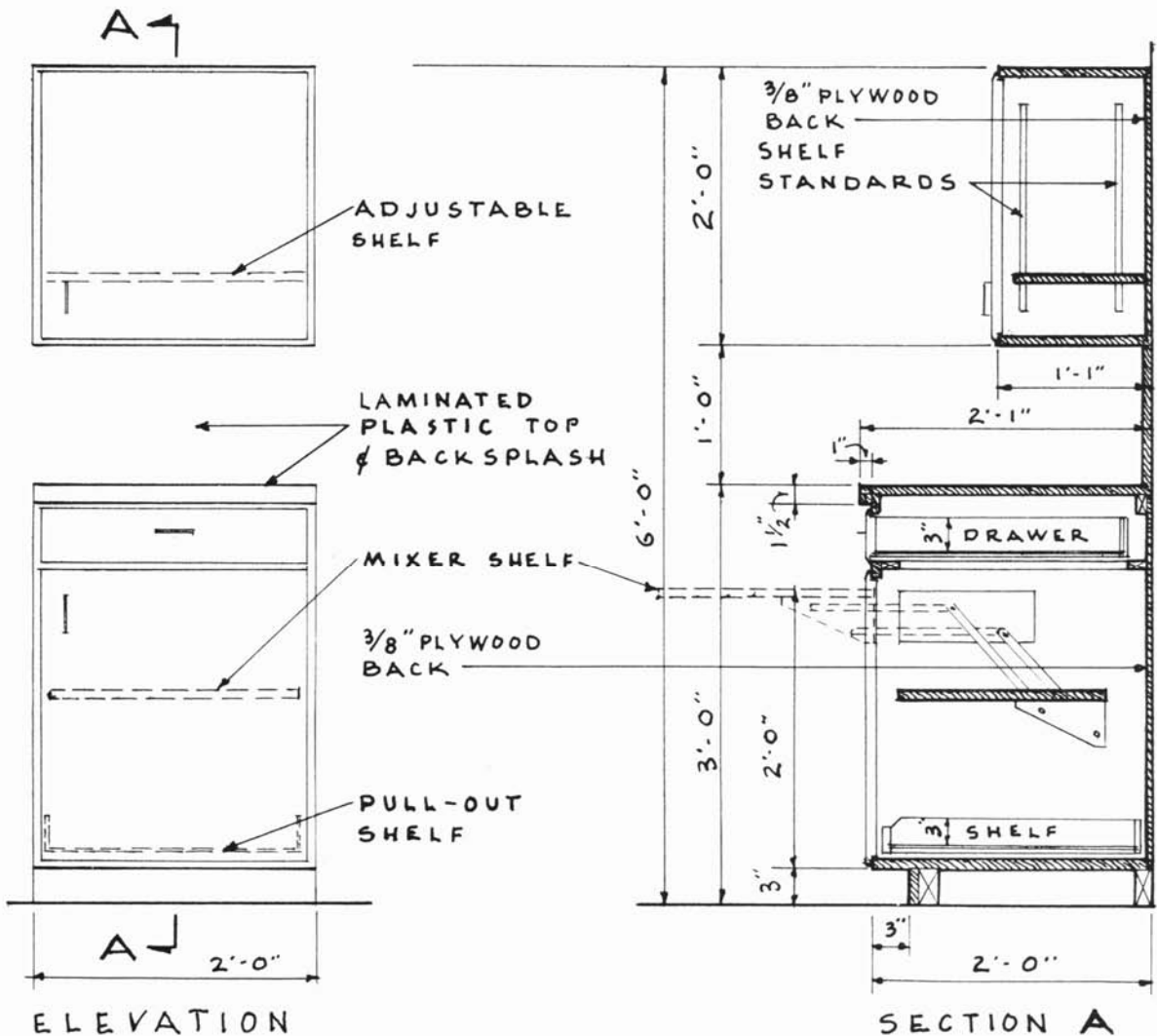
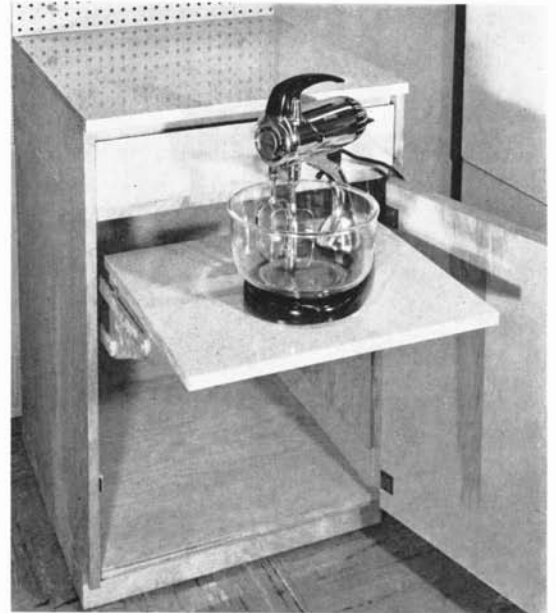




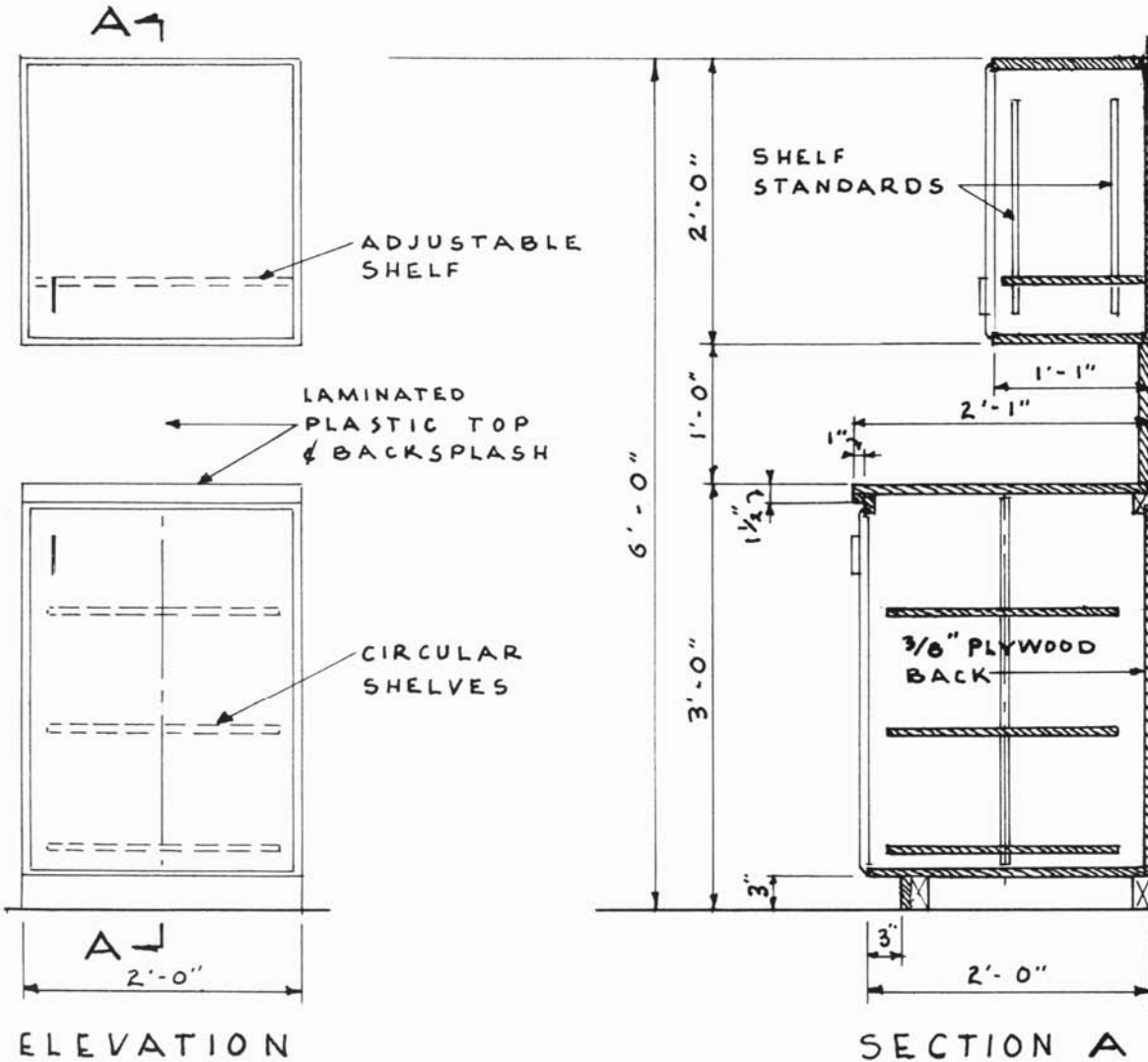
## Special Units

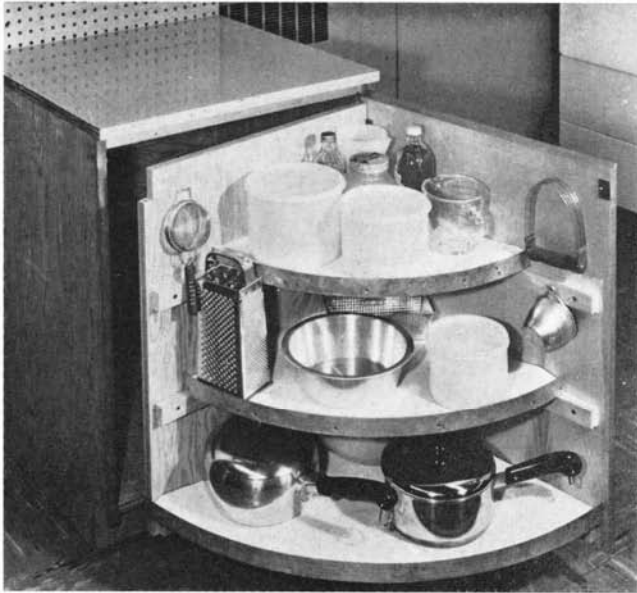
These special units are shown in standard 36-inch-high cabinets, but they can be adapted to cabinets of lower heights. Likewise, all the storage units in this circular that are designed for wheelchair kitchens can be incorporated in 36-inch-high base cabinets or standard-height wall cabinets for use in any kitchen.

*Mixer unit.* A pull-up unit for an electric mixer can be adjusted to a convenient height (27 inches shown here) for use from a wheelchair. The diagram shows a pull-out shelf at the bottom of the cabinet for storing mixer attachments.

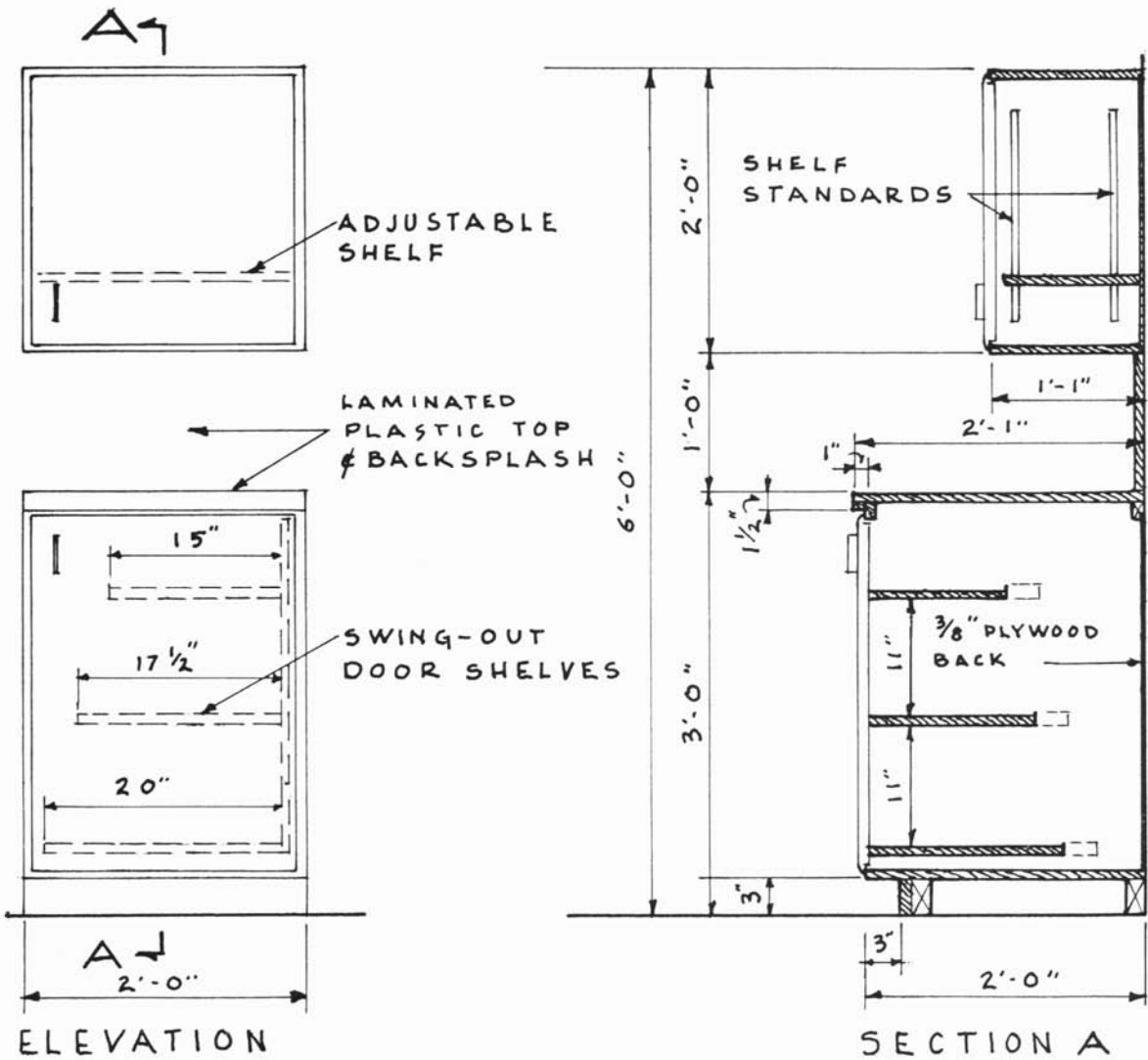


Revolving-shelf unit. Persons with weak arm muscles can easily use revolving shelves that operate independently of each other.





Swing-out unit. Swing-out shelves bring supplies within easy reach.



## COMMERCIAL CABINETS

The kitchen cabinets shown in this publication were custom built to illustrate special designs for use from a wheelchair. For those who wish to use commercial units, standard wall cabinets present no problem. Cabinets 24 and 30 inches high with provisions for adjustable shelves can be hung at any convenient height.

Standard base cabinets present a problem because of the needs for lower heights, knee space, and easily accessible storage space. Heights in commercial cabinets could be reduced by eliminating toe space — 4 inches — which is not needed for work from a wheelchair. Toe-space units could be added later to bring the cabinets to standard height if the house were sold. To provide for knee space

at the sink, range, and mix centers, counters could be placed between base cabinets. Storage units designed for wheelchair workers might be difficult to find, but there are units available with drawers, pull-out shelves, and revolving shelves, which could fill this need if carefully selected.

In planning a kitchen for a person in a wheelchair, it should be recognized that the kitchen will probably also be used by others who stand to work. For this reason some standard-height units, with storage space suitable for wheelchair workers, should be included. As far as wheelchair workers are concerned, the design of work centers — sink, range, and mix — should be given the most attention.

## APPLIANCES

Many commercial appliances are suitable for women who work in wheelchairs. In selecting appliances, consider the following points.

*Refrigerators* with a side-hinged door on the freezer compartment and door shelves are excellent. Pull-out or revolving shelves add to easy accessibility. The model shown on page 22 is only 28 inches wide and 56 inches high, with a door hinged so that when it is opened it is flush with the refrigerator and does not require extra wall space.

Front-opening *dishwashers* are easy to use. A self-cleaner is important, since it is difficult to reach the drain from a sitting position. Most dishwashers require a 36-inch-high cabinet. One brand may be lowered to 32 inches by removing the toe space.

A *separate oven* has the advantage of being easy to place at a convenient height. The most frequently used oven shelf should be at counter height. A side-hinged door would eliminate the hazard of burns from a hot door, but a model was not available at the time the research took place. If a side-hinged door is used, a heatproof pull-out board just below the oven is recommended for setting hot dishes.

Most of the women who were tested in the research did not object to the use of ovens in stand-

ard ranges. However, such ranges are not suitable for use from a wheelchair because the high burners and lack of knee space present a safety hazard. The low broilers in most ranges are also dangerous. A high broiler, with a side-hinged door, is desirable.

*Surface burners* are available as single or double units which are easy to insert in counter tops. Three burners would be adequate in many kitchens if supplemented with small electrical appliances. Controls should be easy for the homemaker to reach but difficult for children to manipulate.

*Sink bowls* should be shallow with drains at the back to allow for knee space and to prevent burns from hot pipes. The double-bowl, 5-inch-deep sink, with drains at the back, illustrated on page 2, was custom made, but a similar one is now on the market. Garbage disposal units can be fitted to these sinks.

Front-opening *washing machines* and *dryers*, with side-hinged doors are easy to use. Avoid models with drop-down doors.

Adjustable *ironing boards* are available in a variety of models. Select one that is easy to adjust. Not only is an adjustable ironing board good for ironing, but, with a plywood counter added, it also makes a good sewing or typewriter table.



## Appliances

The pictures on these two pages illustrate styles of appliances recommended for women in wheelchairs, with the exception of the low broiler shown on the opposite page. This photo is included to show how hazardous this type of broiler can be.







## KITCHEN ARRANGEMENTS

The three basic kitchen arrangements—the U, the L, and the Corridor—on the following pages incorporate the work centers, storage cabinets, and appliances illustrated on pages 2 through 23. The plans show different ways to obtain needed counter heights and widths, knee space, and storage units in good locations.

Part of the research in designing these kitchens involved the preparation of meals by women in wheelchairs to test the convenience of the three basic arrangements. The women who took part in this phase of the study found that each type of kitchen was easy to use. However, the two corners in the U kitchen and the one corner in the L presented a problem: counters and cabinets in these corners were difficult to reach and clean. For this reason, in the plans shown here special attention has been given to making corners as accessible as possible.

The main advantage of the U kitchen is its compactness. The L kitchen requires more travel distances than the other arrangements, but it has the advantage of ample space within the kitchen area for a table and allows for flexibility in the placement of doors. The corridor arrangement, with 5 feet between cabinets and appliances opposite each other, presents no problems. It eliminates corners, is compact, and has short travel distances.

Unlike the separate units assembled to form the kitchens tested in the original research, these finished kitchens have continuous counters. Besides improving the overall appearance of the kitchen, continuous counters are useful for sliding objects along instead of carrying them while moving in a wheelchair. They also make it possible to interchange base cabinets if desired.

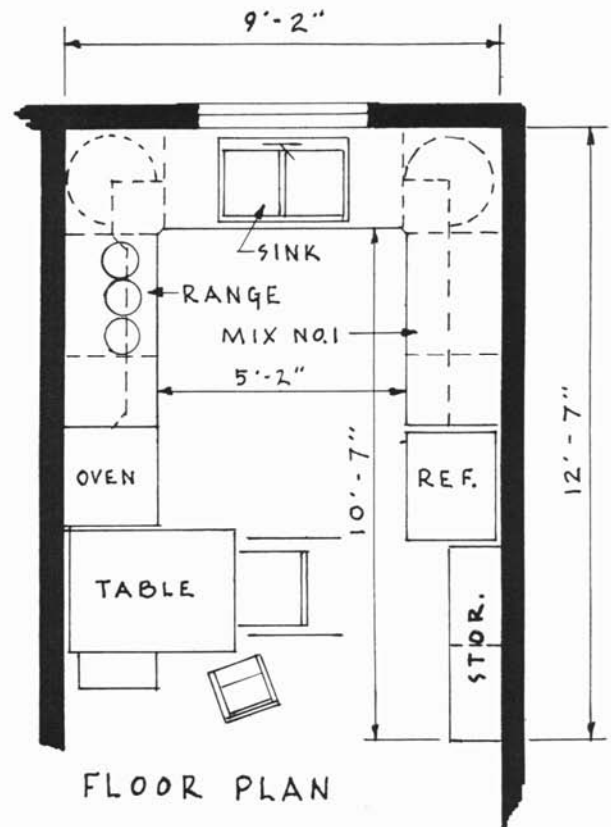
In these arrangements, the 27-inch-high mix counter (see page 8) is referred to as Mix No. 1 and the 30-inch-high counter (see page 6) is referred to as Mix No. 2. Pull-out boards are shown by dotted lines extending out from the counter. Wherever a table is shown, a sketch of a wheelchair is included to show the space available at the table.

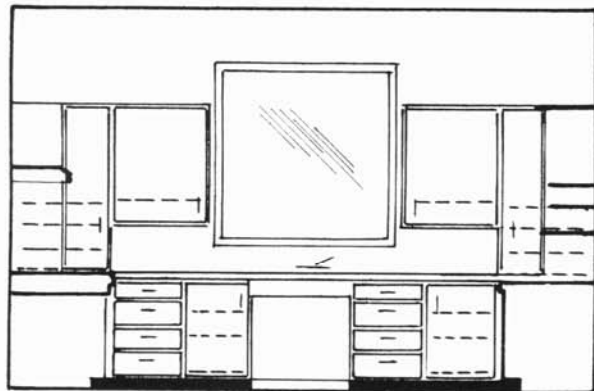
It may not be possible to use any of the plans exactly as shown when designing a specific kitchen,

because of door and window locations or available floor space. Also the particular physical limitations of the person for whom the kitchen is planned may require changes, such as in the height of counters. In addition, individual tastes vary; for example, where one person may want drawers, another may prefer revolving shelves. Nevertheless, these plans should suggest arrangements that can be modified to meet the needs and desires of the individual.

### U Kitchen: Plan A1

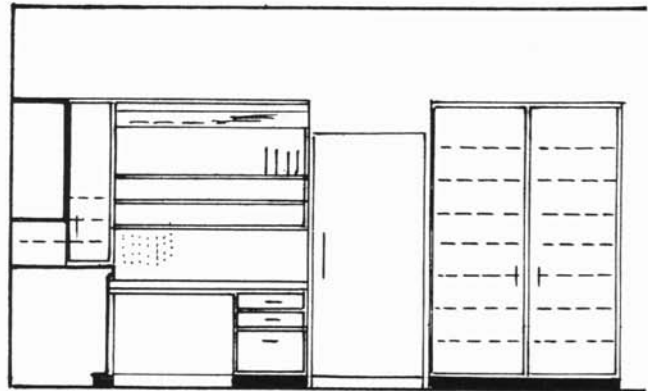
In this minimum U plan, two storage units of the larger U kitchen shown on page 25 have been omitted and the table has been placed against one wall. This arrangement is suitable for a small family (note the high chair at the table). Corner cupboards above the counter, rather than ones extending to the counter, should be used to allow for adequate sink counters. See page 25 for the elevation of this kitchen (except for the changes noted above).





SINK

ELEVATION - VIEW 1

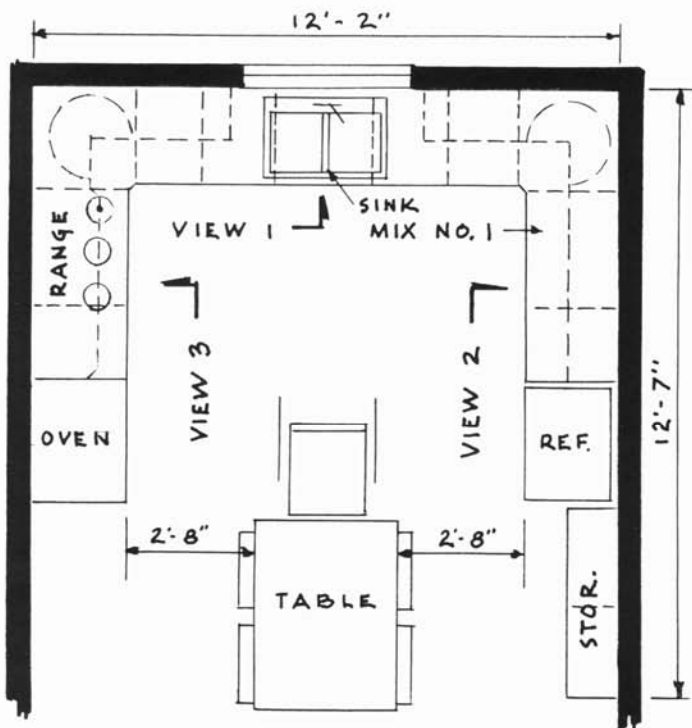


MIX NO. 1 REF.

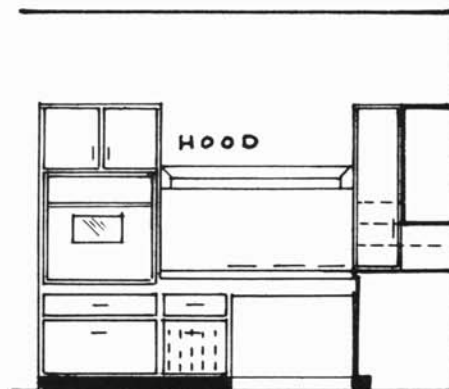
ELEVATION - VIEW 2

### U Kitchen: Plan A2

This U kitchen has blind base corners and upper revolving corner shelves that extend to the counter. If revolving shelves were used in the corner base cabinet, the width of the cabinet would have to be increased one foot on each side to accommodate the circular shelves. Although the 27-inch-high counter is shown, either mix center fits well. The plan shows a possible table location and allows flexibility in placing doors and additional storage.

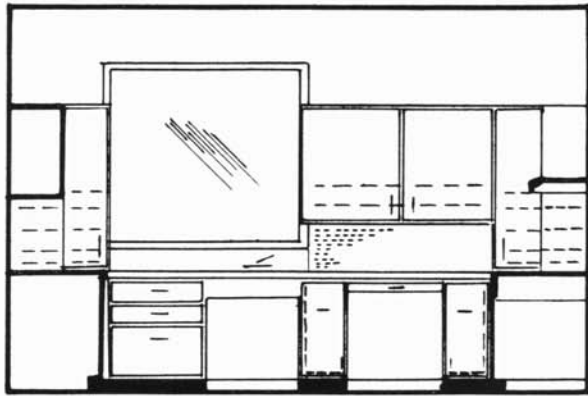


FLOOR PLAN



OVEN RANGE

ELEVATION - VIEW 3



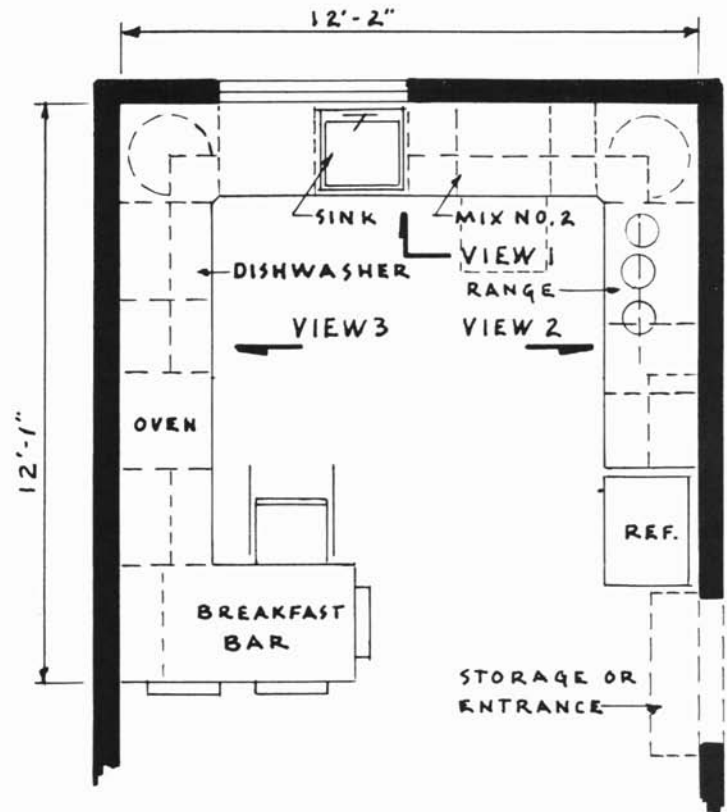
SINK MIX NO 2  
ELEVATION VIEW 1



RANGE HOOD REF.  
ELEVATION VIEW 2



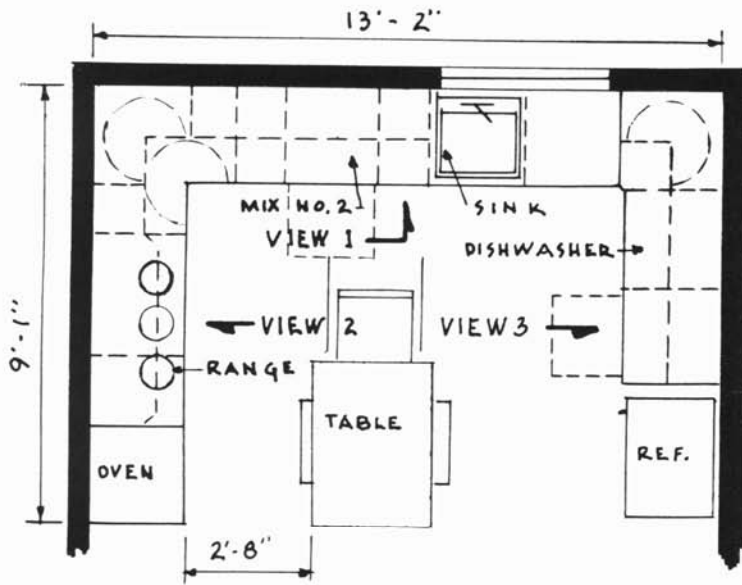
APPLIANCE CENTER T.V. 2'-3" SERVE OVEN DISH-WASH.  
ELEVATION VIEW 3



FLOOR PLAN

### U Kitchen: Plan B

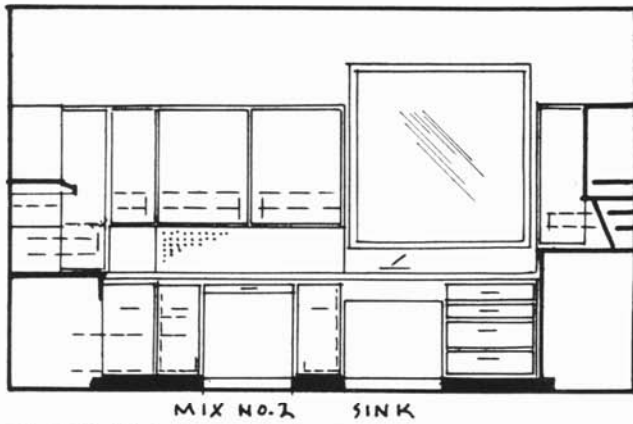
This U kitchen shows a serve center and breakfast bar. The 36-inch-high counter above the dishwasher can be used by standing persons. This kitchen plan permits flexibility in the placement of doors and additional storage.



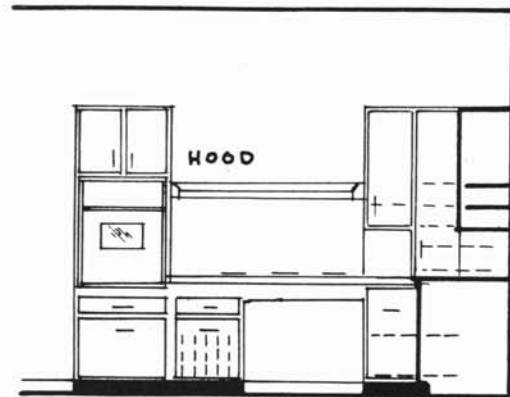
FLOOR PLAN

### U Kitchen: Plan C

This kitchen has a dishwasher and a 4-foot-wide single-bowl sink. The 4-foot sink unit has room for only one storage cabinet containing four drawers. One drawer and two pull-out shelves could be used, if preferred. The 5-foot double-bowl sink unit could be used with this plan by increasing the width of the kitchen by a foot. This plan shows a revolving-shelf base cabinet in one corner and a blind base in the other.



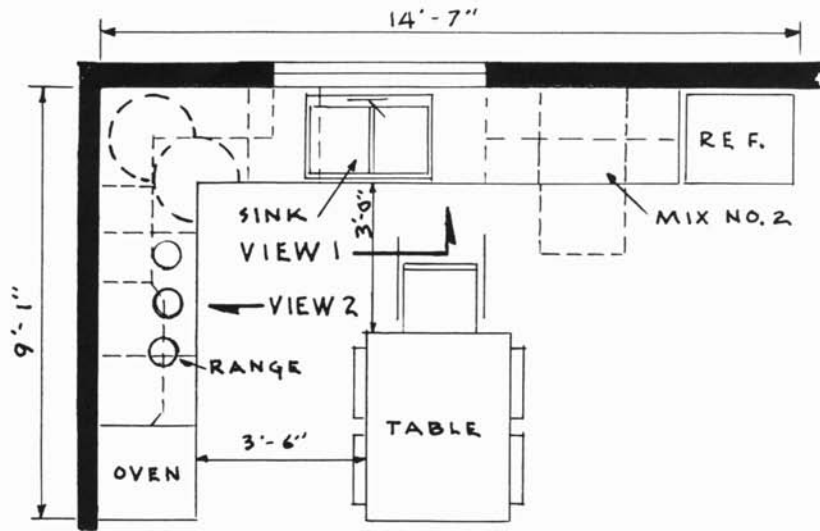
ELEVATION VIEW 1



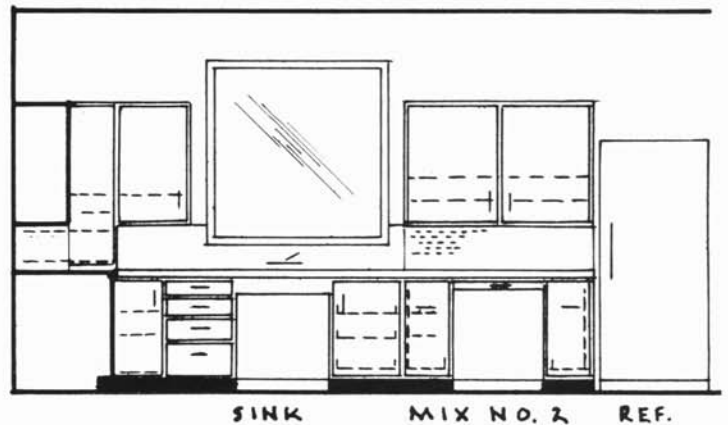
ELEVATION VIEW 2



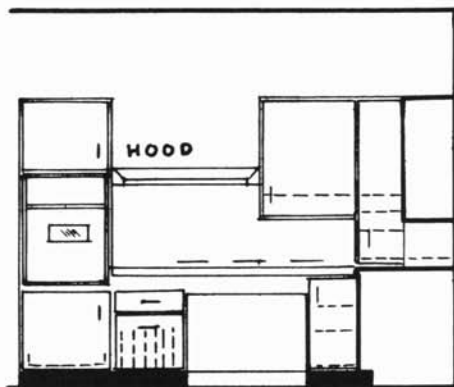
ELEVATION VIEW 3



FLOOR PLAN



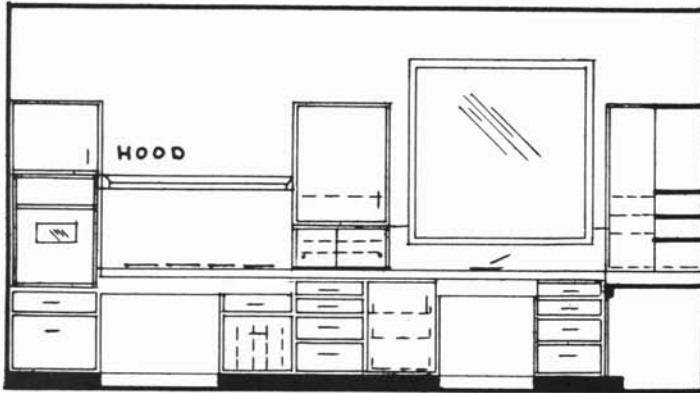
SINK MIX NO. 2 REF.  
ELEVATION VIEW 1



OVEN RANGE  
ELEVATION VIEW 2

### L Kitchen: Plan A

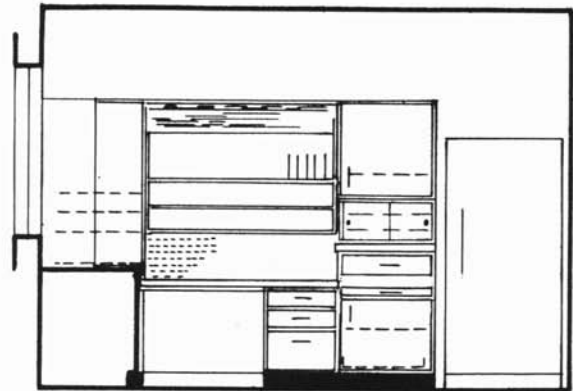
The use of Mix No. 2 in this kitchen allows easy transfer of items from the mix center to the sink center on counters of the same height. There is ample space for a table and additional storage.



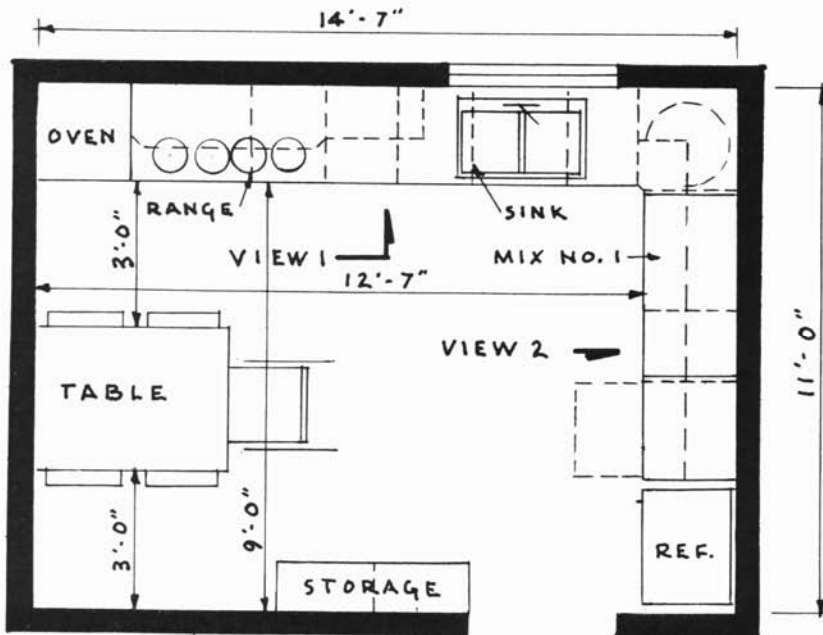
OVEN RANGE SINK  
ELEVATION VIEW 1

### L Kitchen: Plan B

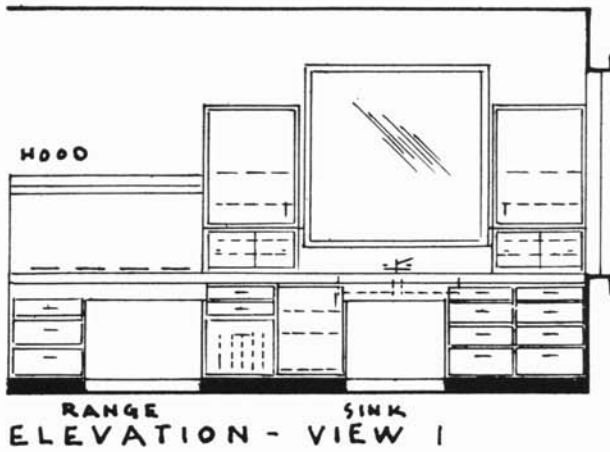
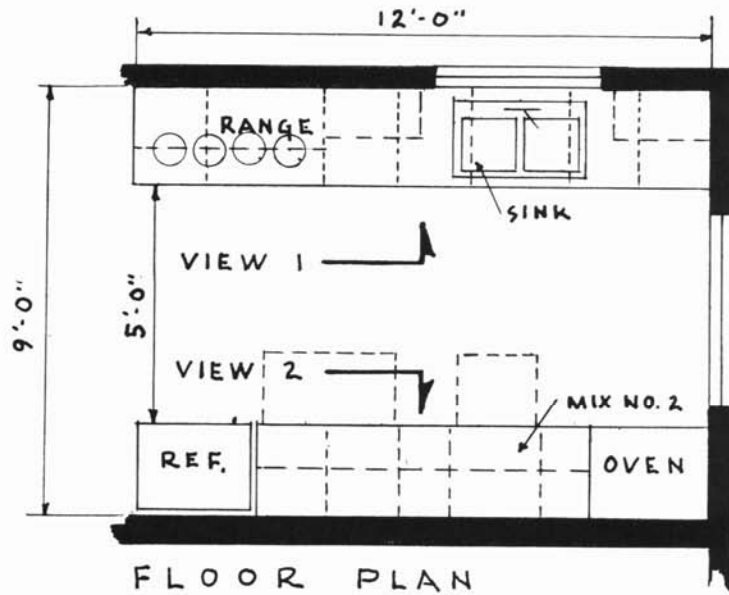
This L kitchen permits considerable freedom in the placement of doors, table, and additional storage units. Either mix center fits equally well. A 36-inch-high unit next to the refrigerator is also shown. It provides storage adjacent to the mix center and a small work counter for a standing person.



MIX NO. 1 REF.  
ELEVATION VIEW 2

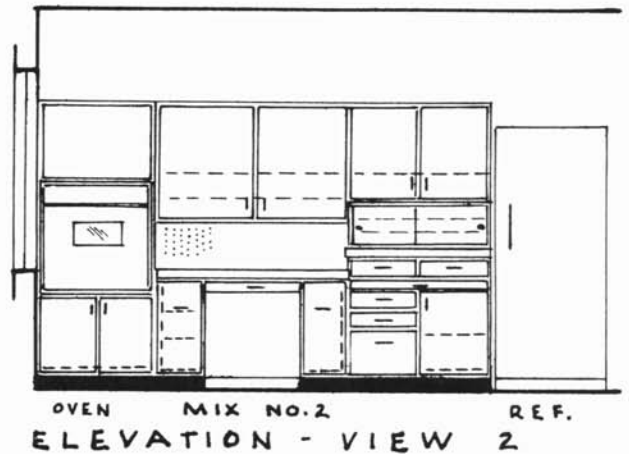


FLOOR PLAN



### Corridor Kitchen: Plan A

This 9 x 12 corridor plan includes excellent storage and counter facilities within a minimum space. The 36-inch-high, 36-inch-wide unit adjacent to the refrigerator provides a work counter for a standing person and a pull-out board for eating space. Either mix center may be used.





## Corridor Kitchen: Plan B

This corridor plan allows space for a table. A smaller window over the table would allow space for a door between the table and refrigerator if desired. Either mix center may be used. A 36-inch-high counter for the benefit of standing persons is included. A base cabinet with circular shelves is shown next to the sink center. Drawers or pull-out shelves could be used in this cabinet instead of revolving shelves.

