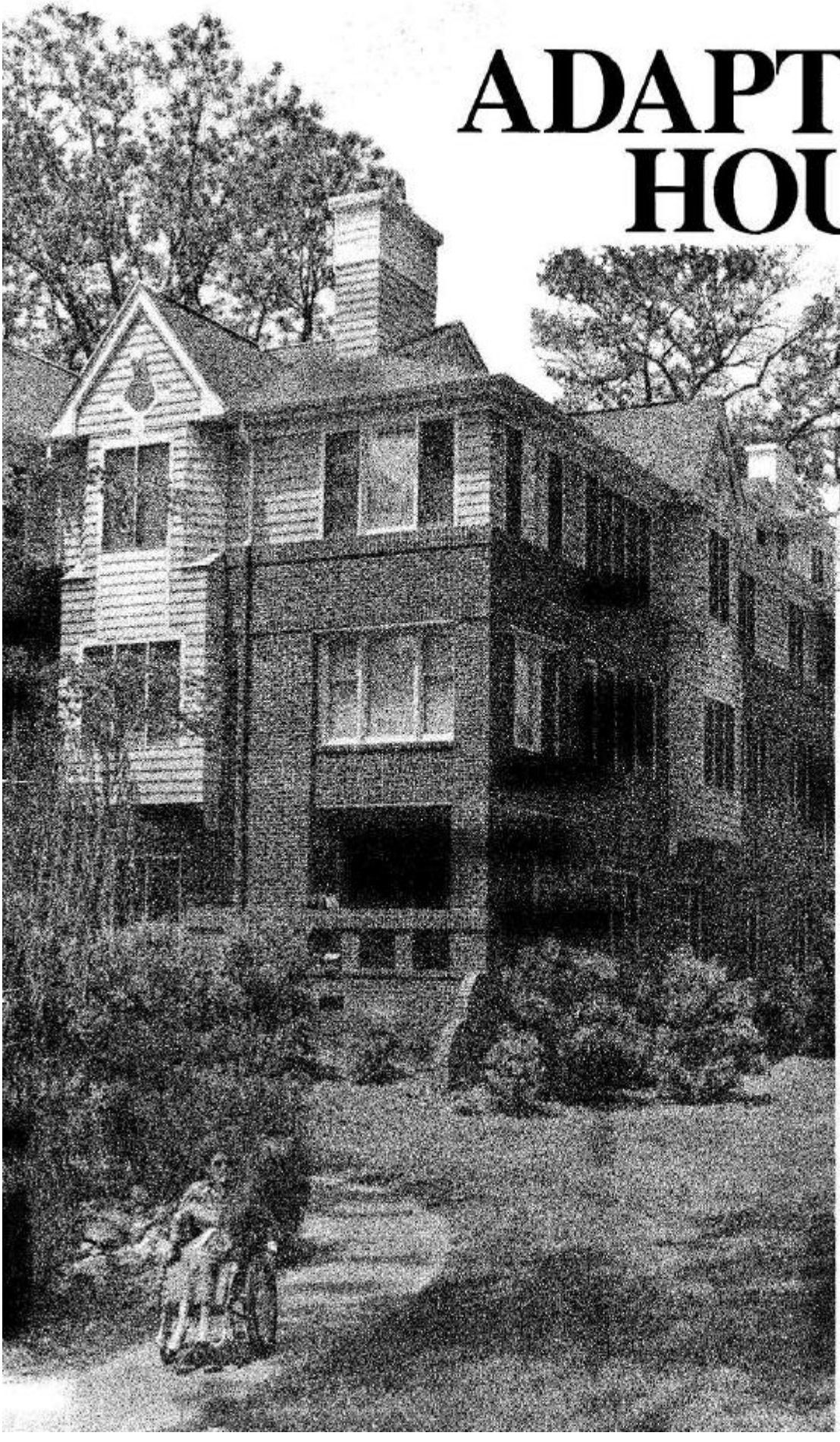
U.S. Department of Housing and Urban Development
Office of Policy Development and Research

ADAPTABLE HOUSING



MARKETABLE ACCESSIBLE HOUSING FOR EVERYONE

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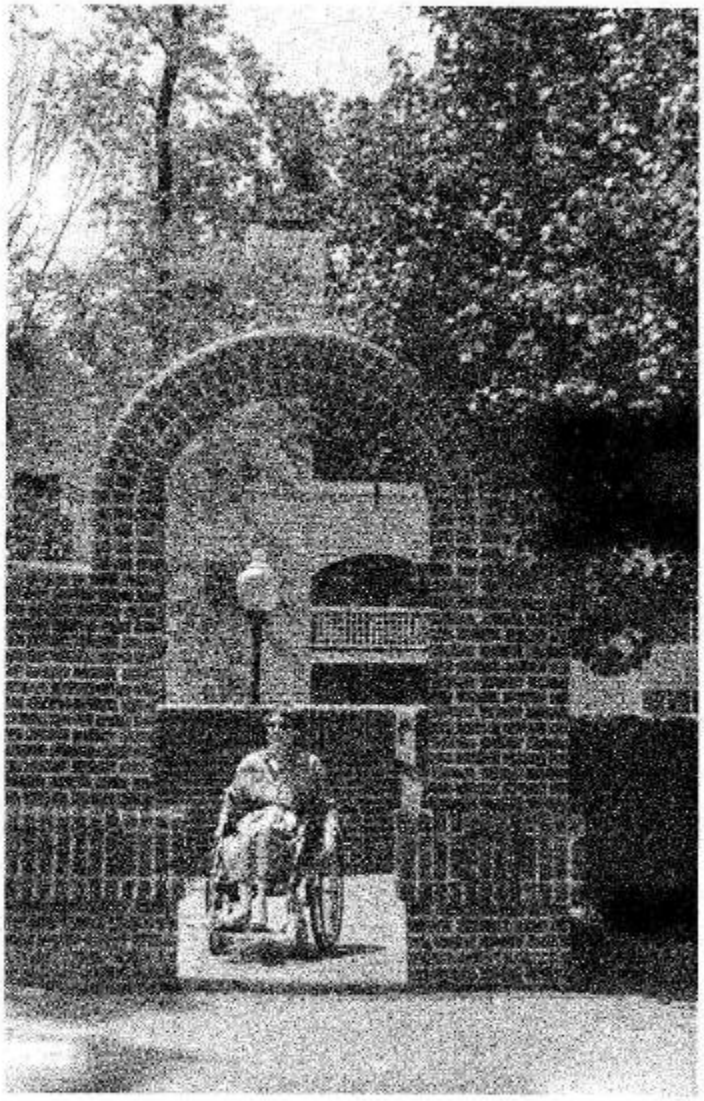
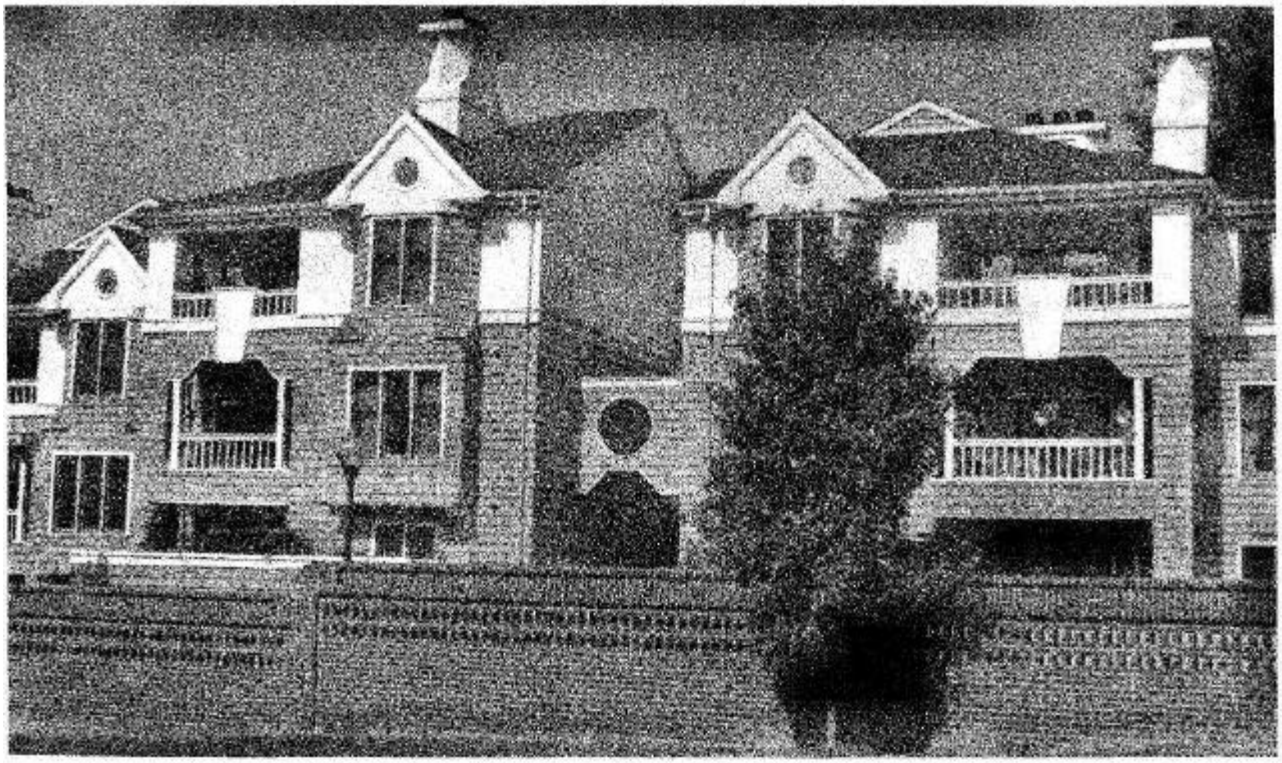
ADAPTABLE HOUSING



A TECHNICAL MANUAL FOR IMPLEMENTING ADAPTABLE DWELLING UNIT SPECIFICATIONS

DESIGNED AND DEVELOPED BY
BARRIER FREE ENVIRONMENTS, INC.
RALEIGH, NORTH CAROLINA

FOR
THE U. S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
OFFICE OF POLICY DEVELOPMENT
AND RESEARCH



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1987

CONTENTS

(continued)

CONTENTS

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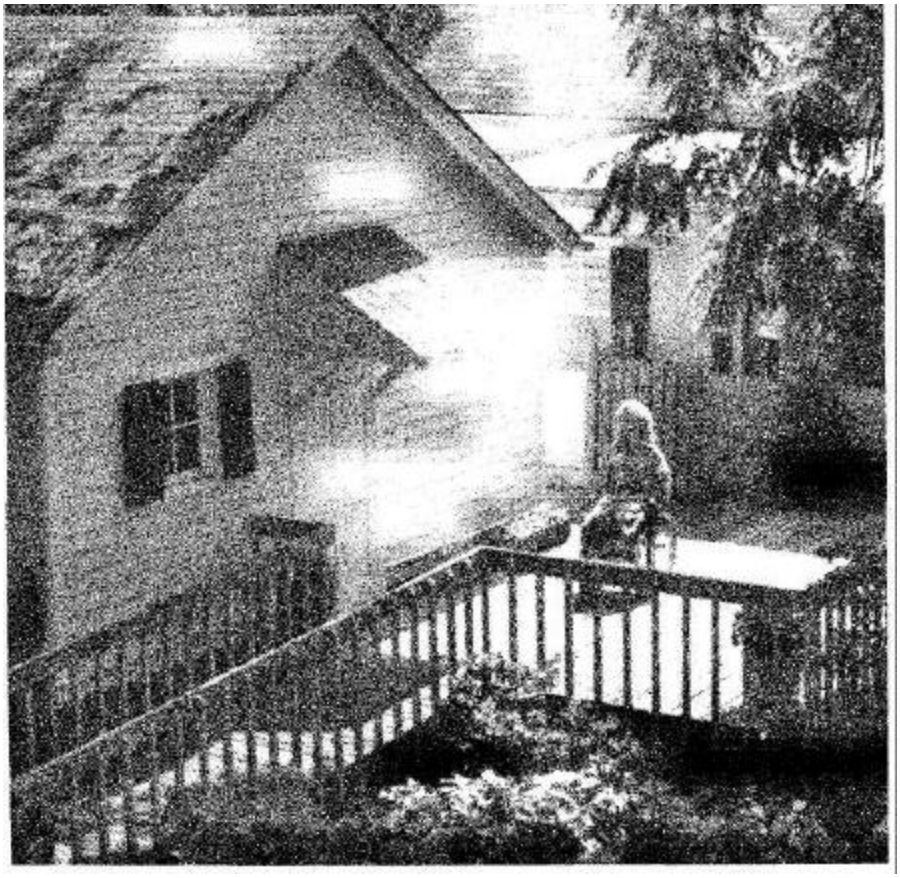
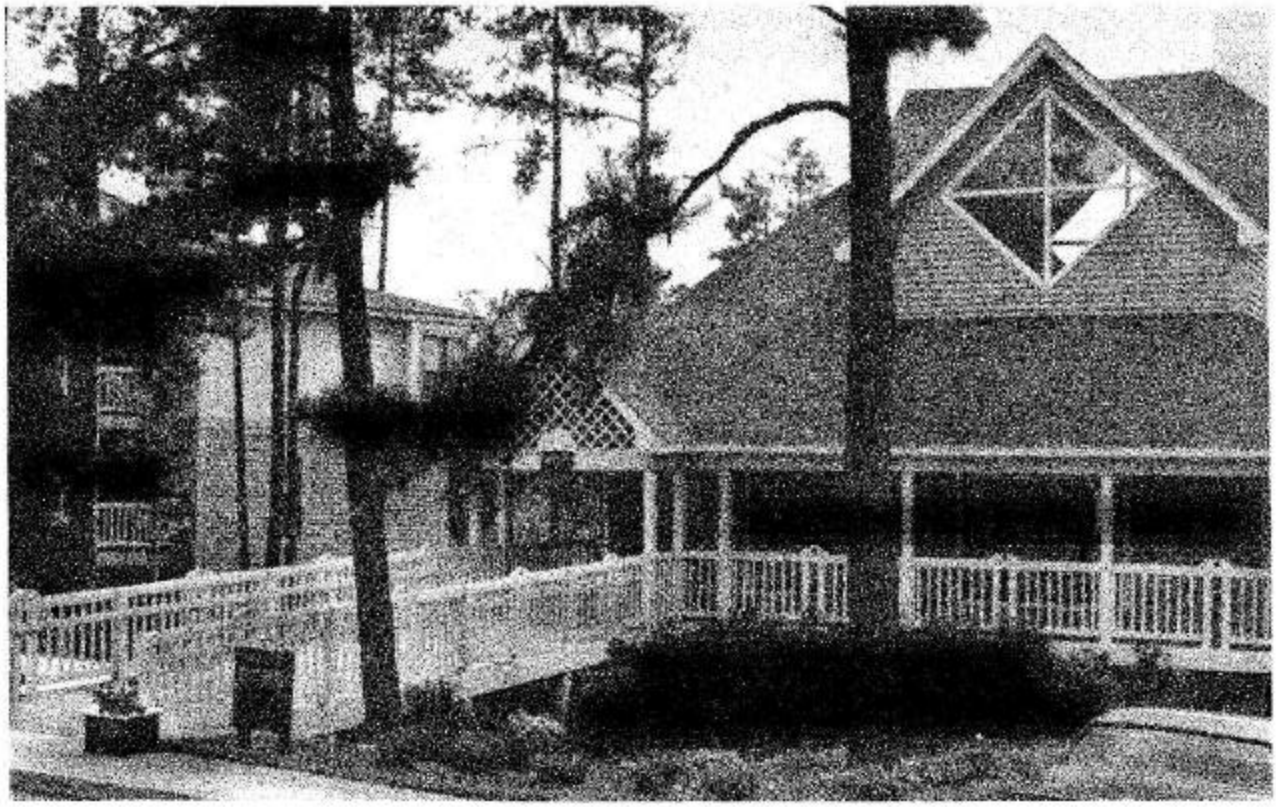


INTRODUCTION



Ever since provisions for accessible housing have been included in building codes and standards, the building industry as well as disabled people have been dissatisfied with most fixed accessible housing units mandated by state and federal laws. Problems such as inappropriate design details, inadequate space for families, clinical appearance, high vacancy rates, limited numbers, and poor locations are among the complaints.

Adaptable housing, a little understood design approach, appears to be one solution for many of these problems. It holds the promise of more universally usable housing in the future at little or no extra cost.

Adaptable housing is accessible housing that does not look different from other housing and which has features that in only minutes can be adjusted, added, or removed as needed to suit the occupants whether they are disabled, older, or non-disabled. By creating housing that can fit any occupant, the adaptable design approach opens up the possibility for mass-produced, attractive, and universally usable housing in all sizes, price ranges, and locations.

Adaptable housing has many potential benefits both for disabled people who need accessible housing and for developers, builders, and managers of housing. As adaptable housing becomes widely available, disabled people will have a greater choice of housing locations both to live in and to visit. Developers and builders will find it is less expensive to build more units of the same kind. Owners and managers will be able to rent to a larger market.

For the past 15 years the concept of adaptable housing has been continuously developing into a method for residential design. Adaptable housing features are now specified in the national and federal standards for accessibility which have been adopted into many state and local building codes.

As the adaptable housing concept becomes more wide-

spread, the demand for information on designing and building adaptable units increases. It is the purpose of this book, *Adaptable Housing*: *A Technical Manual for Implementing Adaptable Dwelling Unit Specifications*, to provide this information and to promote the further development of adaptable housing in the United States.

This book contains both general and technical information about adaptable housing and is intended for disabled and non-disabled people, builders, developers, managers, architects, product manufacturers, government officials, and building code officials.

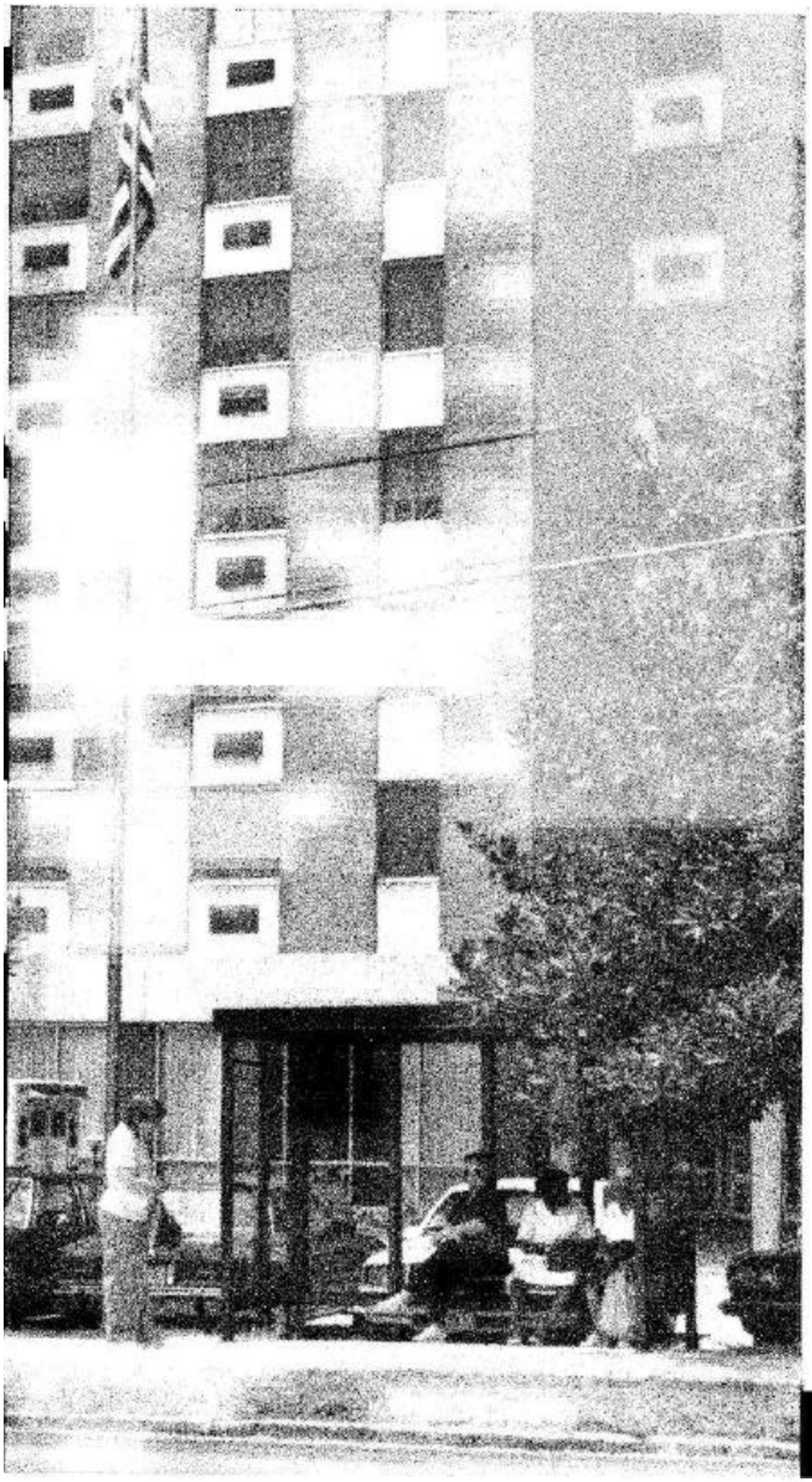
Adaptable Housing explains adaptable features as specified in the national and federal standards. These standards are the American National Standards Institute Al 17.1 -1986, *Providing Accessibility and Usability for Physically Handicapped People,* (ANSI 1986), and the 1984 *Uniform Federal Accessibility Standards* (UFAS 1984).

Adaptable Housing is divided into three chapters. Chapter 1 provides background information on the development of adaptable design, defines and explains adaptable housing, clarifies some misconceptions, and describes the benefits of adaptable housing for both housing consumers and the building industry.

Chapter 2 contains technical information. It explains and illustrates some suggested methods for providing adaptable features, shows examples of their use in model kitchens and bathrooms, and gives cost comparisons for these methods.

Chapter 3 describes the role of manufactured products in adaptable design, gives examples of some products which are helpful in creating adaptable housing and lists their sources, and discusses the need for new products. The three appendices contain information about the standards, addresses for product manufacturers, and sources of further information on adaptable and accessible design.

Adaptable Housing is designed to be used in conjunction with ANSI Al 17.1(1986) and UFAS (1984). It is in no way intended to be a substitute for these standards but rather is meant to help explain the requirements in detail and suggest some methods for implementing them. The user of this manual must refer to the ANSI and UFAS standards for all required dimensions, sizes, forces, loads, and arrangements of elements and must rely solely upon the standards, common practice, and approval of local jurisdictions for compliance with laws, regulations, and life safety requirements.



CHAPTER ONE
BACKGROUND

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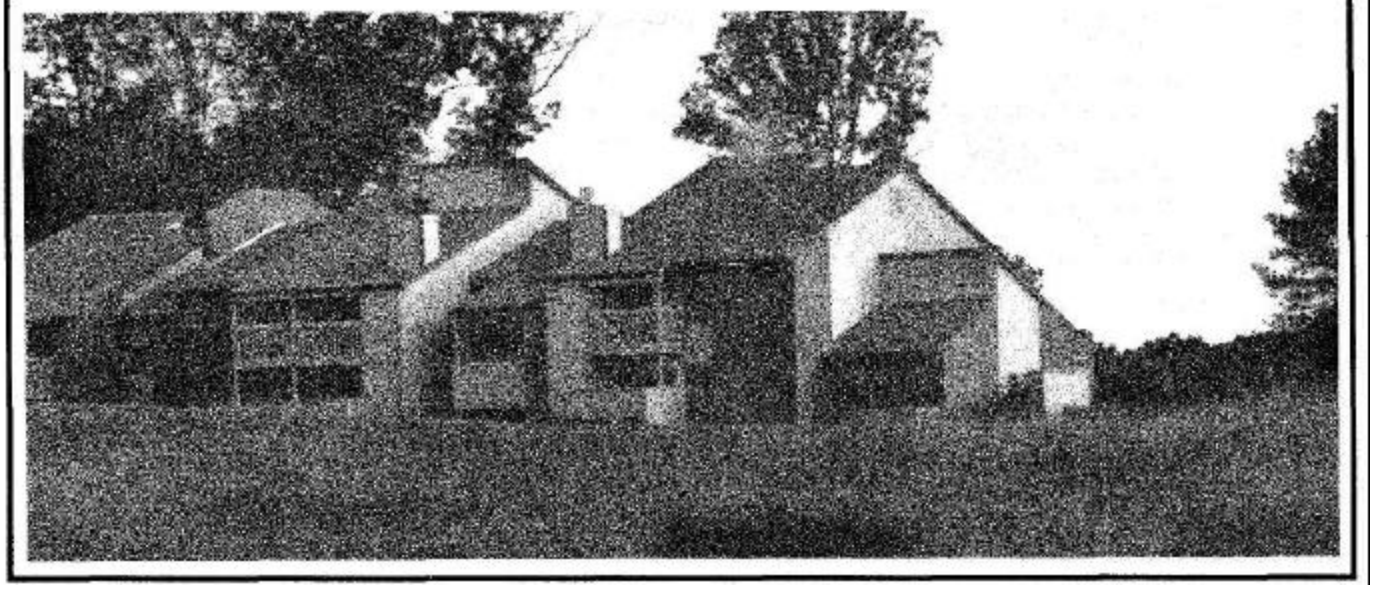
BACKGROUND



For years accessible housing for disabled people has been provided by building a small percentage of specially designed units. This method has caused dissatisfaction among both the disabled community and the housing industry. For disabled people, finding accessible, affordable, available housing has been almost impossible. For developers and builders, understanding the design requirements, and building and renting accessible units have been confusing and have caused financial losses.

Ironically, some of these problems have been caused by the way the standards that were intended to solve them have evolved. Now, the new direction toward adaptable housing presents an approach which should help solve these problems.

THE DEVELOPMENT OF ACCESSIBLE DESIGN STANDARDS

Early Design Standards

Efforts to make buildings accessible to disabled people gained impetus after World War II with the return of disabled veterans. Polio epidemics in the late 1940s and early 1950s, other diseases, the proliferation of the automobile and automobile accidents, and the rapidly expanding population also increased the number of disabled people. This new population required access to education and employment opportunities, but most builders and designers did not know how to accommodate them.

At that time no standards existed for design of accessible buildings. Over the years, pressure mounted for a design standard which addressed accessibility. In 1961, the American Standards Association (now the American National Standards Institute) published the first design standard on accessibility, *Specifications for Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped* (ANSI Al 17.1-1961). This early standard, based on research conducted by Dr. Timothy Nugent at the

University of Illinois, was adopted during the 1960s by states and federal agencies as the basis for accessibility requirements in building codes and construction regulations.

The 1961 ANSI standard was the first attempt to write a standard for design based on the way disabled people function. It was a good first step, but by today' s standards it had several serious deficiencies including a lack of provisions for some disability types and specifications for housing. However, as states and building officials adopted ANSI's technical specifications for use in their codes and building regulations, they began to discover the deficiencies and saw the need to add and change certain provisions for their local jurisdictions.

Under pressure from disability advocacy organizations and the U.S. General Accounting Office, states and federal agencies added to the standard in order to overcome its deficiencies and to expand its coverage. As a result, these new specifications, which were based upon local opinions or individual preferences, varied widely. By the mid 1970s there were approximately 65 different codes and regulations for accessible design in the U.S., and most of them required very different solutions to similar accessibility problems. For some projects as many as three standards or codes could apply. The chaos and confusion resulting from inconsistent codes caused compliance and enforcement problems and prevented manufacturers from producing profitable products that could meet the standards. As a result, disabled people and the building industry began to lobby for more uniformity.

The Move Toward Uniformity

In response to the need for uniformity, the secretariat for the ANSI Al 17.1 standard initiated research, funded by the Department of Housing and Urban Development, to evaluate and revise the 1961 standard. The goal was to expand the standard's coverage of disability types and building components and to add specifications for housing. The new standard, which was more detailed than any previous version and included a section on housing, was approved by the ANSI committee and published in 1980.

In 1984, the ANSI (1980) technical specifications were largely incorporated in the new *Uniform Federal Accessibility Standards* (UFAS), currently the standard for all federally funded construction subject to the Architectural Barriers Act. UFAS incorporated a few minor adjustments and omitted a few of the ANSI technical specifications. As a result, for the first time all federal agencies were using the same set of technical specifications for access in buildings.

In 1985, during the regular five-year review for ANSI Al 17.1, the ANSI committee chose to adopt some of the UFAS refinements. The revised ANSI Al 17.1, published in 1986, made the UFAS (1984) and ANSI (1986) technical specifications more nearly alike and brought increased uniformity in access requirements to both the federal and private construction systems.

Progress within the federal system has been matched outside. Since 1980 many states have adopted the ANSI standard into their building codes and laws, and the technical specifications of ANSI are now being considered for adoption in model building codes. With essentially the same specifications for state and local building codes and federal and state regulations, uniformity has vastly improved.

EVOLUTION OF ADAPTABLE HOUSING

Prior to 1980 and the updated ANSI standard, many states and federal agencies had developed their own specifications for fixed accessible housing units. Many of these requirements focused on features for wheelchair users only and mandated that a certain percentage of new, multi-family housing construction — usually between 5% and 10% — comply.

Problems with Early Fixed Accessible Housing Units

The system of requiring a small number of special units did not work as well as had been hoped. The disabled people for whom the units were intended often did not rent the accessible apartments. Because the percentage of new units required to be accessible was small, disabled people often had difficulty locating available accessible units. Because the quotas applied only to new construction, the rent for accessible units was often too high for some disabled people, many of whom live on fixed or limited incomes.

Size also became a problem. Many codes did not specify the size of the accessible units, so some builders made only one-bedroom units which complied; disabled people who needed space for families or live-in attendants could not use them.

Some builders and owners also had trouble renting accessible units to non-disabled people. Prospective tenants did not like the institutional appearance of the grab bars in the bathroom or the unevenness of the kitchen counter with the lowered work surface. Some did not want to sacrifice the base cabinet storage space for the knee spaces in the kitchen. To rent accessible apartments to non-disabled people, some owners offered rent discounts and lost money. Many felt that they were losing money by providing units that it appeared no one wanted or needed, and some began to lobby to have the mandatory percentages of fixed accessible units eliminated or drastically cut back.

Development of the Adaptable Housing Concept

Both the ANSI standard research team and the disability community responded to this new pressure by addressing the problems of appearance and inconvenience caused by some of the fixed accessible features. In addition, the data generated from the research and experience in the field demonstrated a need for flexibility in the standards for housing. As a result, the concept of adaptability in housing was developed.

The adaptable housing concept fit the dwelling unit more appropriately to its tenants' needs and eliminated the special and different appearance that made accessible units undesirable to non-disabled people. It eased the problems the developers had renting fixed accessible apartments, and provided a way to build more apartments that would meet everyone's needs.

Encouraged by support for this common sense approach to accessible housing, several states incorporated the adaptable housing concept in their building codes as an alternative to fixed accessible housing.

Definition and Explanation of Adaptable Housing

An adaptable housing unit is an accessible dwelling unit with adaptable features that eliminate the "special" appearance and/or meet the needs of the individual user by adding or adjusting elements. An adaptable housing unit includes all of the accessibility features required by ANSI (1986) andUFAS (1984) (such as wider doors, clear floor space, and an accessible route) and allows a choice of certain adjustable features or fixed accessible features.

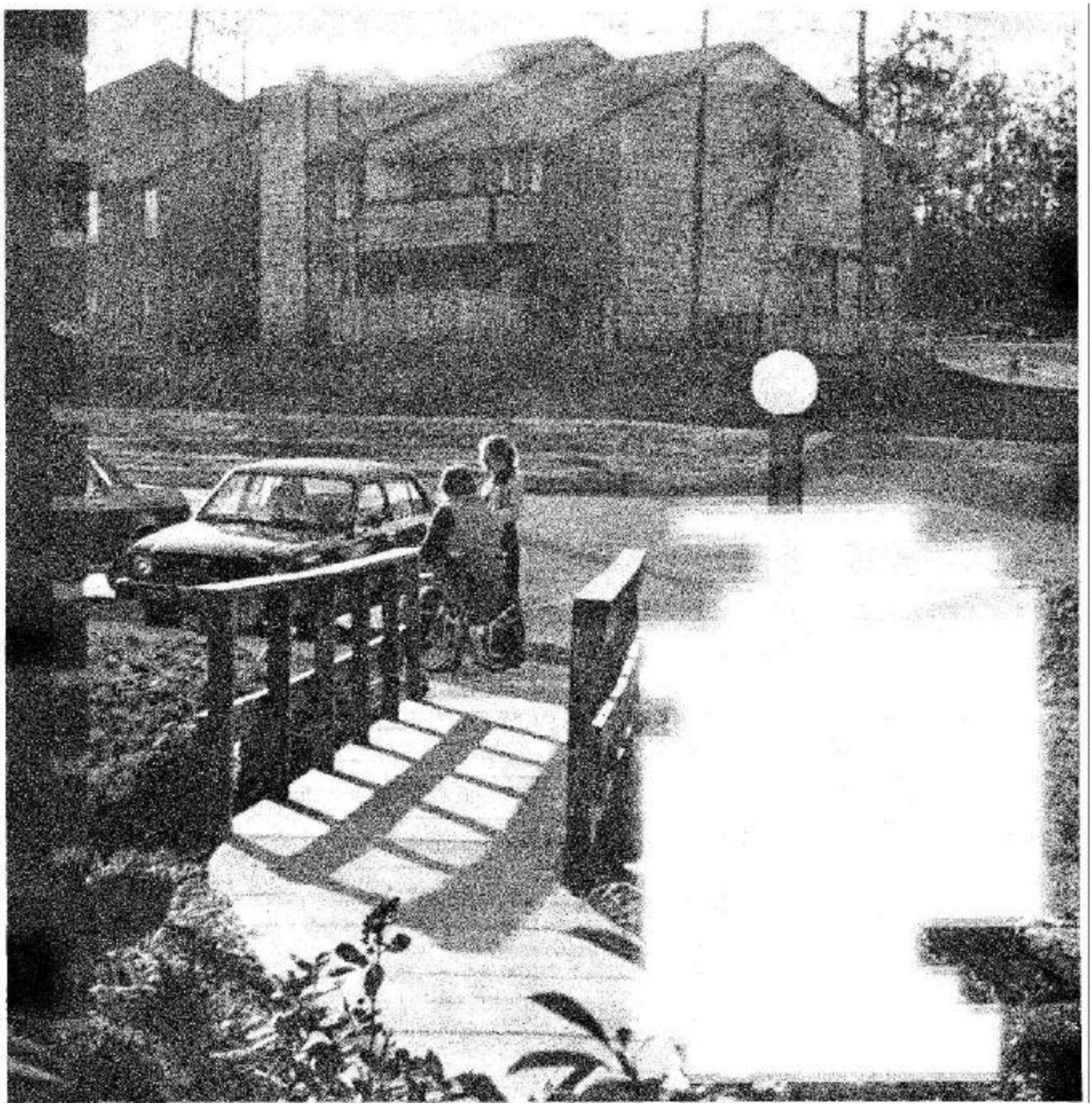
When adaptable design is properly implemented, an accessible unit looks no different from a standard unit. Adaptability solves the problem of making accessible housing attractive and marketable to people who do not need or want some of the accessible features that look different or might be inconvenient, while making it possible for the adaptable features, such as clear knee space and grab bars, to be available when a tenant requires them.

Misconceptions About Adaptable Housing

As the concept of adaptable housing has been refined, some housing providers as well as consumers have developed misconceptions about the idea. Some building industry people have thought that an adaptable unit was a standard unit that would be remodeled if a disabled person wanted to move in and required certain accessible features. This remodeling would widen doors, add an accessible entrance, remodel kitchens and bathrooms, and provide accessible storage. Owners who have made this interpretation have called for a 60 to 90 day waiting period. In today's mobile society, it is unrealistic to subject a tenant to a wait of two to three months for an apartment.

Truly adaptable units can be adjusted or adapted *without* renovation or structural change because the basic accessible features like door widths and ground level entrance are already part of the unit. Non-structural adaptations may include changing counter and sink heights; removing a cabinet to reveal a knee space under the work surface, kitchen sink, and bathroom lavayory; and attaching grab bars if needed. These changes can be made without delaying occupancy by the new tenant. The building maintenance staff, tenant, or owner should be able to make these simple adjustments in a few hours.

Some disabled people and disability organizations fear that the adaptable housing unit will not be as usable for a wheelchair user as a fixed accessible unit. These consumers fear that the adapted units will be less accessible because of their design or because of the reluctance of owners and managers to make adequate adaptations. When adaptable dwellings are built correctly, they have the same features as those required in fixed accessible units, but the standards allow some of the features to be temporarily hidden by cabinets or omitted for marketing to people who don't need them. An adaptable unit *is* an accessible unit with features that can be tailored to the specific needs of the tenant.



Benefits of Adaptable Housing

Adaptable housing benefits both providers and consumers of housing. Developers, owners, and managers of multi-family housing benefit when they build adaptable units because the units look no different from others and can be rented easily to disabled or non-disabled people. This aspect alone will expand the market for these accessible units and eliminate the need ever to compromise on rents or provide other incentives for leasing them to non-disabled people. The manager or owner who installs adaptable units should be able to meet the needs of any prospective tenant. Some landlords have already recognized the potential marketing advantage of offering adjustable counter heights to short people or pointing out the ease and safety of moving one's valuable furniture through the wide doors. Some managers (and tenants) have taken advantage of the maneuvering space in bathrooms by placing book shelves, etageres, or other furniture in these usually austere spaces. One survey reports that non-disabled tenants are very fond of these larger bathrooms. Adaptability features can be turned into selling points that improve the units marketability.

Tenant longevity has long been recognized as an advantage to landlords. Fewer turnovers mean less clean up and reconditioning,

fewer vacant days, and higher profits. Disabled people who find and adjust an adaptable house to meet their particular needs are likely to stay longer than other tenants because their housing choices are more limited. Adaptable housing can also be expected to increase tenant longevity because non-disabled tenants who acquire a permanent or temporary disability (due to age or any other cause) are less likely to have to move to more accommodating facilities.

The growing population of older people is a potentially large market for appropriate housing. Many older people do not wish to be placed in "special" housing but recognize they may need some "assistance." Adaptable housing does not look special and its adaptability allows many older people to remain in their homes longer than they might in non-accessible units. Where services are provided as part of a housing program, adaptable features can reduce the demand on personnel and make it easier and less expensive to provide appropriate help when needed.

Manufacturers can benefit from the development of adaptable housing and are a key factor in its successful growth. Adaptable housing design creates a new market for existing products and creates new opportunities for innovative new products that are adjustable or designed to meet a range of needs.

Disabled people and their companions and service providers will all benefit from the adjustable features of adaptable housing. Severely disabled people often live with non-disabled spouses or attendants who perform specific household tasks, such as cooking, that the disabled individual cannot do for him/herself. In an adaptable house disabled and non-disabled people can live together and have the adaptable features fit both. For example, the kitchen can remain set up for use by a standing person, and the rest of the dwelling, including the bathroom, can be accessible to the disabled resident as well.

Adaptable housing if produced in adequate numbers and types of units will benefit the disabled community by putting a supply of accessible units on the market in all price ranges and locations. Since adaptable units are attractive and usable by everyone, it can be anticipated that they will be popular with disabled and non-disabled people alike and will be fully occupied.

For the adaptable housing concept to succeed, it is vital that enough units be built to meet the demands of both the disabled and non-disabled community. This number needs to be much greater that the small number of fixed accessible units that have been required.

An increase in the number of adaptable units will benefit all people who need improved access with no disadvantage to others. Mass production, improved marketability, and further refinement of methods should prevent costs from becoming a disadvantage to owners.

Codes and regulations for accessibility generally apply only to public or rental property but the concept of adaptability can be a positive marketing tool for all types of housing. Disabled and older people are not only renters but also home buyers. It is generally accepted that there are over 36 million disabled people in the U.S. and they are from every socio-economic strata. Some recent corporate marketing experience indicates the number may be much larger and clearly if one includes older people, at some point everyone must be included. This is a significant potential market.

With increased experience with the adaptable housing concept and growing participation of product manufacturers and better market information, the building industry may find that most houses can be made accessible at little or no increase in cost. One key to low cost accessibility is simple, inexpensive methods for providing adaptable features. The next chapter describes the several sample methods that can be used in both new and existing construction.

CHAPTER TWO
METHODS, COSTS, AND EXAMPLES

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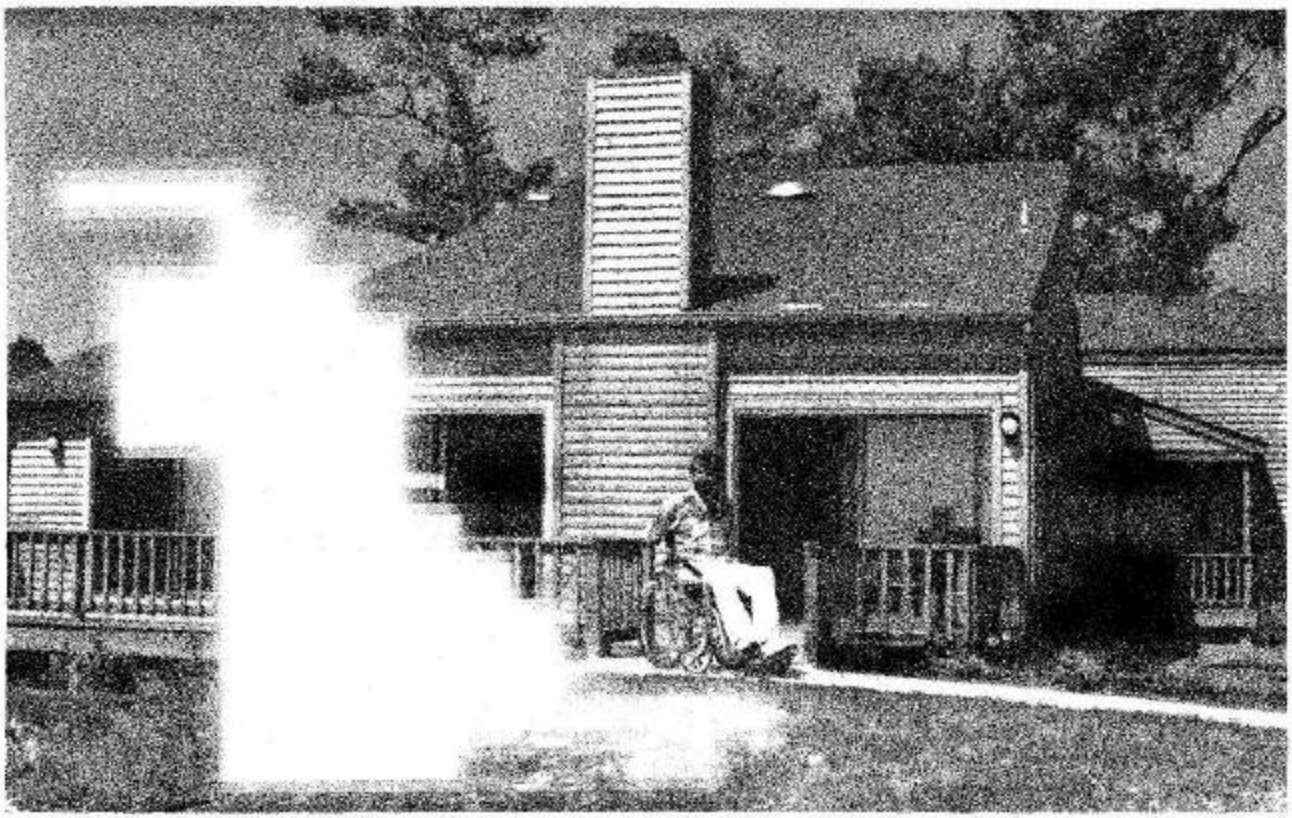


INTRODUCTION

Adaptable housing is a type of accessible housing that has both adjustable features and fixed accessible features. Instead of being designed specifically for people in wheelchairs, the adaptable home has features which can be added, adjusted, or removed as needed to fit the needs of many occupants whether they are disabled or non-disabled.

Accessible Features in AdaptableHousing

Permanent accessible features are a required part of an adaptable dwelling. These features include wide doors, no steps at the entrance, switches and controls mounted low, most rooms and spaces located along an accessible route, and other features specified in ANSI Al 17.1 (1986) and UFAS (1984). The accessible features are important because they make each adaptable unit usable by disabled people without renovation or structural changes such as moving walls and widening or replacing doors. The fixed accessible features built into standard adaptable dwellings provide basic access for mobility impaired people allowing wheelchair users to visit even when the unit is adjusted for non-disabled people.

Legend

Labels for recommendations are in italics

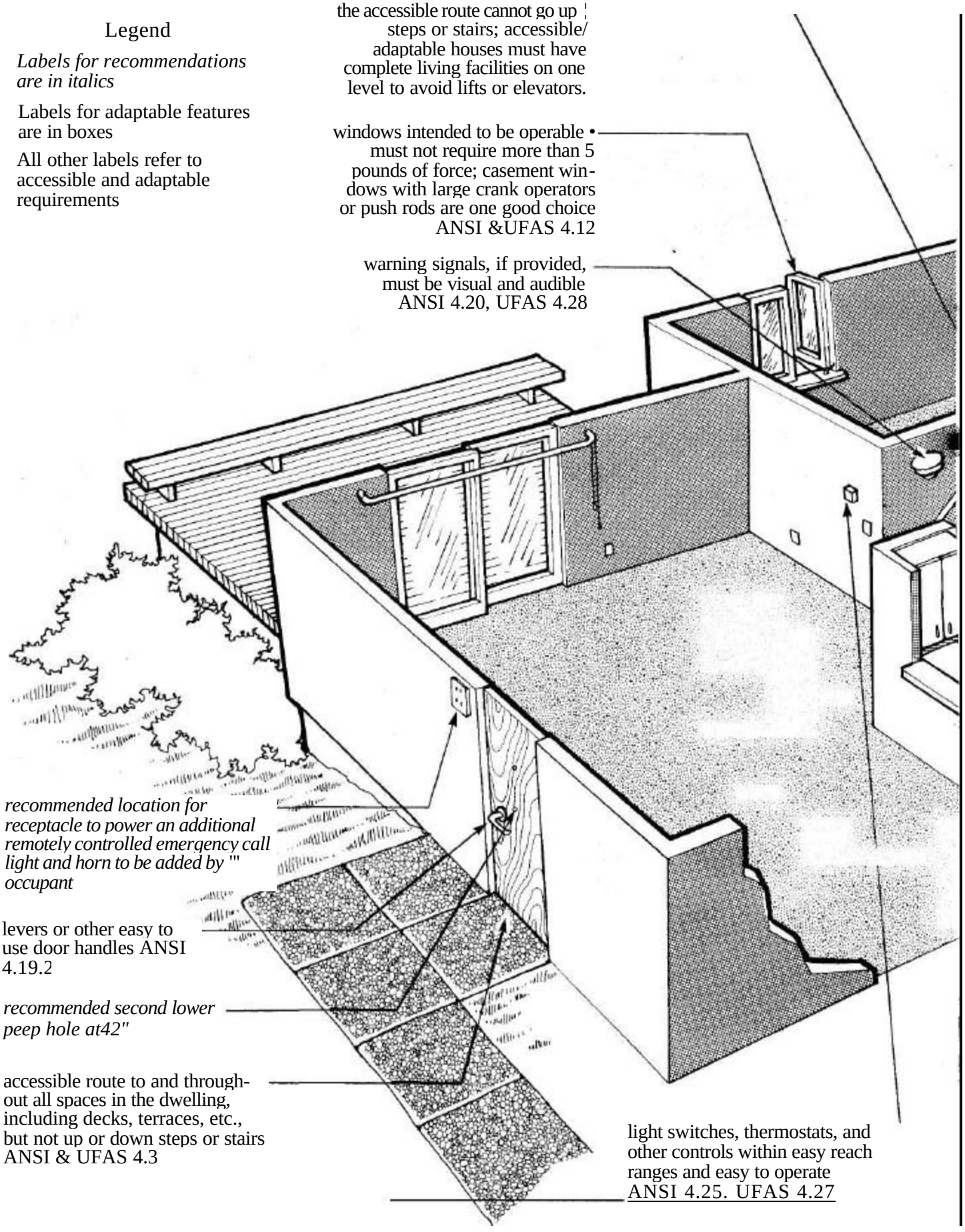
Labels for adaptable features are in boxes

All other labels refer to accessible and adaptable requirements

the accessible route cannot go up steps or stairs; accessible/ adaptable houses must have complete living facilities on one level to avoid lifts or elevators.

windows intended to be operable must not require more than 5 pounds of force; casement windows with large crank operators or push rods are one good choice ANSI &UFAS 4.12

warning signals, if provided, must be visual and audible ANSI 4.20, UFAS 4.28



recommended location for receptacle to power an additional remotely controlled emergency call light and horn to be added by '" occupant

levers or other easy to use door handles ANSI 4.19.2

recommended second lower peep hole at42"

accessible route to and throughout all spaces in the dwelling, including decks, terraces, etc., but not up or down steps or stairs ANSI & UFAS 4.3

light switches, thermostats, and other controls within easy reach ranges and easy to operate ANSI 4.25. UFAS 4.27

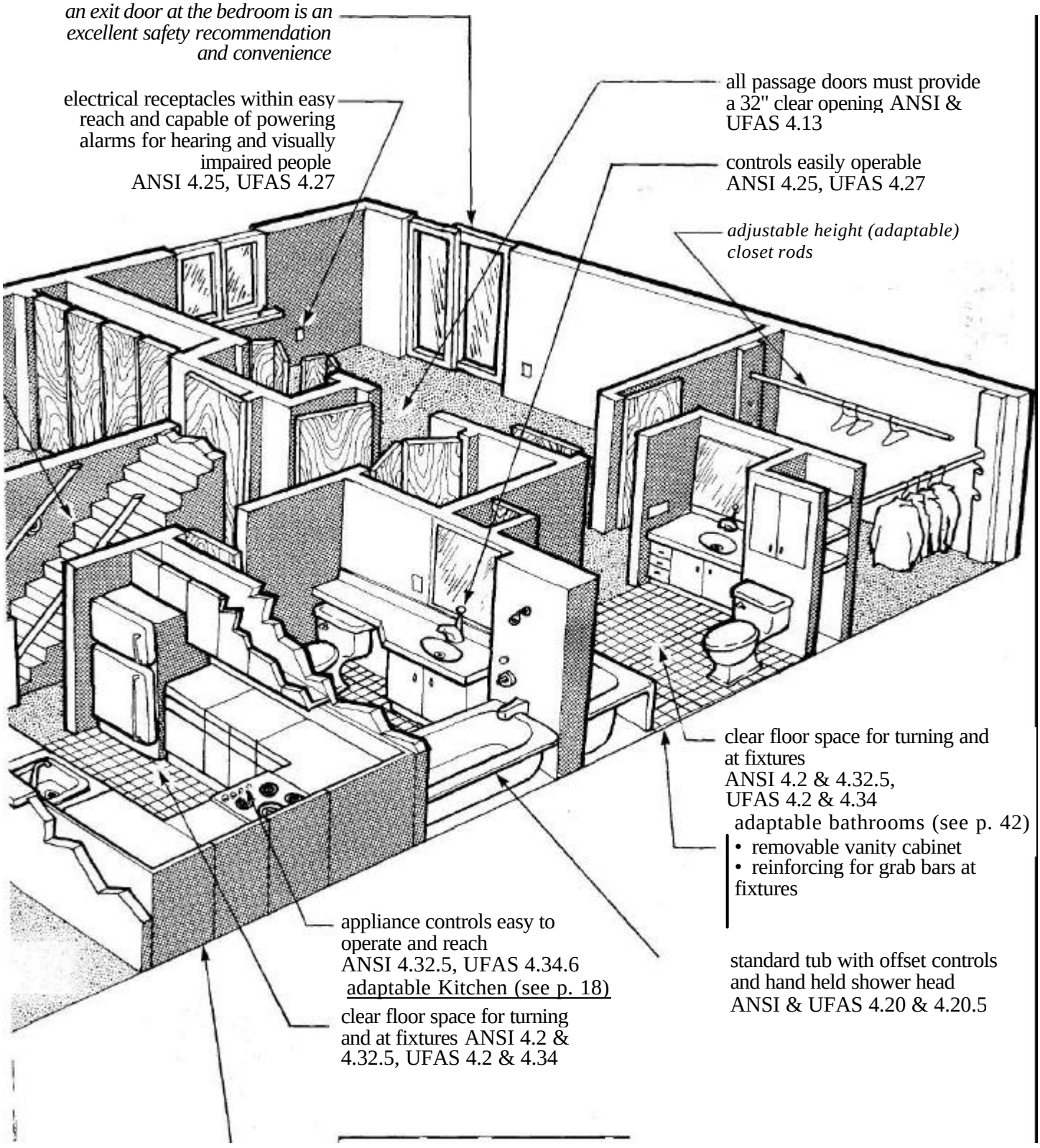


Figure 1. An Adaptable Home

Adaptable Features in Adaptable Housing

Adaptable features are commonly found in kitchens and bathrooms. These features include adjustable height counters for work spaces and sinks, provision to expose knee spaces under these counters, reinforced areas around the bathtub, shower, and toilet for later installation of grab bars, and provision for exposing a knee space under the bathroom lavatory.

Although removable base cabinets and adjustable counters are usually placed in kitchens and bathrooms, they can be used in other areas of a home to make it more usable by children, older people and disabled people. Examples include built-in desks, work surfaces in a shop or utility room, and counters in a laundry room.

Some other features can also be considered adaptable, although not specifically mentioned as such in the standards. These include provisions for alarm systems for hearing impaired people and methods for providing adjustable storage areas that must be accessible.

An Example of an Adaptable Home

Adaptable dwellings are fully accessible homes — they just don't look like it. The accessible features that are built into an adaptable dwelling need not be obvious and, when done correctly, they are attractive, functional, and competitively priced. The interior of an adaptable unit shown in figure 1 has all the accessible and adaptable features necessary to make it usable by both disabled and non-disabled people.

The accessible and adaptable features shown are specified by ANSI Al 17.1(1986) and UFAS (1984). The label for each of the required accessible or adaptable features includes a reference to the appropriate sections of the standards. The labels for the adaptable features are surrounded by a box and details of these features are shown in figures 2,3, and 4. Recommended or additional adaptable features that are not mandated by the standards are indicated by italics.

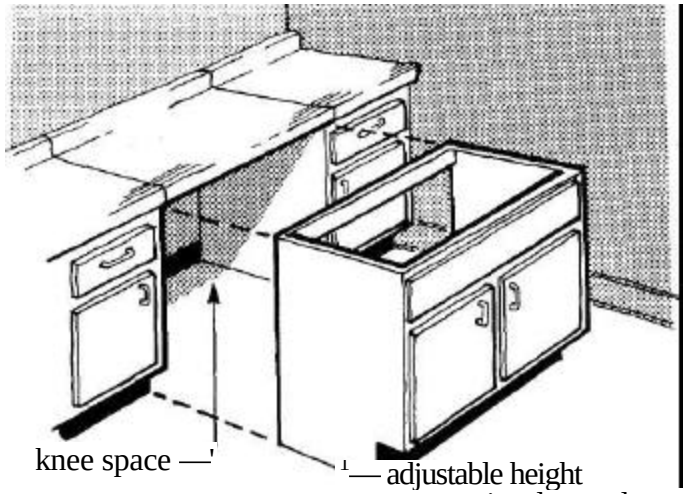
Three Principal Elements of Adaptable Housing

The standards specify three principal adaptable elements that distinguish adaptable housing from fixed accessible housing:

1. **removable base cabinets** installed in knee spaces to pro vide storage and a standard ap pearance (figure 2);
2. segments of counters that can be adjusted in height from a standard height of 36 inches to a minimum of 28 inches so that non-disabled and disabled people can use the surfaces (figure 3);
3. **reinforced wall** areas so grab bars can be attached and re moved at bathtubs, showers, and toilets as needed by the occupants (figure 4).

Removable base cabinets and adjustable height counters are features of the adaptable kitchen, and removable vanity cabinets and reinforcing for grab bars are found in the adaptable bathroom. Descriptions of suggested methods for constructing these adaptable elements at reasonable cost are found in the first two sections of this chapter—"Adaptable Kitchens" and "Adaptable Bathrooms." These sections also list the fixed accessible features, describe other applications of the adaptable features in kitchens and bathrooms, and show examples of these features in both minimal and elaborate settings.

The last two sections, "Consumer Information" and "Other Adaptable Features," discuss the labeling requirements for adaptable units and make suggestions for two other features which benefit from being made adaptable.



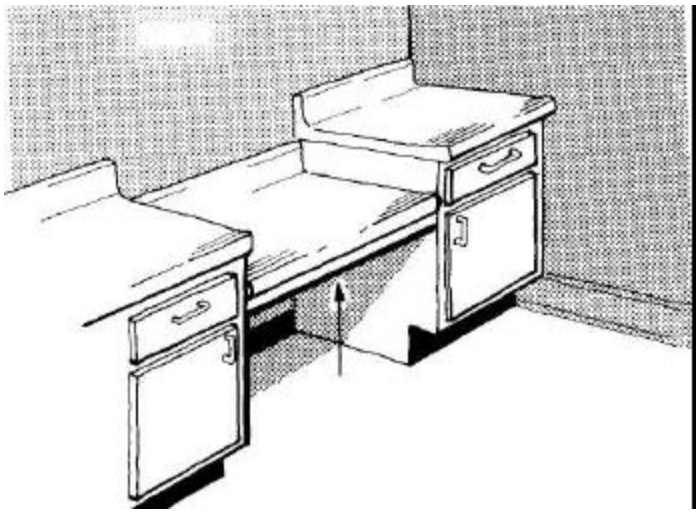


Figure 2. Element # 1: Removable Base Cabinets

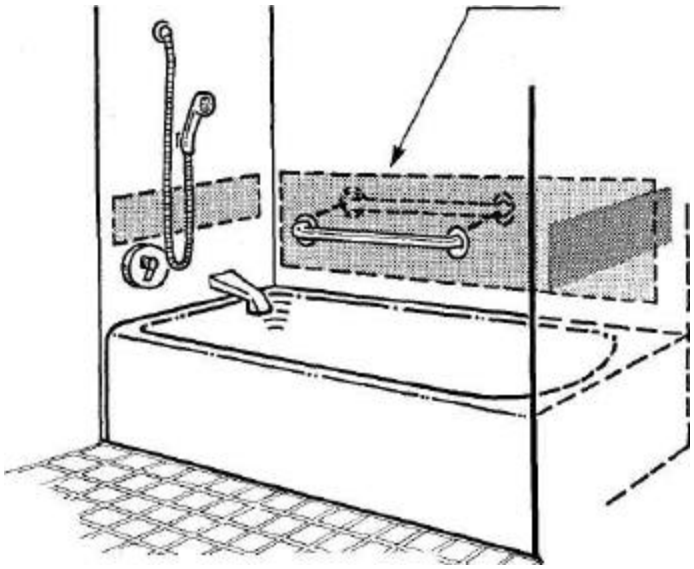


Figure 3. Element # 2: Adjustable Counters

areas around tub to be

Requirements

The ANSI and UFAS standards require accessible and adaptable features which make the kitchen usable by most people. The fixed accessible features specified in ANSI 4.32.5 and UFAS 4.34.6 include requirements for doors, clearances, clear floor space, appliances, storage, controls, and knee space. The adaptable features are removable base cabinets at knee spaces and counters that can be adjusted in height or fixed at a lower than standard height.

The adaptable features for kitchens specified in the standards are shown in figures 5 and 6. In the first view, the kitchen is shown in a standard

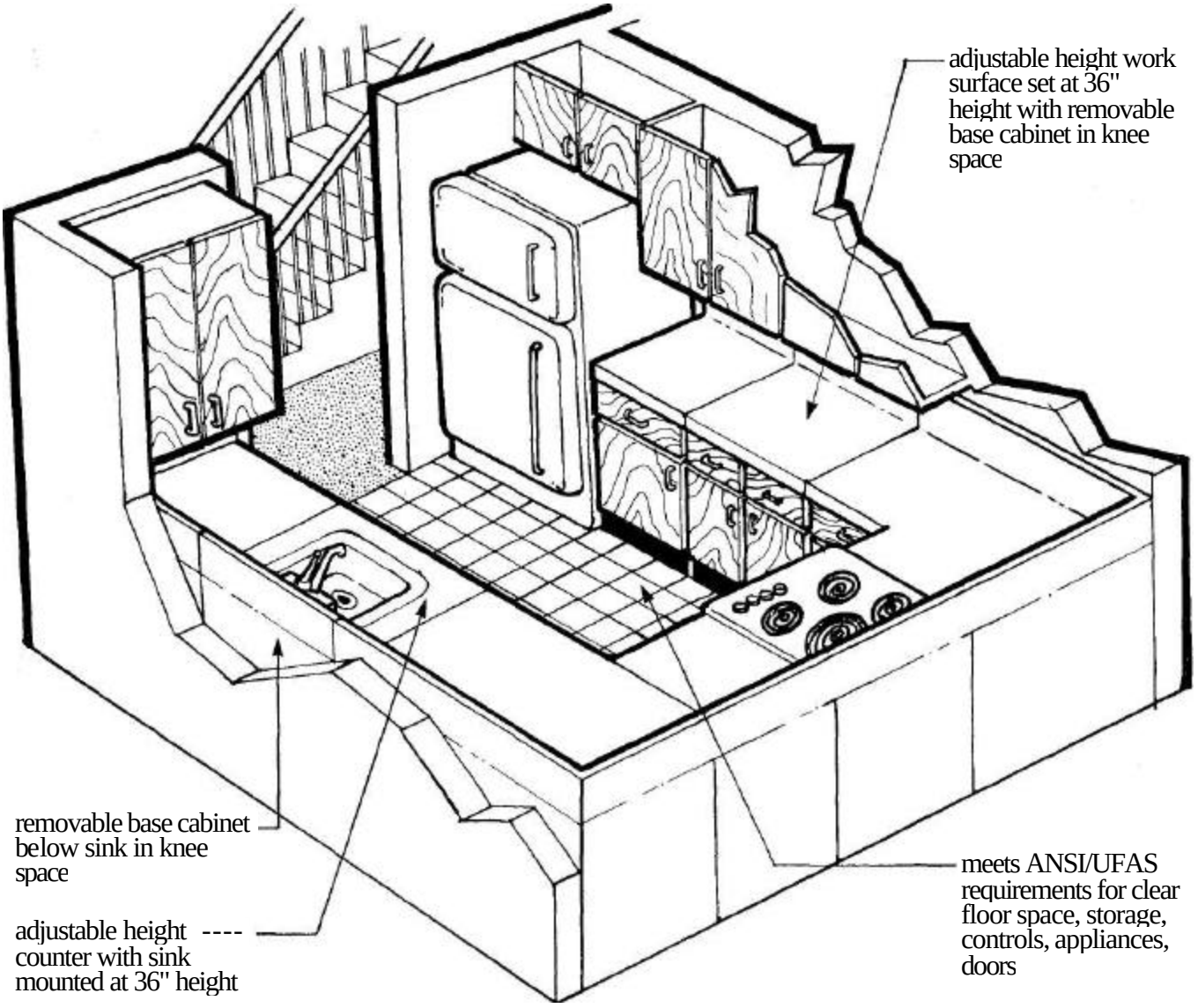


Figure 5. **An Adaptable Kitchen in Conventional Configuration**

configuration with the counter height at 36 inches and the knee spaces covered with base cabinets.

In the second view, the kitchen has been adapted by exposing the knee spaces and lowering the work surface and sink counter segments. No other changes have been made to the kitchen.

Since removable base cabinets and adjustable height counters are not now products that are readily available for purchase, they are usually custom made items. The following sections describe some easy and inexpensive methods for providing removable base cabinets and adjustable height counters that could be mass-produced or custom built.

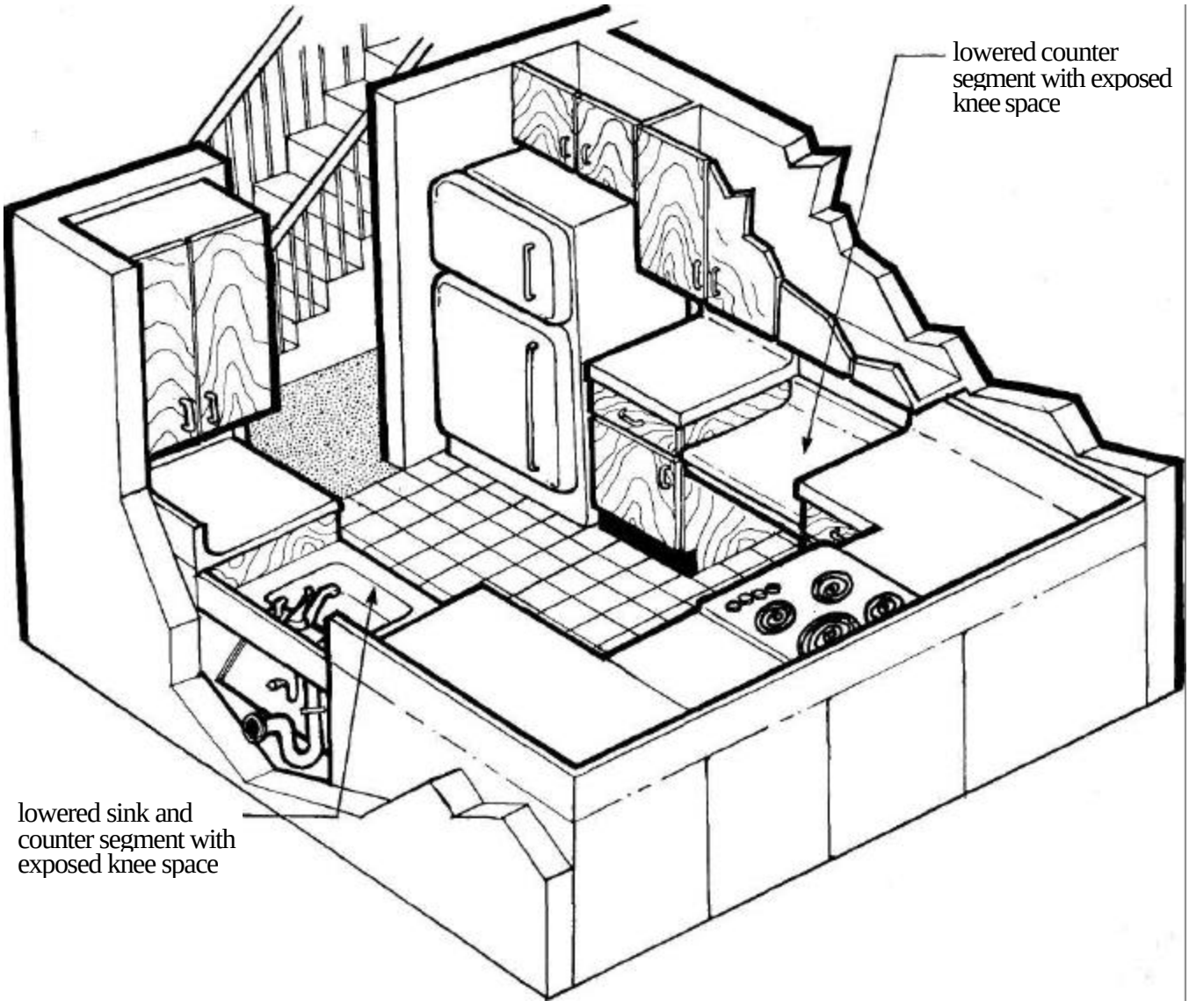


Figure 6. **An Adaptable Kitchen in the Adjusted Configuration**

Three Methods for Providing Removable Base Cabinets at Knee Spaces

Removable base cabinets at knee spaces are key features of adaptable design. The knee space permits a seated person to pull up under the counter close enough to reach most of the counter area. Knee spaces must be built into adaptable dwellings but they can be concealed with a removable base cabinet when not needed. When a disabled person needing knee space lives in the dwelling, the knee space can be exposed by removing the base cabinet. No other changes are necessary to provide the knee space.

Three suggested methods for providing removable base cabinets to expose knee spaces under work surfaces follow. All methods shown allow the counter to be installed independent of the base cabinet. The cabinet does not support the counter segment and does not need to be attached. Thus, base cabinets can be totally separate units that can be slid out from under the counter, leaving the counter independently supported.

Finishes on the floor, walls, and cabinet faces of the knee spaces should be installed when the cabinets are first installed so that no other finish work is necessary when the base cabinet is removed.

These methods are sample solutions for meeting the adaptable provisions of the standards and while they represent some of the best ideas that are currently available, other solutions that meet the standards are also possible.

Method 1. Removable Standard Base Cabinet

Knee spaces may be exposed by pulling out a standard base cabinet and leaving the space empty. (Figures 7 & 8) The removable cabinet is not anchored into the walls but may be fixed with removable screws to adjacent cabinets or to the back wall. The base cabinet must be stored in a safe dry place so that it can be re-installed when needed. Removing the standard base cabinet to expose a knee space should be done easily whether the knee space is located under a work surface or under a sink.

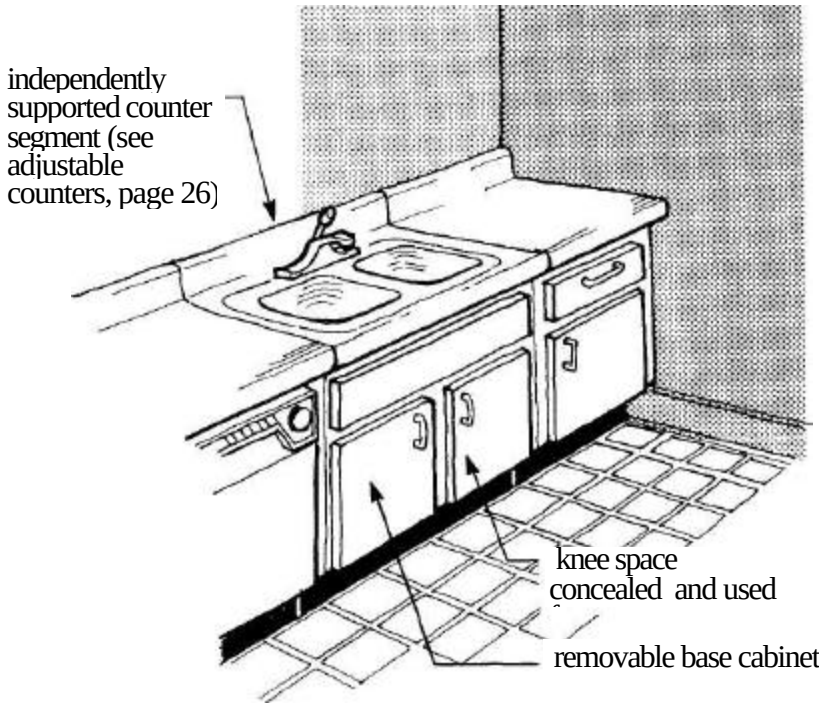


Figure 7.
Removable Modified Standard Base Cabinet in Knee Space

If standard base cabinets are to be placed under adjustable height counter segments or sinks, their sides and backs may need to be cut down or altered to clear the support systems and to provide clearance for the water lines, valves, and drain pipes so that the plumbing does not have to be disconnected. (Figures 8 & 9) If the back of the cabinet is removed, the sides may have to be reinforced as well as lowered. (Figures^ 10, & 11)

The floor under the removable base cabinet must be finished so that it will match the surrounding floor. The wall behind the knee space and the adjacent cabinet walls should also be finished.

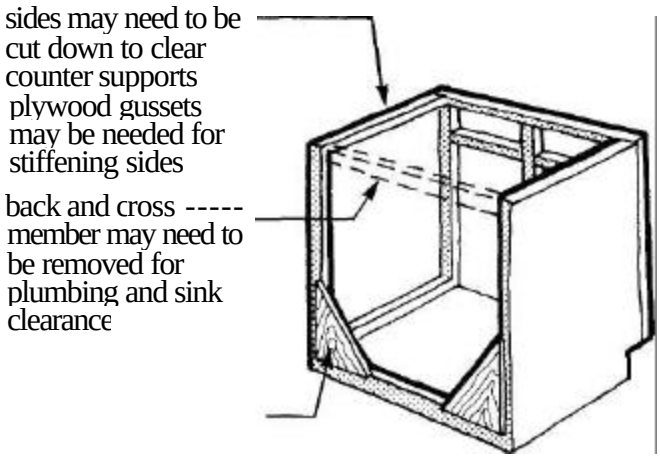


Figure 9.
Standard Base Cabinet Modified to be Removable at Adjustable Counters and Sinks

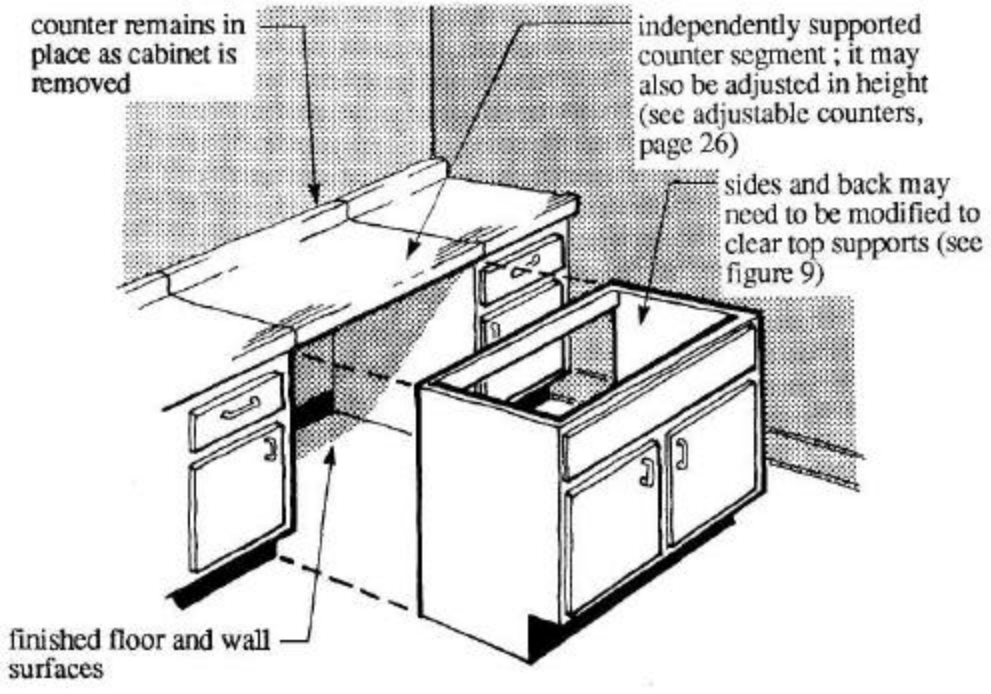


Figure 8.
Removing a Standard Base Cabinet to Expose Knee Space

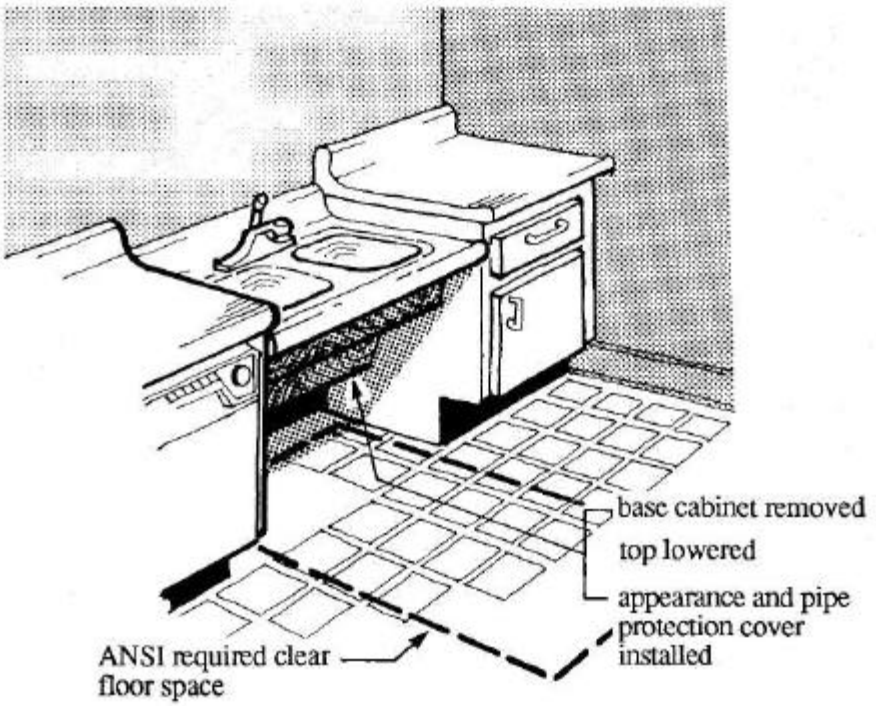


Figure 10.
Exposed Knee Space at Kitchen Sink

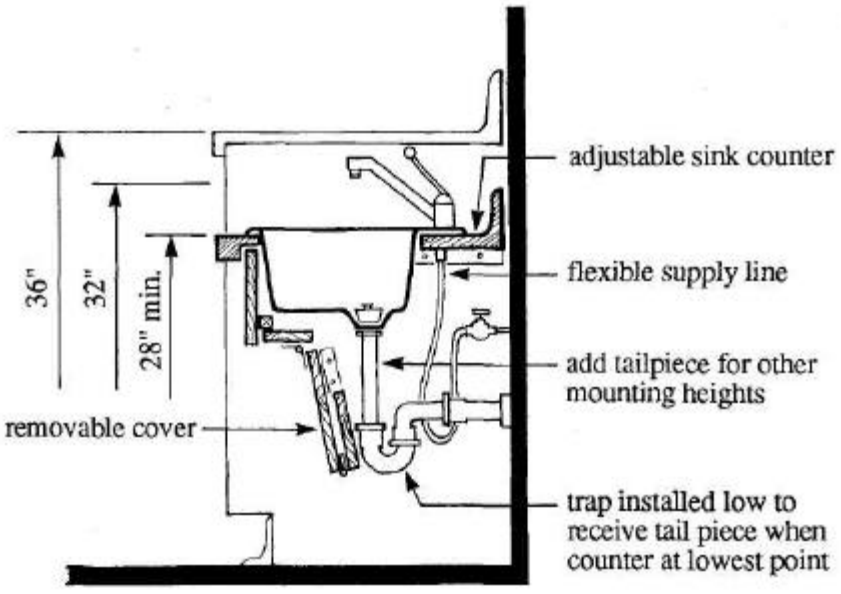


Figure 11.
Section at Adjustable Sink with Base Cabinet Removed

Method 2. Base Cabinet with Self-storing Folding Doors and Floor

A second type of adaptable base cabinet uses self-storing retractable door hardware and a hinged floor to expose the knee space. (Figure 12) The self-storing features permit the cabinet to be adapted without the necessity of storing the removed base cabinet in another location. (See page 69 for information on self-storing door hardware.)

To expose the knee space, the doors swing open and slide back along the sides of the cabinet into a stored position. Then the cabinet floor is folded up against the back wall to expose the finished floor below. (Figures 13,14, and 15)

This cabinet works well with the fixed 34 inch maximum height counter that ANSI and UFAS allow. It could also be used with an adjustable height counter which is adjusted by adding shims or a drawer unit to raise the height of the counter (see figure 18).

While building this type of cabinet may be somewhat more expensive than modifying a standard base cabinet, the self-storing design may be preferred where storage space is unavailable.

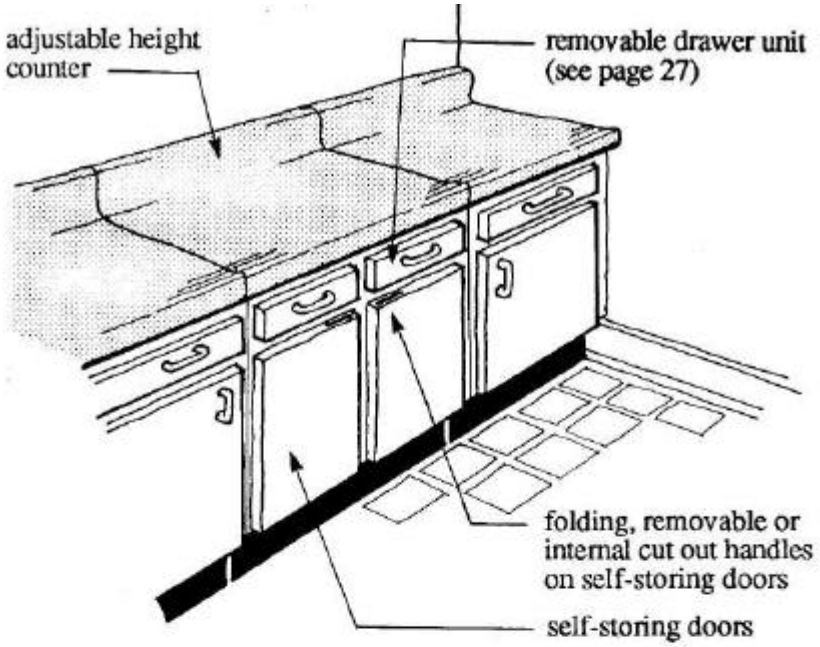


Figure 12.
Adaptable Base Cabinet with Self-storing Doors

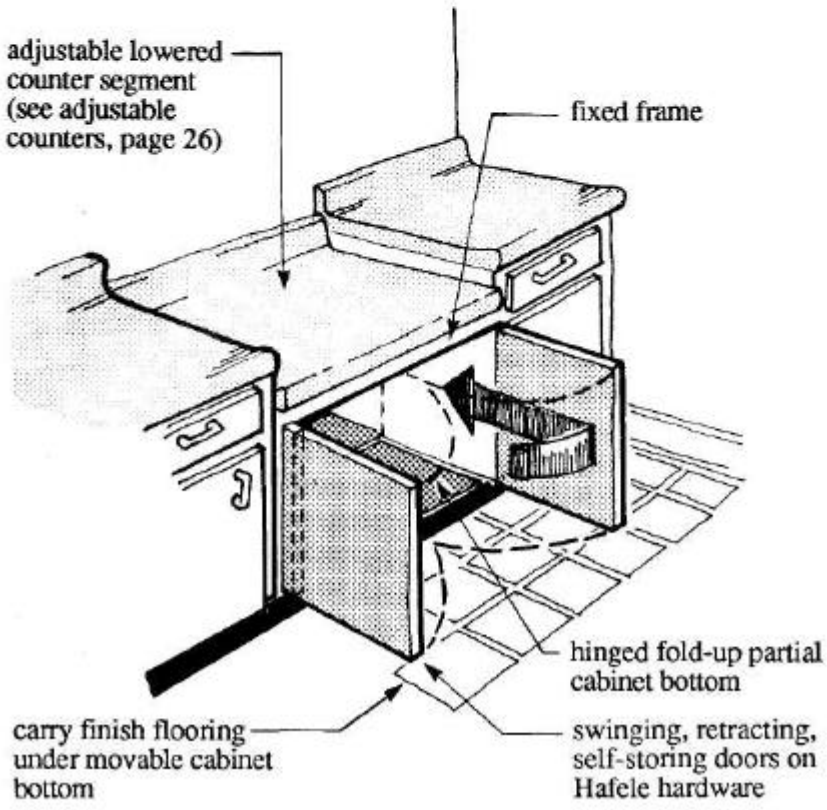


Figure 13.
Storing Doors to Expose the Knee Space

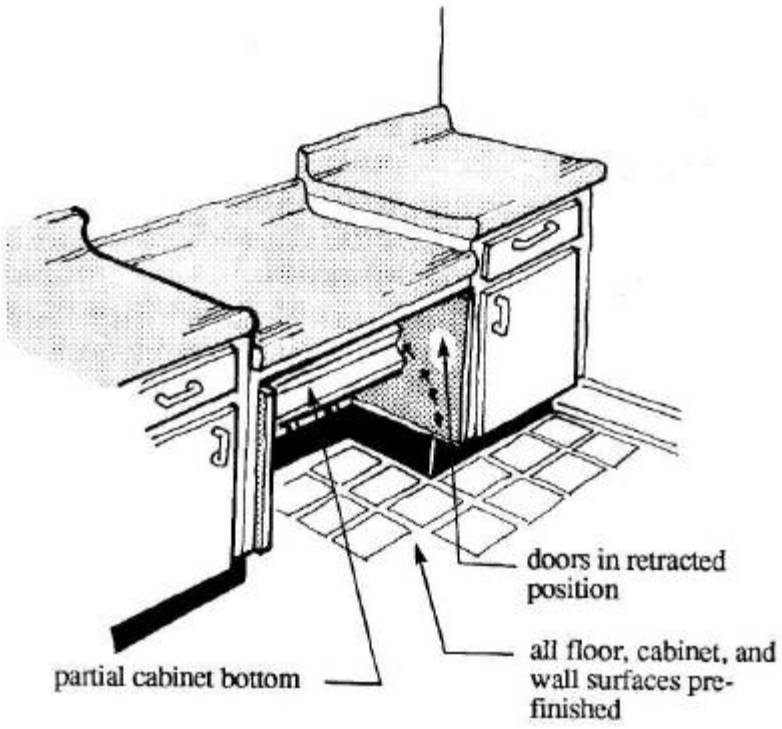


Figure 14.
Adapting Self-storing Cabinet Floor

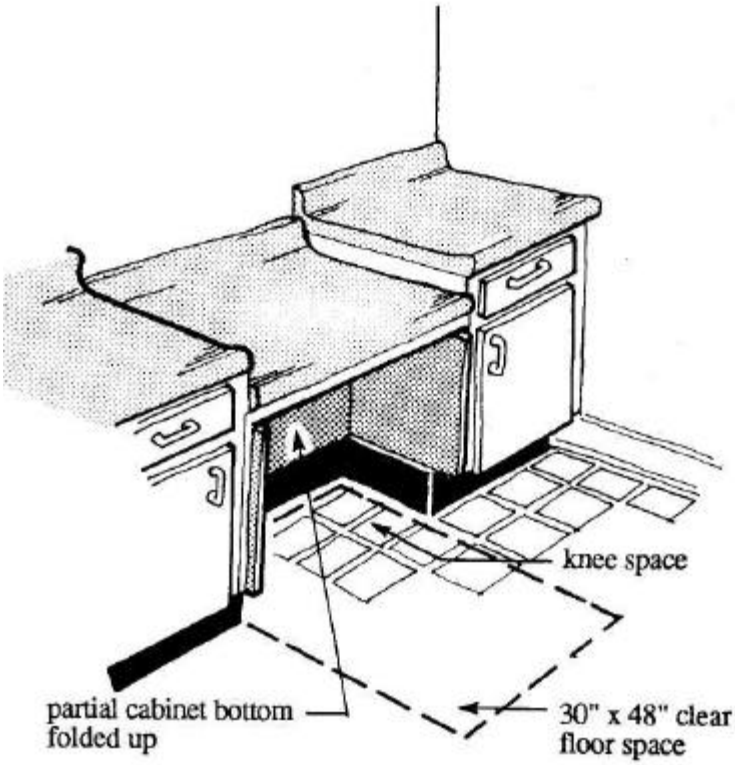


Figure 15.
Self-storing Cabinet with Exposed Knee Space

Method 3. Removable Cabinet Floor and Front

A third type of adaptable base cabinet uses a removable cabinet front and floor which can be inserted between two other fixed base cabinets to provide storage and conceal the knee space. This unit may be made from a standard sink or range front panel that is attached to a base. It has two operable cabinet doors with two fixed, false drawer fronts above. (Figure 16) The floor extends the full depth of the adjacent cabinets, providing a large storage space when the unit is installed in the knee space.

The front panel and the floor are installed as a unit that can be unfastened from the adjacent cabinets by removing screws along the sides. The adjacent cabinets should be equipped with threaded metal inserts that will withstand repeated installation and removal. The whole unit slides forward to expose the knee space. (Figure 17) The front and floor can be stored as a unit or taken apart and stored flat. (See page 69 for information on threaded metal inserts.)

Any of the adjustable counter support methods described in the following section can be used with this removable cabinet front and floor.

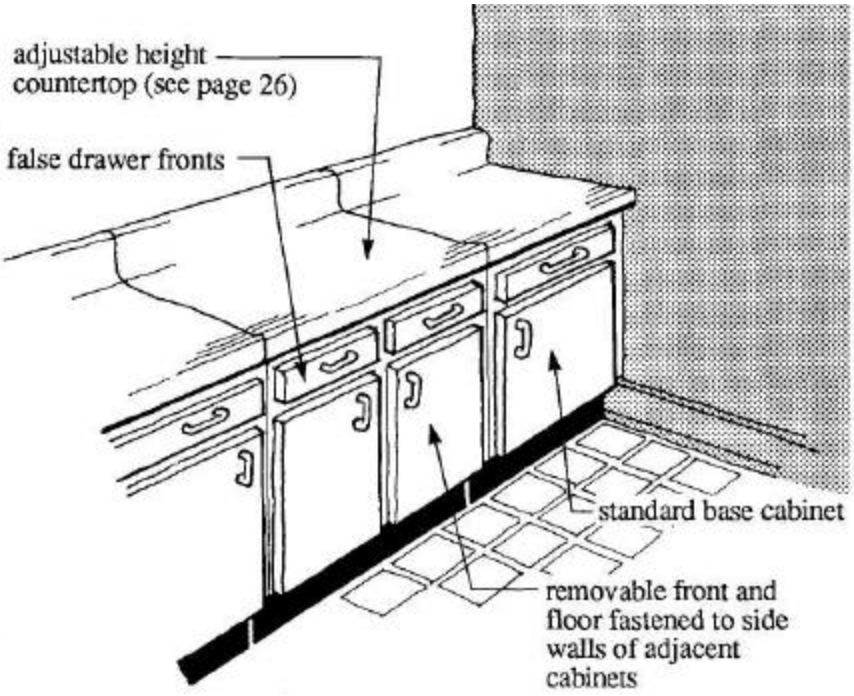


Figure 16.
Removable Cabinet Front and Floor

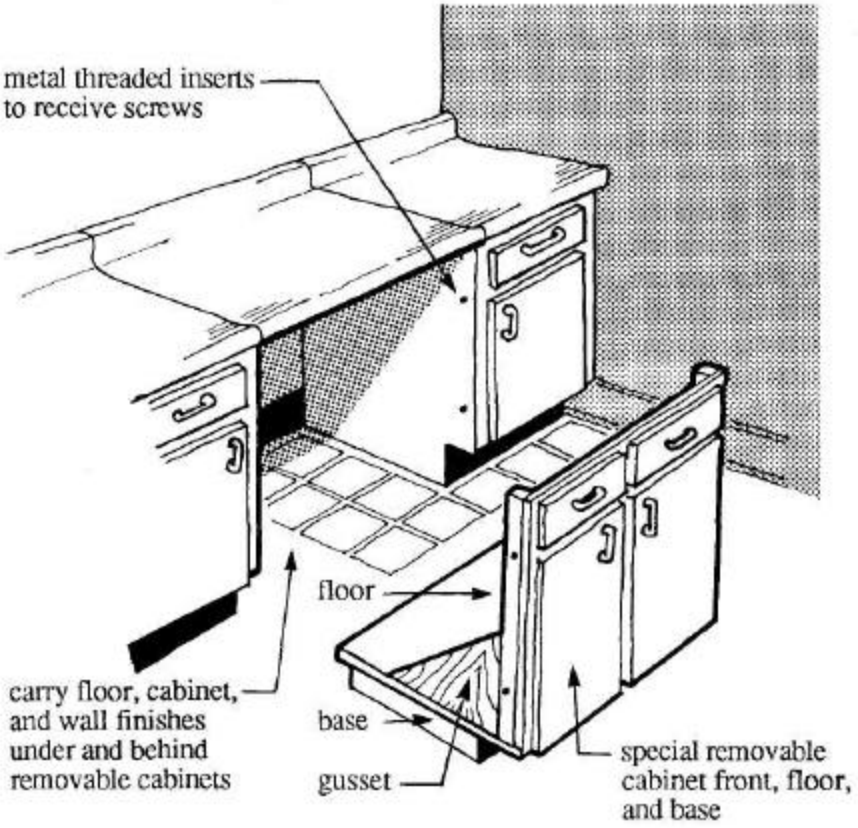


Figure 17.
Removing Cabinet Front and Floor to Expose Knee Space

Three Methods for Providing Adjustable Counters

Counter segments which are lowered or adjustable in height are placed over knee spaces to make lowered or adjustable work surfaces, sinks, or cooktops. The lowered counter permits a seated person to pull up perpendicular to the front edge of the counter with his/her legs extending into the knee space, and reach the rear of the counter. The following three methods for providing adjustable height counter segments are simple, inexpensive, and use only common materials or readily available hardware. These methods can be used equally well for work surfaces, sinks, or cooktops.

For all three methods, the counter is firmly attached to the supporting device after the height has been adjusted so that a stable surface is provided. This is very important because people, whether they are standing or seated, will lean on counters and could be injured if the counter is not securely fastened.

These are not mandatory methods but only suggestions intended to show some possible solutions for adjustable counters that meet the standards.

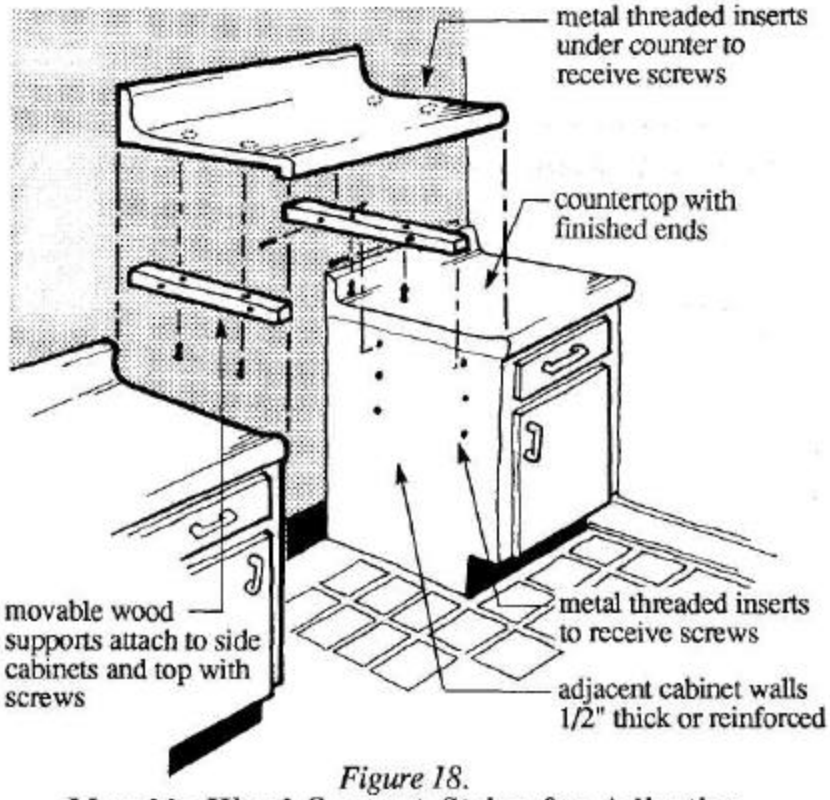


Figure 18.
Movable Wood Support Strips for Adjusting Counter Height

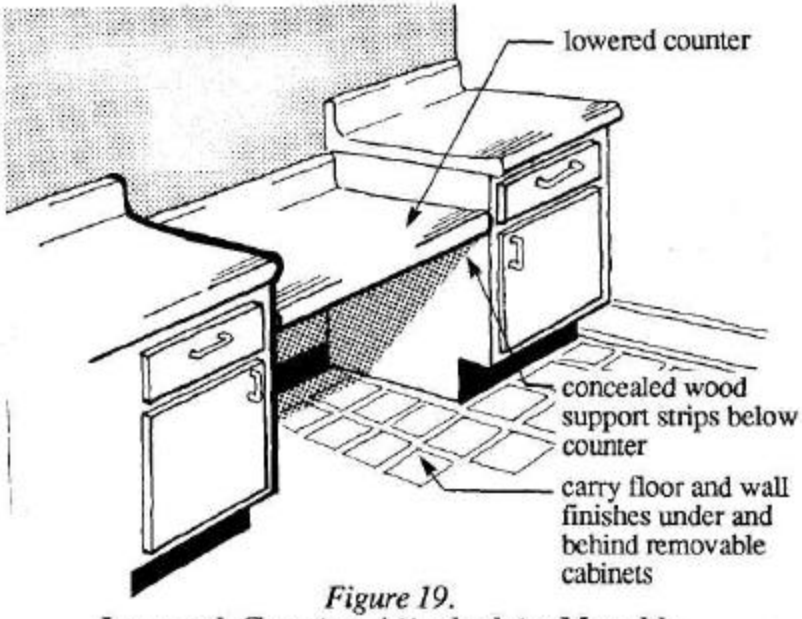


Figure 19.
Lowered Counter Attached to Movable Wood Support Strips

Method 1. Movable Wood Support Strips

The first method uses movable wood strips screwed into the sides of the adjoining base cabinets to provide support for the adjustable counter segment. The wood strips must be able to be set at a minimum of three pre-determined counter heights of 28 inches, 32 inches, and 36 inches. Other heights could be added as long as these three are available.

The two wood strips are attached to the cabinets by screws which are fastened into threaded metal inserts placed in the cabinet wall. The inserts provide long-term strength and stability and allow the counter to be repositioned as often as necessary and make it easier to adjust the counter height. (See page 69 for sources for threaded metal inserts.)

To lower a counter that is supported with wood support strips, first remove the counter by removing the screws that fasten it to the strips. With the strips exposed, remove the screws which hold the strip to the side cabinet, lower both strips to the desired height, and fasten the strips to the cabinet at the new height. (Figure 18) After both strips are attached, install the counter on the strips with the original mounting screws. (Figure 19)

The use of side strips is only one example of mounting an adjustable height counter to the sides of adjacent base cabinets. Metal angle brackets or a variety of conventional shelf support hardware could be substituted for the supporting wood strips. Regardless of the type of support hardware used, the counter must be securely attached to prevent movement or tipping should the user pull, lift, or lean on the counter.

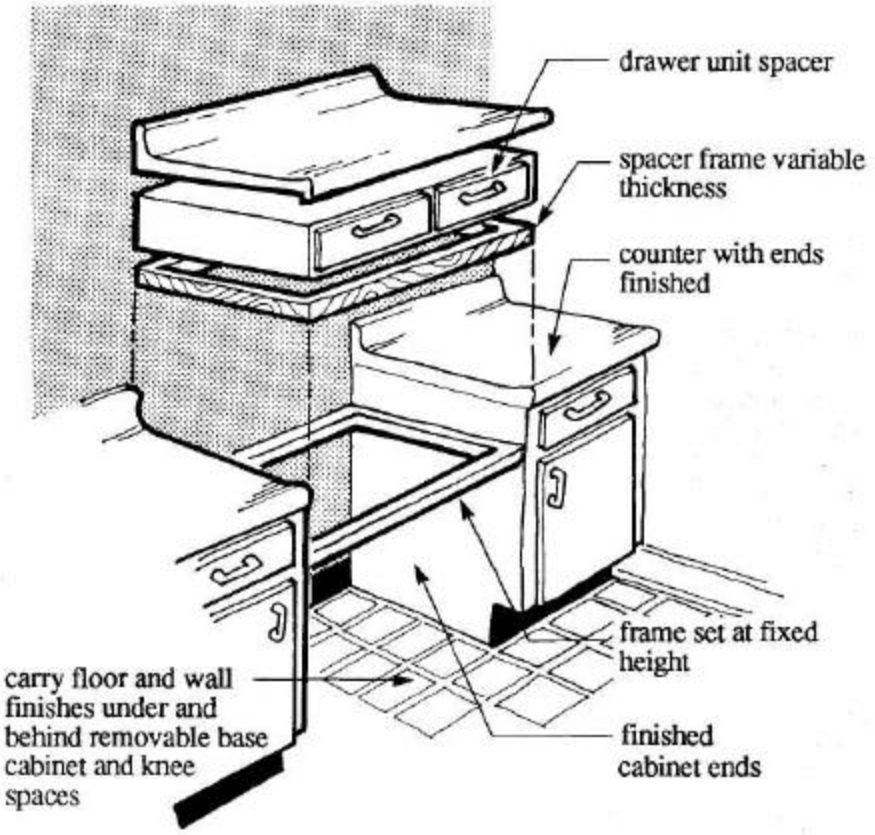


Figure 20.
Fixed Frame and Variable Thickness Spacers

Method 2. Fixed Support Frame and Spacers

The second method uses a fixed support frame and spacers to vary the height of the counter. (Figure 20) The counter is removable and is fastened to the top of the fixed support frame or to the top of the drawer unit or spacers. The fixed frame supports the counter directly when the counter is installed at the lowest height. (Figure 21) When the counter height is increased, inserting spacers and/or drawer units of various thicknesses raises the counter to any height up to 36 inches.

Since the frame is not movable, this method may also be used to provide a fixed lowered counter segment. Fixed segments 34 inches or lower are acceptable under ANSI 4.32.5.4 and UFAS 4.34.6.4.

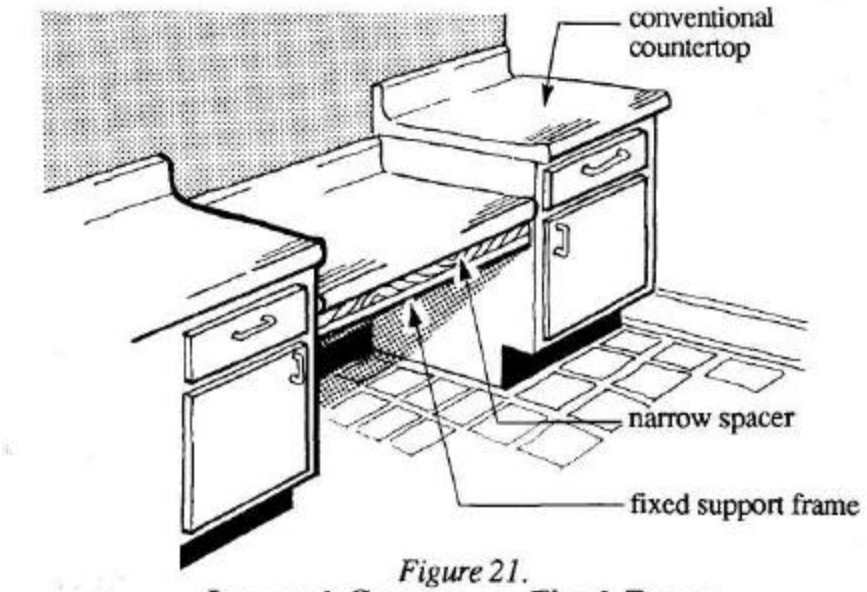


Figure 21.
Lowered Counter on Fixed Frame

NOTE: This method may not meet clearance requirements of ANSI and UFAS for 2 inch maximum depth of counter at the knee space. Where compliance is critical, the fixed frame may be made movable instead of installing inserts to raise the counter.

Method 3. Wall-mounted Adjustable Brackets

Wall-mounted, large, heavy duty shelf brackets of the type commonly used for display counters in stores and commercial facilities can also be used to support adjustable counter sections. As shown in figure 22, the brackets are locked into a track system that is firmly mounted either to the studs or to wall reinforcing. The track system permits the counter to be installed at heights from 28 to 36 inches above the floor.

To adjust the height of the counter, the brackets are first placed into the tracks at the desired height and then are locked in place. The counter is placed over the brackets and fastened securely. (Figure 23)

The track system can be painted to match the wall color. The counter is finished on both ends so that the exposed edges that show when it is lowered will match the color of the remaining counter. (See page 69 for information on wall-mounted brackets.)

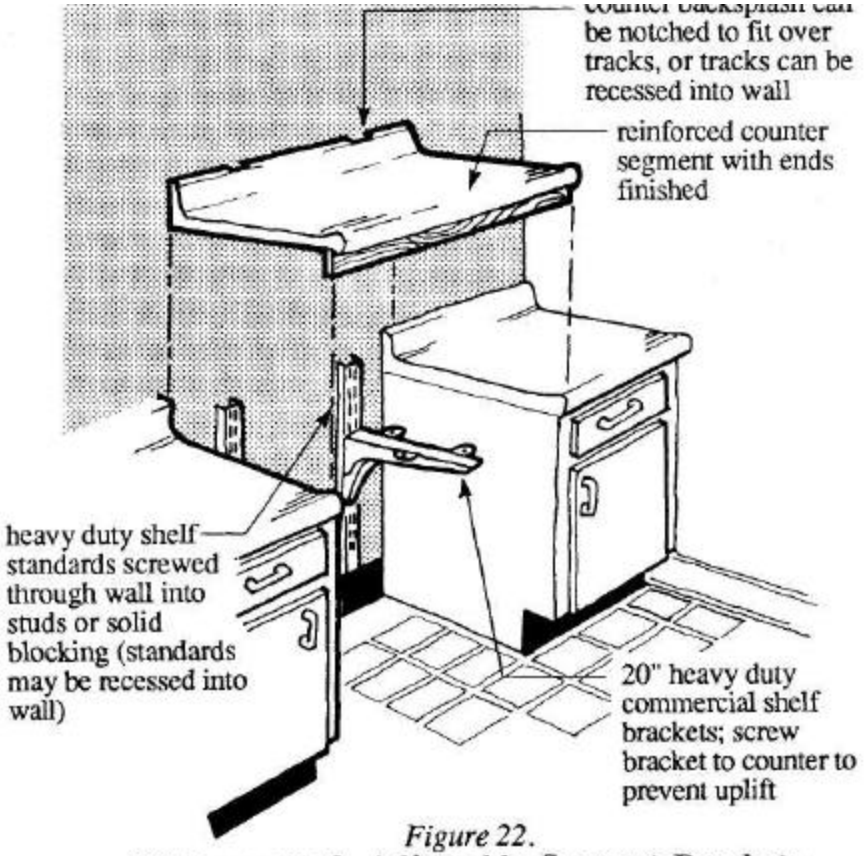


Figure 22.
Wall-mounted, Adjustable Support Brackets

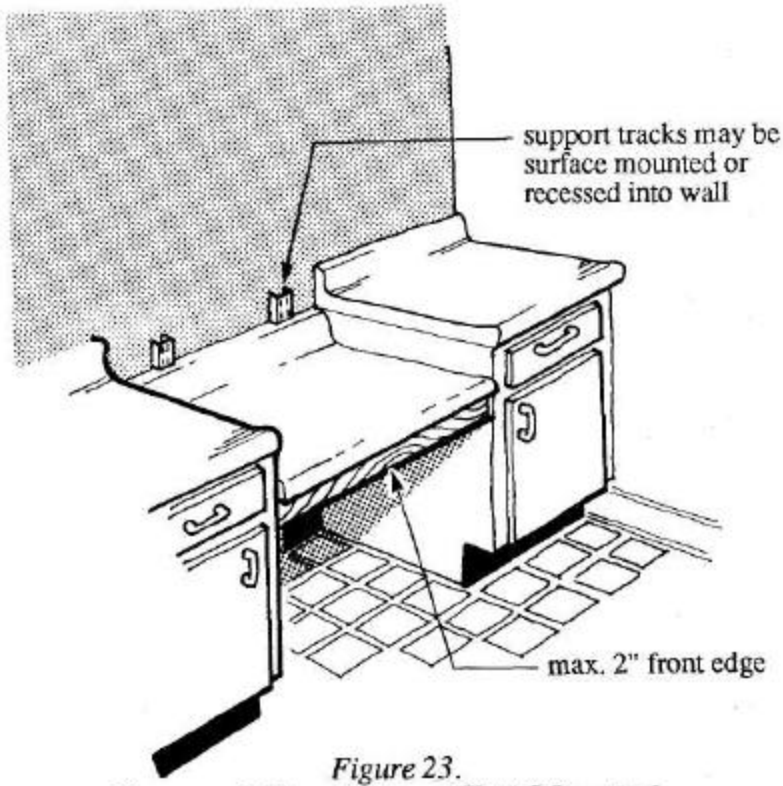


Figure 23.
Lowered Counter on Wall-Mounted, Adjustable Support Brackets

Costs for Providing Removable Cabinets and Adjustable Height Counters

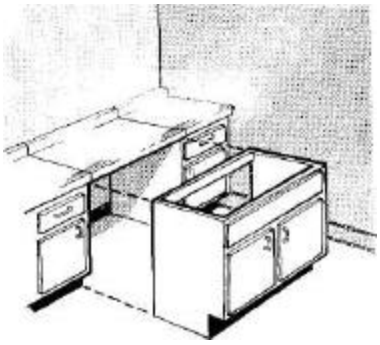
To develop cost estimates, two local suppliers of cabinets and counters in Raleigh, North Carolina, and a large manufacturer of stock cabinets were asked to review the methods for providing removable base cabinets and adjustable height counters. One of the local suppliers was a custom cabinet shop and the other was a supplier of several lines of manufactured kitchen and vanity cabinets and counters.

For a basic price comparison, each was asked to quote a price for a standard 30 inch base cabinet from their line so that these costs could be compared with the costs for each of the methods for adaptable cabinetry. The lowest price for the standard base cabinet was $128.00 from the custom cabinet shop. One line of manufactured cabinets had a 30 inch base cabinet that was quoted at $178.06, and the other line had a quote of $230.00. These prices are typical of cabinets of average quality; lower priced cabinets are available as are other cabinet lines that are much more expensive.

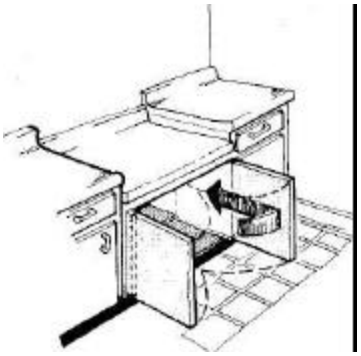
The cabinet suppliers and the manufacturer provided information on what it would cost to produce each of the methods for removable base cabinets. This information was provided as a percentage increase above the cost of a standard cabinet that they sold. Each estimate gives an indication of what it may cost to purchase adaptable cabinets and adjustable height counters at this time.

Cost Comparisons for Removable Base Cabinets

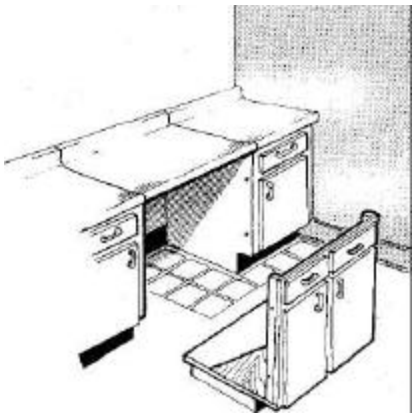
For the first method, **removable standard base cabinet,** the increased cost ranged from no additional cost for the custom cabinet shop to a 10% increase for the manufactured cabinet line. The custom cabinet supplier said that there was no additional cost if the cabinet was ordered without a back, with cut down sides and with bracing.



The second method, **base cabinet with self-storing, folding doors,** was more expensive to build. As a custom made cabinet it would cost 81 % more than the standard custom made base cabinet. This cabinet in the manufactured line of cabinets was estimated to cost 75% more than their standard base cabinet.



The third method, **removable cabinet front and floor,** was also slightly more expensive when supplied by the custom cabinet shop than when supplied by the large cabinet manufacturer. The price for the custom cabinet was 14% more than the price for the standard custom base cabinet. The price for this type of cabinet in the manufactured line was 10% more than the standard manufactured base cabinet.

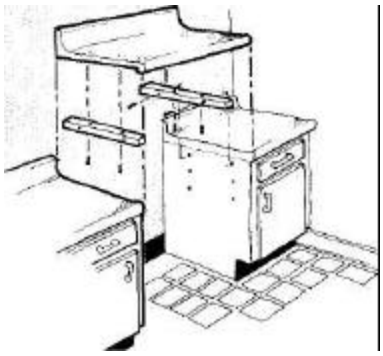


Cost Comparisons for Adjustable Height Counters

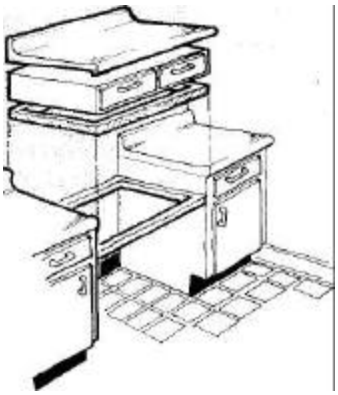
The custom cabinet shop and the local supplier of manufactured cabinets provided cost information on the three methods for providing adjustable height counters. The cost for a standard 30 inch section of laminate covered counter including installation was $40.00 from the custom cabinet shop and $67.50 from the other supplier.

Only the custom cabinet shop provided cost estimates for all three methods of adjusting the counter height. The other kitchen cabinet supplier said that while they could do each of the methods in their shop, it would be difficult for them to estimate the costs for each method until several of the counters were built. Initially, charges for fabricating each method would be made on a materials plus labor rate with labor charges of $25.00 per hour.

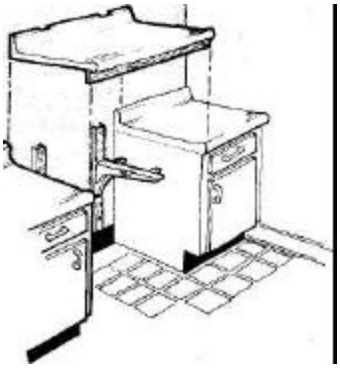
For the first method, **movable wood support strips,** there was a 112% ($85.00 vs. $40.00) increase in cost over the standard 30 inch section of counter provided by the custom cabinet shop. This increase covered the screw inserts, mounting screws, installation of the hardware in the cabinetry and counter, and a 30 inch section of counter with finished ends.



For the second method, **fixed support frame and** spacers, there was a 50% ($60.00 vs. $40.00) increase in cost compared to the standard counter. The cost included the mounting frame, installation of the frame onto the cabinet, mounting hardware and the 30 inch section of counter with finished ends. The cost of a removable 5 inch drawer unit to raise the counter to 36 inches was estimated at an additional $65.00. Optional spacers were $10.00 each.



The third method, **wall-mounted adjustable brackets,** was 137% ($95.00 vs. $40.00) more expensive than the standard counter. The cost covered the special commercial shelf standards and brackets, installation of the standards onto studs, mounting hardware for the wall and for the counter, and a 30 inch section of counter with finished ends.



Applications of Adaptable Features in Kitchens

Adjustable height counters and their accompanying knee spaces can have several different applications in an adaptable kitchen. Besides being used for work surfaces, the lowered counter with knee space may be located next to a wall-mounted oven, a range, or a lowered cooktop, or it may be used to provide an adjustable height sink.

Work Surfaces

People who use wheelchairs and other people who must or wish to sit down while preparing food need at least one work surface lower than the usual 36 inch high counter. (Figure 24)

The standards (ANSI 4.32.5.4 and UFAS 4.34.6.4) require that at least one 30 inch wide, adjustable height work surface be provided in an adaptable kitchen although a wider size is preferred. The wider work surface provides space for pots, dishes, and other utensils as well as small appliances, and makes it easier to work on several things at once or to cook using many ingredients. (Figure 25)

Work surfaces at ovens. If a wall oven is installed, a lowered work surface with knee space should be installed next to the wall oven. The standards specify that when the wall oven is not self-cleaning, a knee space must be located next to the oven to permit a disabled person in a wheelchair to pull up close enough to clean the oven. (Figures 26 and 27)

Figure 24. **Seated Person at Lowered Work Surface**

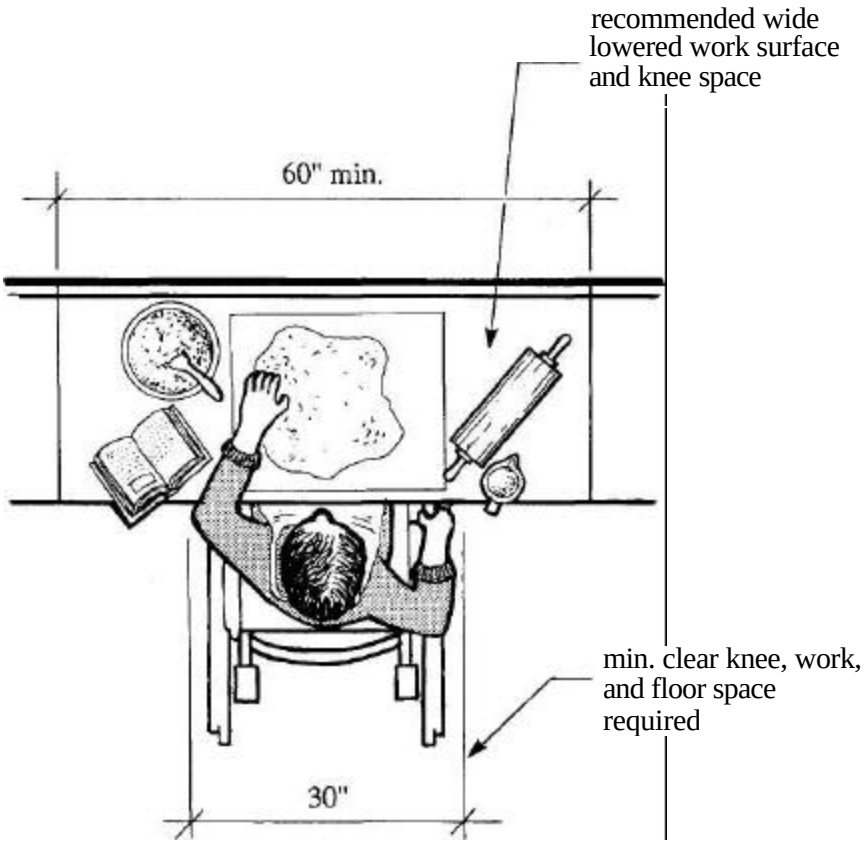


Figure 25. **Use of a Wider, Lowered Work Surface**

Even if a self-cleaning oven is installed, locating the knee space next to the oven makes it easier and safer for a disabled person to remove hot items from the oven.

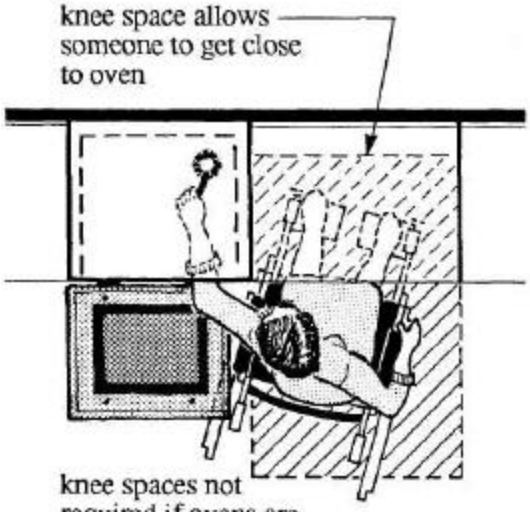


Figure 27.
Use of Knee Space Next to Oven

When an oven with a side-opening door is used, a pull-out shelf located beneath the oven must be installed. The shelf is used as a transfer surface for dishes as they are placed into or taken out of the oven. When not needed, the shelf is pushed back into the oven cabinet. (Figure 28) When an oven with a drop-front door is used, (figure 26), the pull-out shelf is not needed because the door serves as a transfer shelf.

See ANSI 4.32.5.7 and UFAS 4.34.6.7 for dimensions and details of ovens.

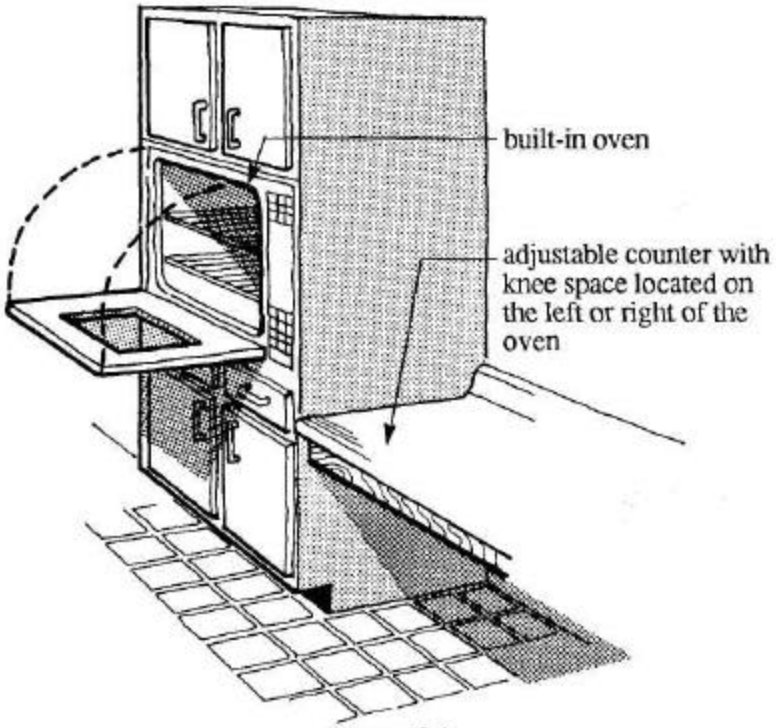


Figure 26.
Work Surface at Non-self-cleaning Oven with Drop-front Door

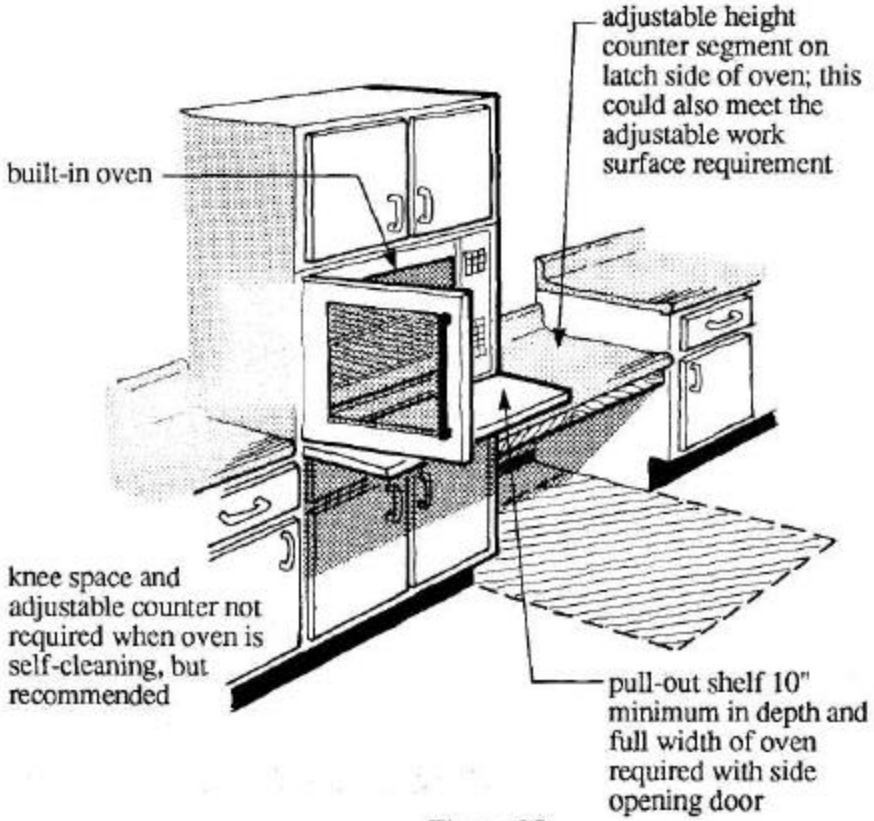


Figure 28.
Pull-out Shelf at Non-self-cleaning Oven with Side-opening Door

Cooktops in Adjustable Height Counter Segments

ANSI 4.32.5.6 and UFAS 4.34.6.6 permit use of a standard range if the controls comply with ANSI 4.25 or UFAS 4.27. The controls must be placed along the front or the side of the range so that a seated person need not reach across a hot burner to adjust the controls. (Figure 29)

Some wheelchair users cannot use conventional ranges because the surface is too high and there is no knee space for maneuvering. Cooktops in lowered counter segments with knee space below allow some wheelchair users to get close enough to operate the controls and move heavy pots and pans. (Figure 30)

Cooktops with smooth surfaces are preferred by people with limited hand and arm strength because they can slide pots of hot food on and off the cooktop rather than lifting them over raised burners and knobs.

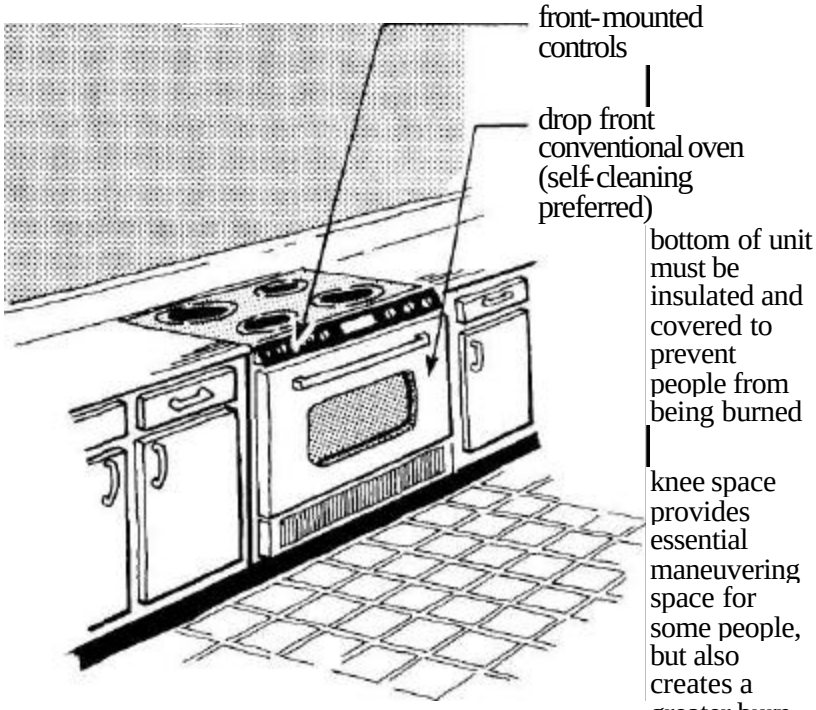
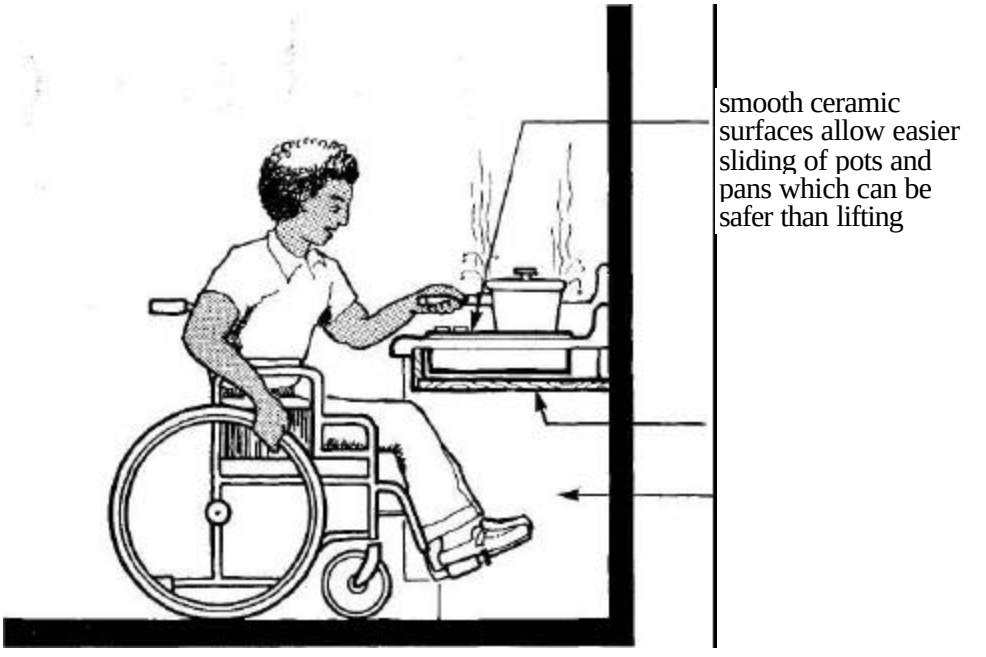


Figure 29. Standard Range

Figure 30. Use of



Cooktop with Knee Space

When a cooktop is installed in a lowered counter, the width of the counter segment and knee space should be at least 30 inches and should provide space to the side of the cooktop for utensils and maneuvering. An additional 30 inches to the side is recommended. (Figure 31)

When the knee space is under a cooktop, the standards require that the bottom of the cooktop be insulated to protect against accidental burns.

While this type of installation may be the only way that some people can cook, it does expose a person in a wheelchair to the hazard of spilling hot food in his/her lap. People who pull up beneath the cooktop must exercise extreme care and cool hot foods before moving them.

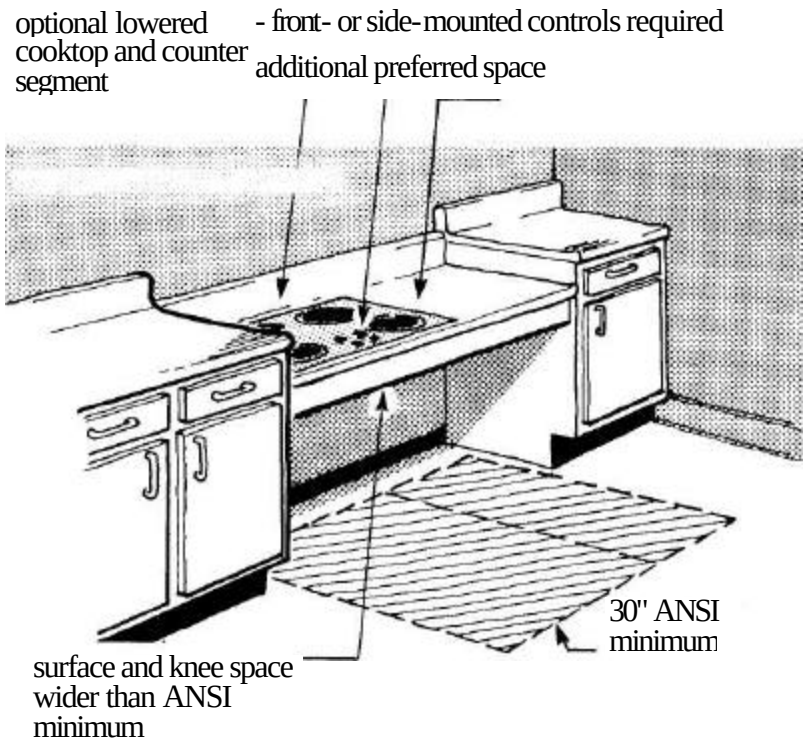


Figure 31.
Lowered Cooktop with Knee Space and Wide Counter

Sinks in Adjustable Height Counter Segments

Like lowered work surfaces, sinks mounted in lowered counters are required by the standards (ANSI 4.32.5.5 and UFAS 4.34.6.5). People who use wheelchairs, seated people, short people, and children have a hard time using a 36 inch high sink. The standards require that a sink be provided in a lowered counter which is at least 30 inches wide and has a knee space. (Figure 32) Sinks must not be deeper than 6-1/2 inches. Single or double bowl sinks may be used. If a double bowl sink is used, only one of the bowls must not be deeper than 6-1/2 inches. Sinks with drains located near the back are also best because they keep pipes and disposals further back and out of the knee space clearances.

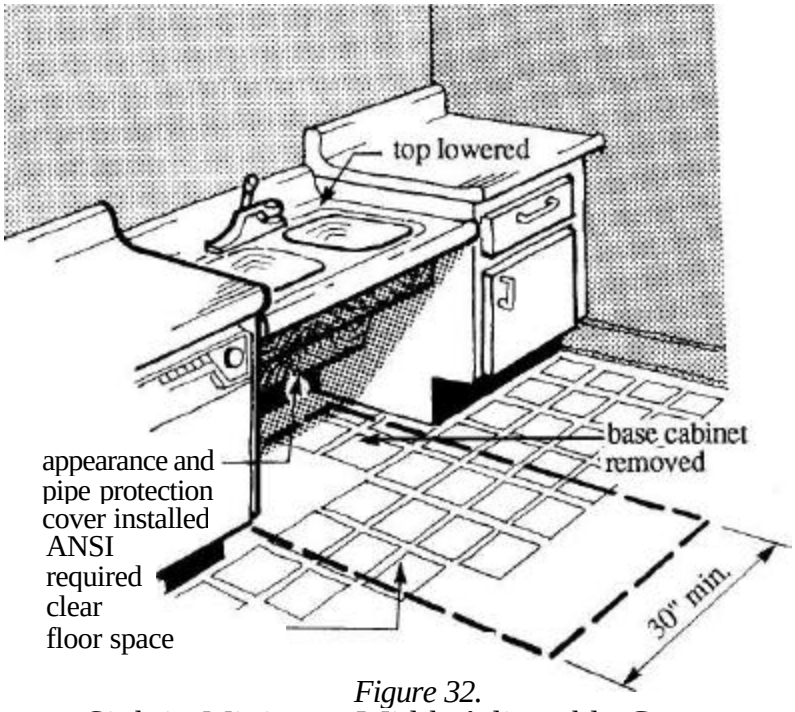


Figure 32.
Sink in Minimum Width Adjustable Counter Segment

The minimum counter width specified by ANSI and UFAS is 30 inches. When sinks are installed in adjustable counter segments, a wider sink and counter combination is preferred to provide extra space at the sink level for dishes and utensils. The additional width permits a seated person to stack dirty dishes on the lowered counter before washing, and it eliminates lifting heavy pots and pans from the bottom of the sink (6-1/2 inches below the lowered counter) up to a 36 inch high counter, which some people cannot do safely. (Figure 33)

Pipe protection at lowered sinks. Knee spaces under sinks must be designed so that people will not receive burns or abrasions on their legs from contact with the hot water and drain pipes. Many people who use wheelchairs have limited sensation in their legs and cannot feel the heat when they are touching a hot pipe or even after a serious burn has occurred.

The pipes can be wrapped with insulation, but each time the plumbing is serviced, the insulation must be removed and then reinstalled which may result in the insulation being left off the plumbing. A better method is to install a removable panel over the plumbing. This panel shields the seated person from possible burns and hides the plumbing from view. (Figure 34).

If a panel is used, it must be installed so that the knee space is not limited and a seated person can pull up to the sink (see ANSI and UFAS for clearance dimensions). The panel also must be hinged or otherwise removable so that the pipes can be easily serviced and the counter height adjusted.

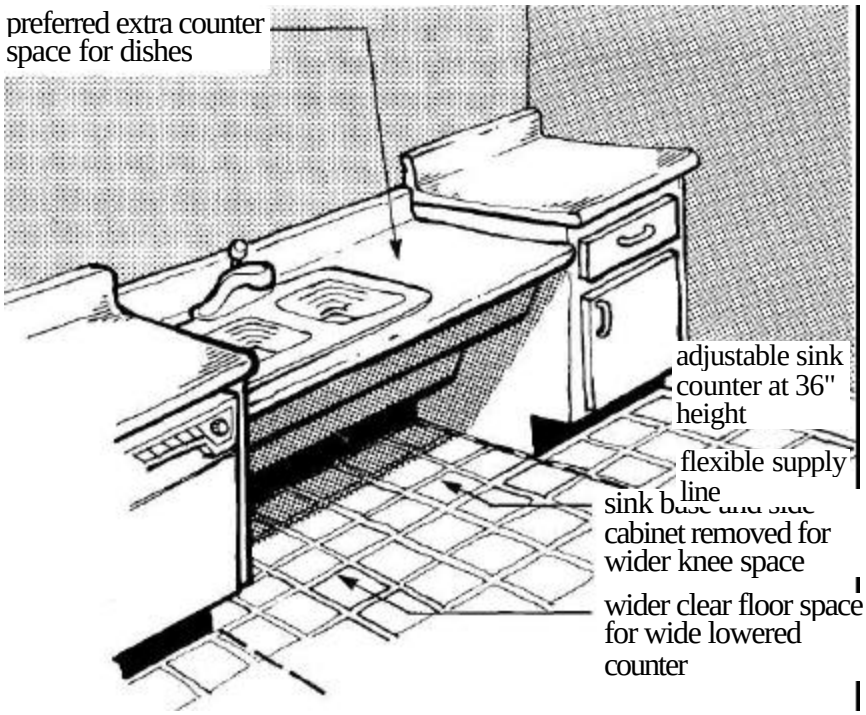


Figure 33. **Sink in Preferred Wider Counter**

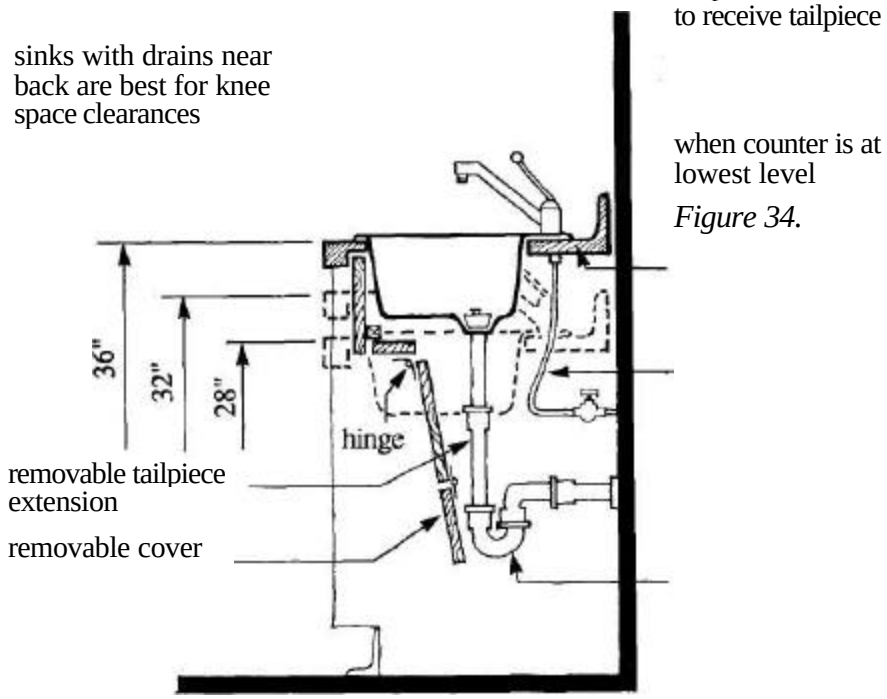


Figure 34.

Section at Adjustable Sink with Base Cabinet Removed and Appearance and Pipe Protection Cover Installed

Disposals installed in lowered sinks. Many disabled and non-disabled people benefit from having a disposal in the kitchen. It makes cleanup much easier and reduces the amount of heavy garbage that must be first carried to the waste basket and later to another waste receptacle outside the dwelling.

Disposals can be installed in lowered sinks as long as the 30 inch minimum width knee space remains under the sink. Some disposals and sink assemblies will interfere with required knee space clearances under sinks and may not fit inside the appearance and protective cover shown in figure 34.

Figures 35 and 36 show an alternative method of installation for disposals at lowered sinks. Figure 35 shows a second base cabinet removed so that the width of the lowered area is increased. The sink is offset so that one bowl is over the knee space and the second bowl is over an enclosed section containing the disposal. A seated person can pull up under the right hand bowl, operate the lever handle faucet, and wash dishes or vegetables. From this position, garbage can be scraped into the other bowl and rinsed into the disposal.

Installing a disposal, while not required by the standards, is suggested as long as the required features — lowered sink, knee space, insulation, lever handle faucet, and clear floor space— can be provided.

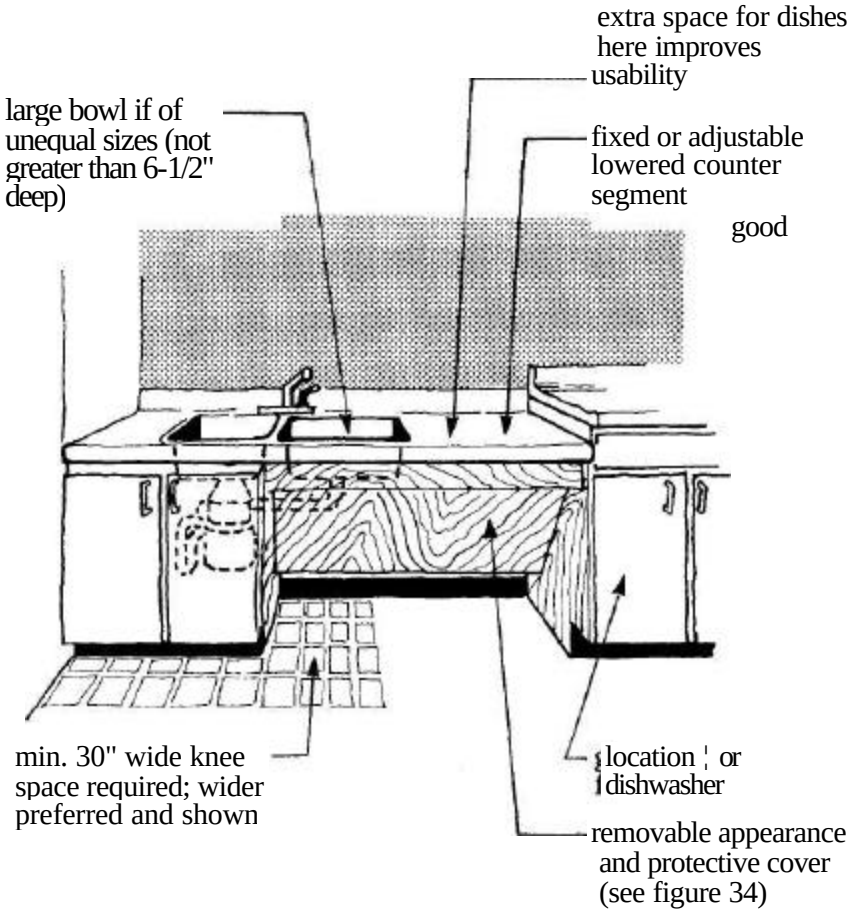


Figure 35. A Suggested Garbage Disposal Enclosure

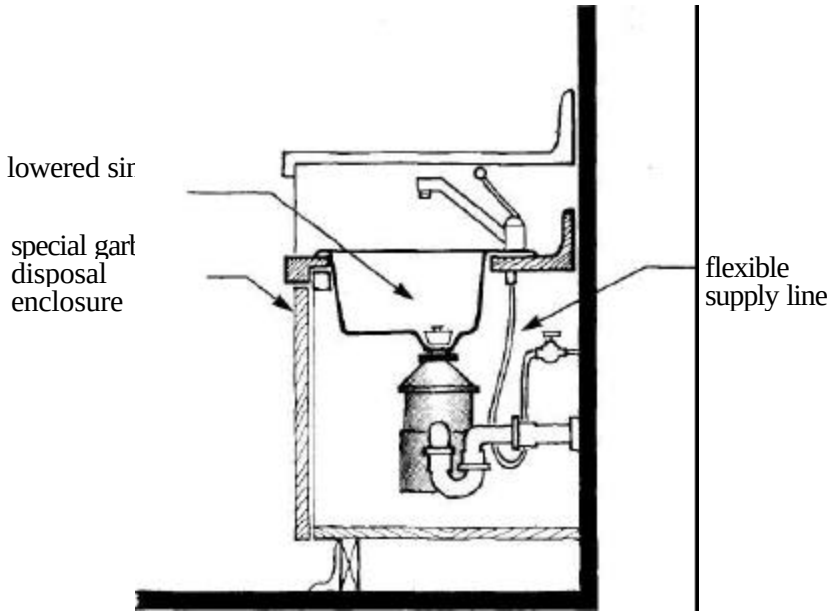


Figure 36.
Section at Special Garbage Disposal Enclosure

Two Examples of Adaptable Kitchens

In the examples that follow, the standards have been used to develop two kitchen designs: one that is a minimum sized kitchen and the other a well-furnished model. Notes on the two illustrations explain the features and show the items specified by the standards as accessible or adaptable features. Other notes point out additional recommended features.

An Example of a Minimum Size ANSI/UFAS Adaptable Kitchen

The small kitchen shown in figure 37 is just one example of a minimum sized adaptable kitchen with basic features that meets the standards. Other arrangements that meet the standards are also possible. This kitchen is shown in its adapted or wheelchair accessible configuration but it may be inadequate for many disabled or non-disabled people because of its small size. A kitchen of this type should only be considered for use when a larger kitchen is impossible as in efficiency apartments.

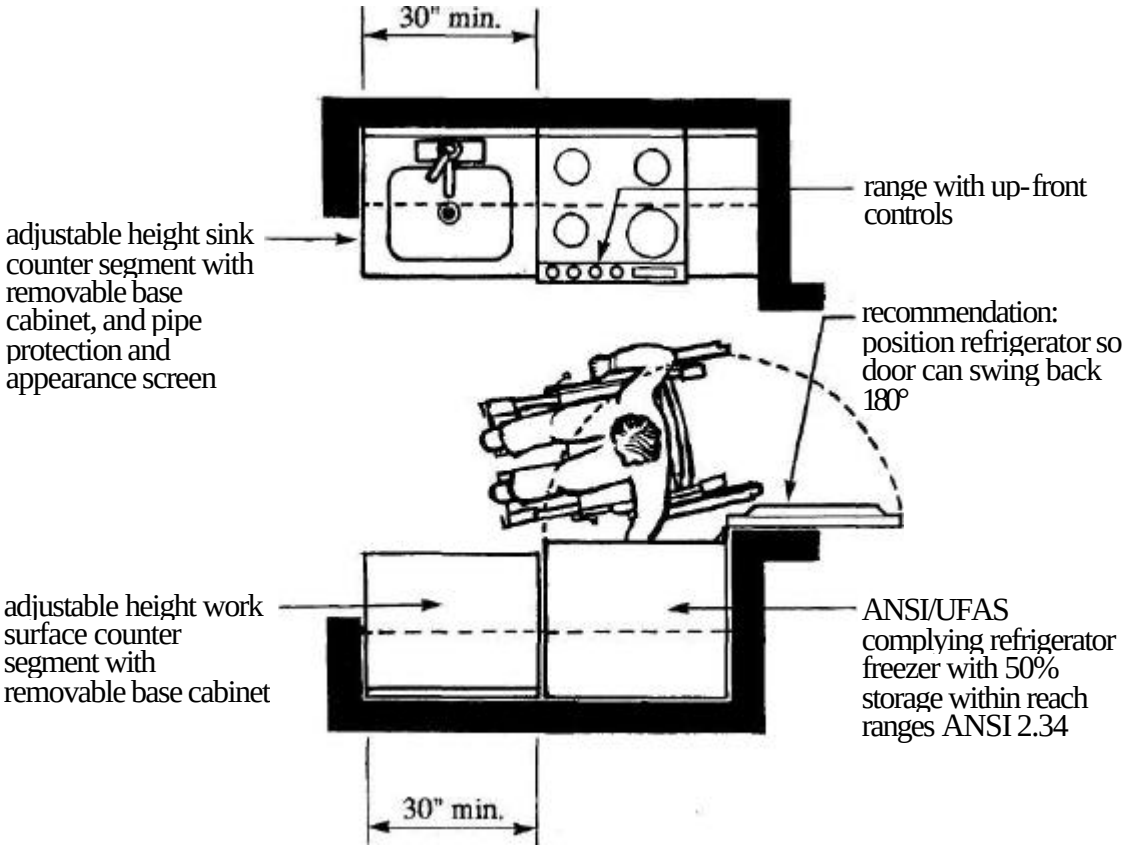


Figure 37.
A Small Kitchen with Adaptable Features
Plan

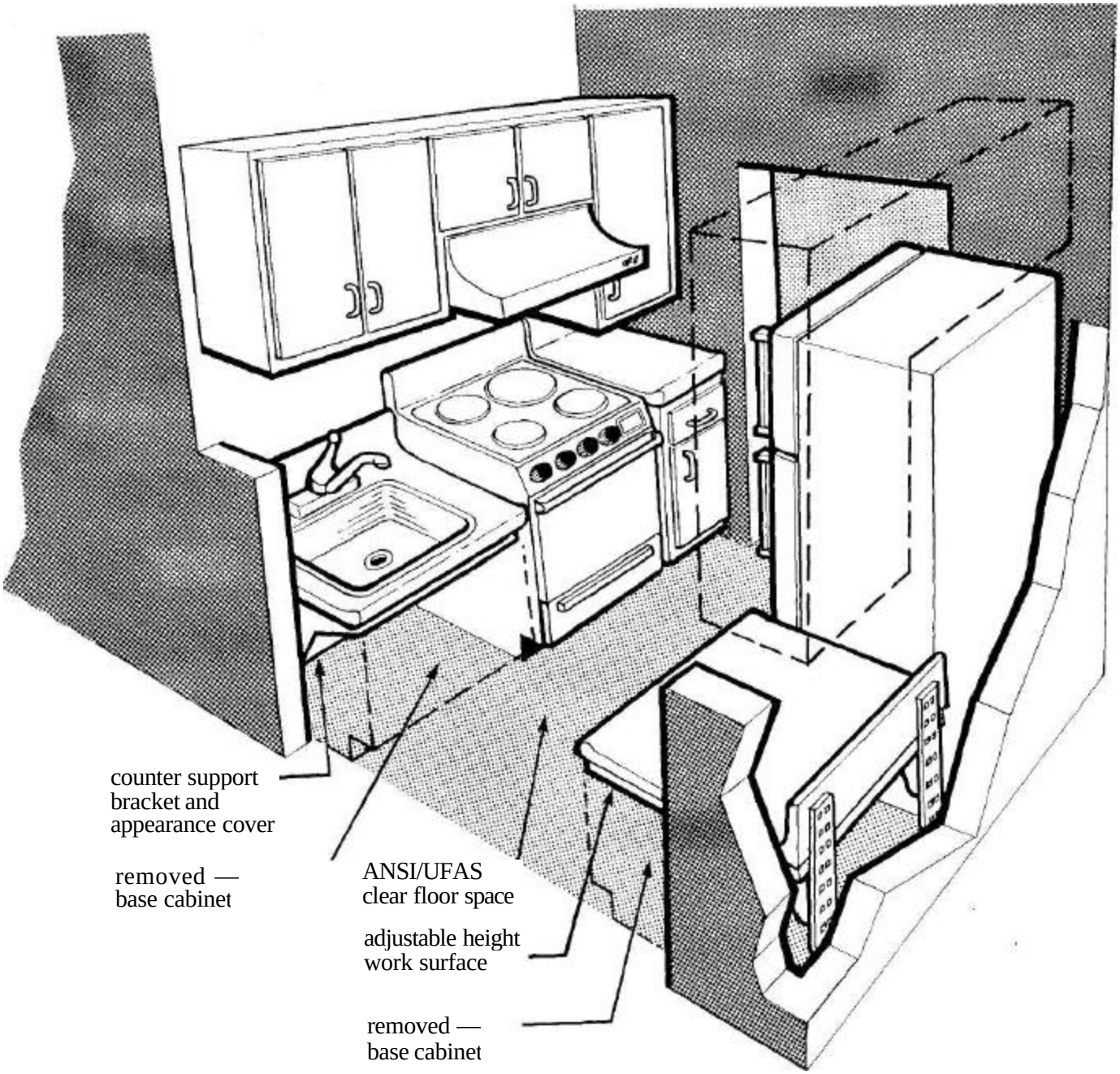


Figure 37.
A Small Kitchen with Adaptable Features
Perspective

An Example of an Elaborate Kitchen with Adaptable Features

The kitchen shown in figure 38 is an example of a more elaborate kitchen having ANSI/UFAS accessible/adaptable features. This kitchen exceeds the ANSI/UFAS minimum requirements and includes recommended conven-

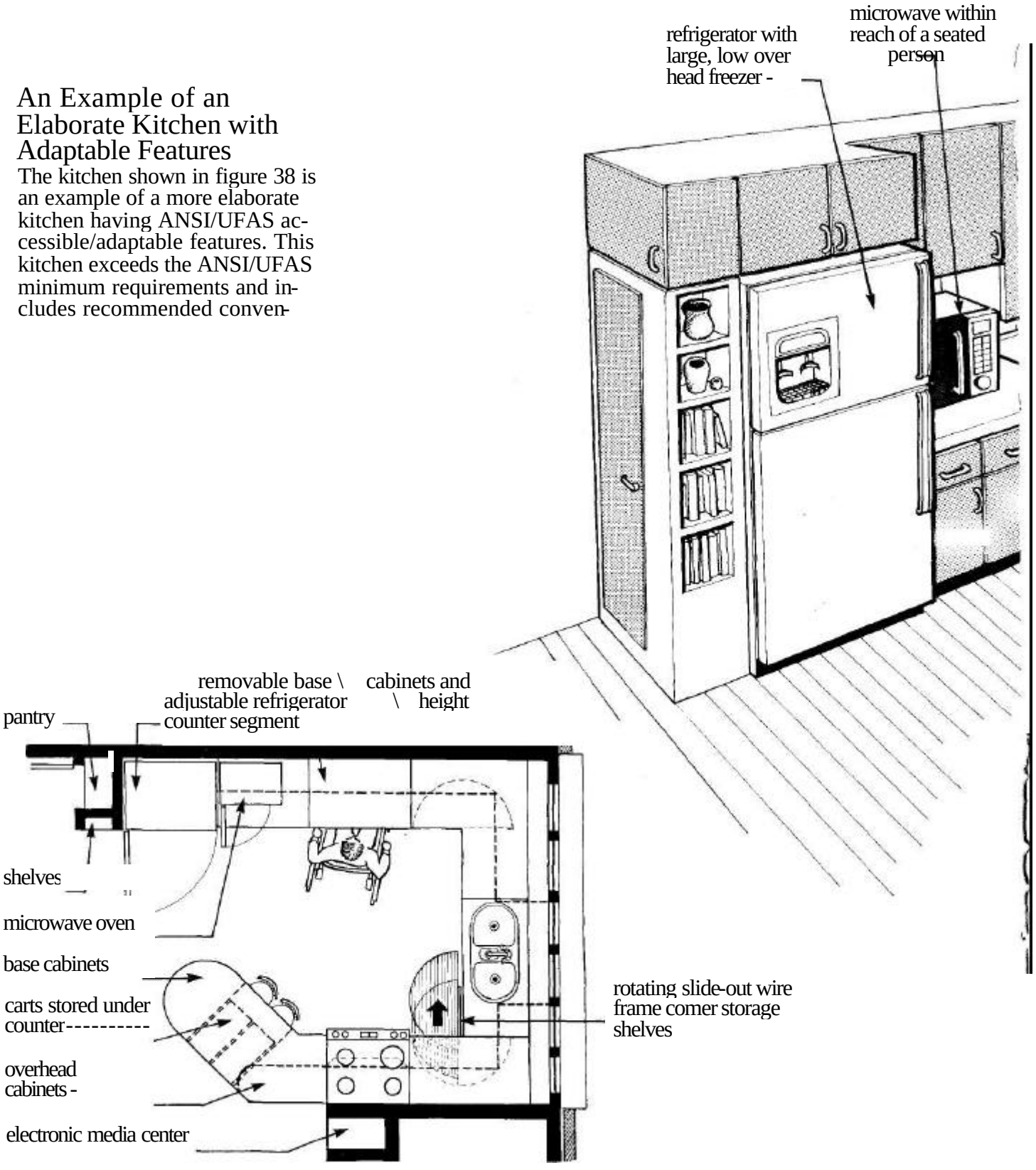


Figure 38.
Plan of Elaborate Kitchen with Adaptable Features

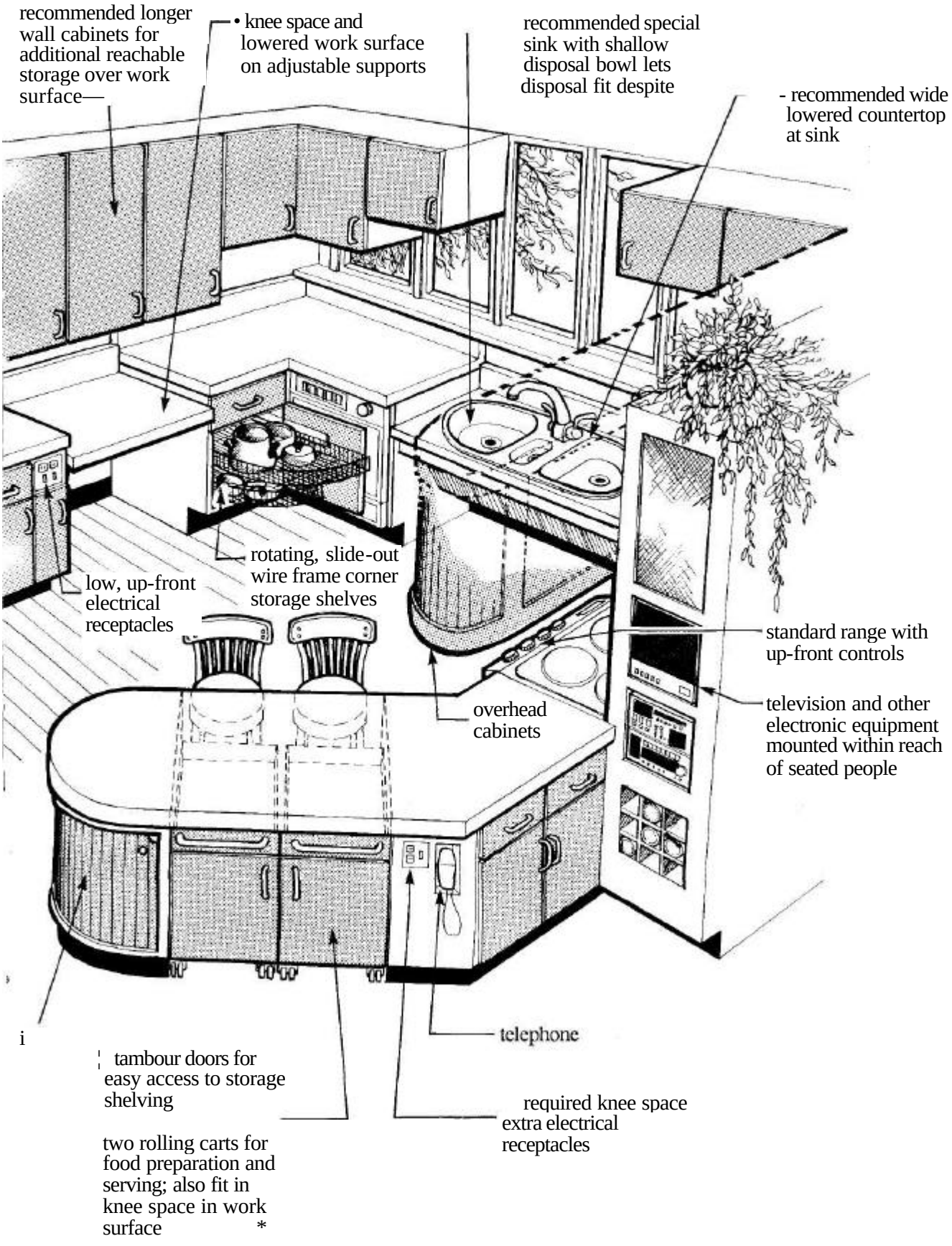


Figure 38.
An Elaborate Kitchen with Adaptable Features
Perspective

ADAPTABLE BATHROOMS

Requirements

The ANSI and UFAS standards specify fixed accessible and adaptable features which can make the bathroom usable by most people. These required features for bathrooms are specified in ANSI 4.32.4 and UFAS 4.34.5. Included as fixed accessible features are requirements for doors, water closets, lavatories, medicine cabinets, mirrors, bathtubs, stall showers, bathtub and shower enclosures, and clear floor space at each fixture.

The adaptable features in bathrooms are reinforcing in the walls around bathtubs, showers, and toilets for the installation of grab bars, and removable vanity cabinets under countertop lavatories.

Both the fixed accessible and the adaptable features must be included in adaptable bathrooms. Figures 39,40,41, and 42 show the two bathrooms from the illustration of an adaptable dwelling (see figure 1) in both their conventional and adjusted configurations.

Figure 39 shows the smaller bathroom in its conventional configuration without grab bars and with a vanity base cabinet in the knee space under the lavatory. In Figure 40, the bathroom has been adjusted by removing the vanity cabinet, installing grab bars at the toilet and tub, and adding a portable, clamp-on tub seat.

Figure 41 shows the larger

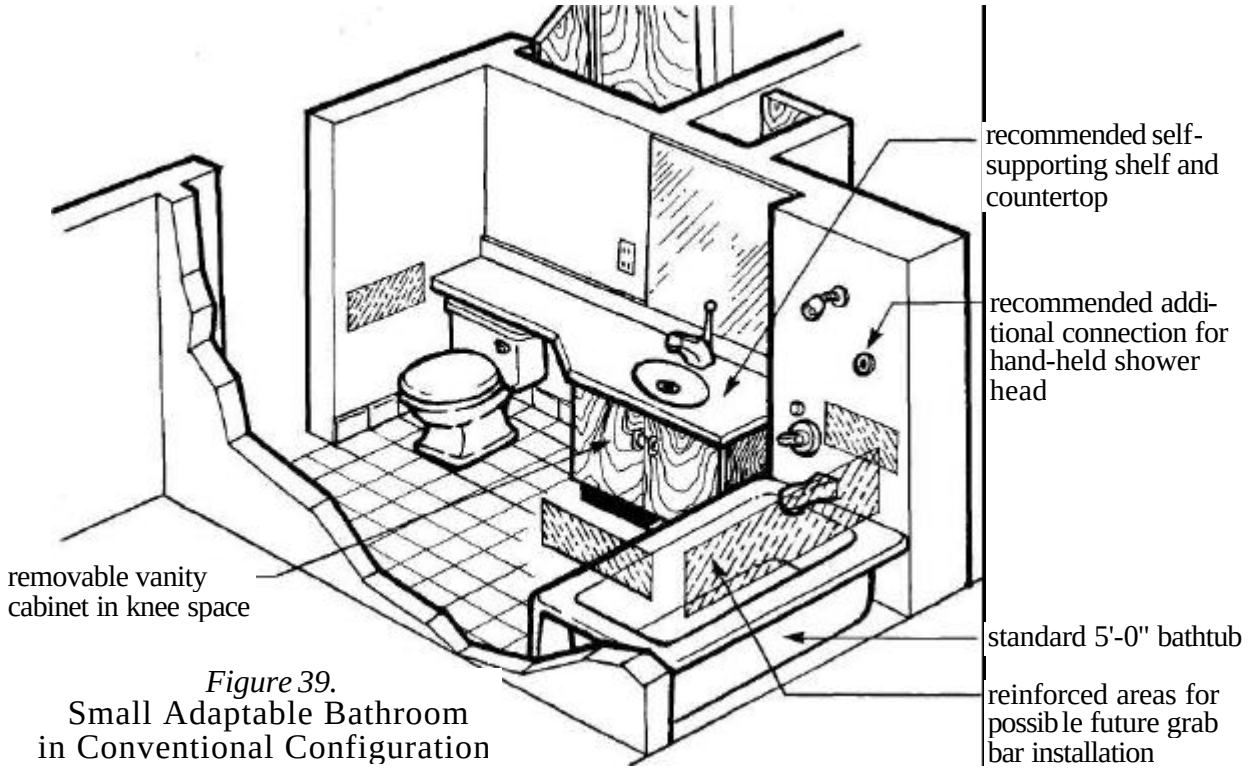


Figure 39. Small Adaptable Bathroom in Conventional Configuration

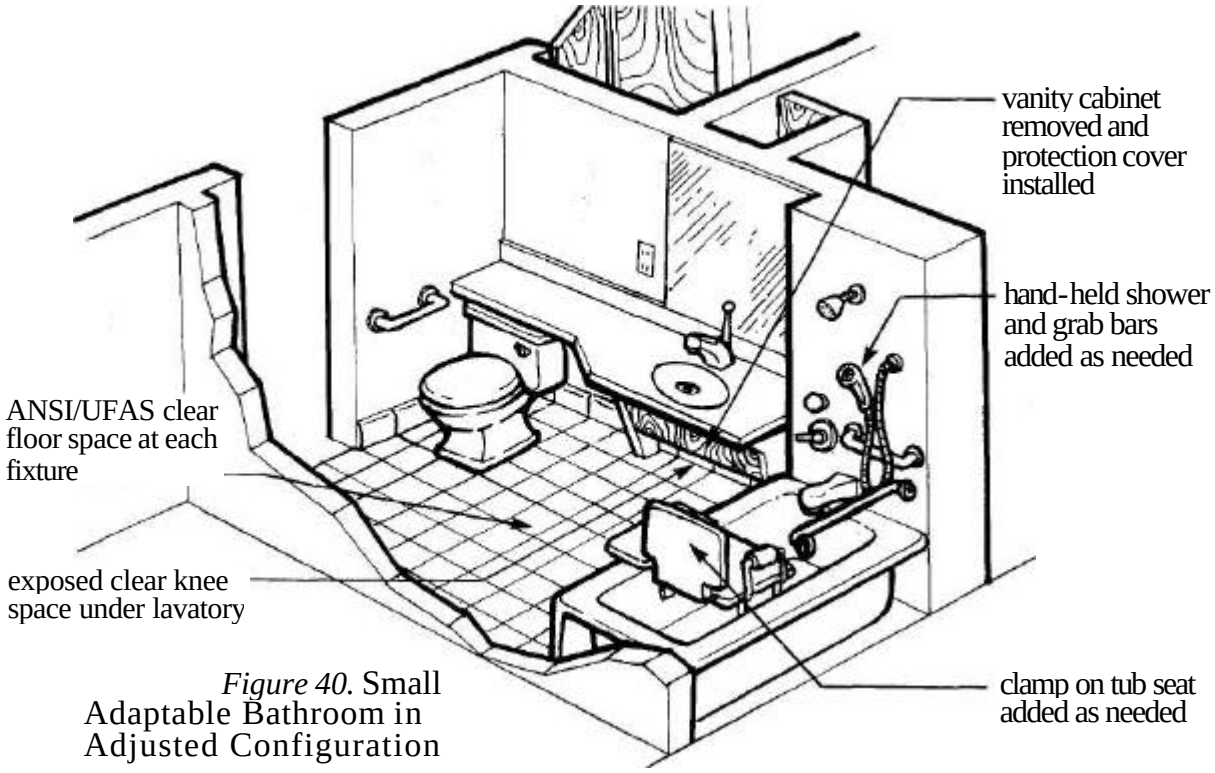


Figure 40. Small Adaptable Bathroom in Adjusted Configuration

adaptable bathroom before modification. In Figure 42, the vanity cabinet has been removed to expose a knee space and grab bars have been added at toilet and tub. No tub seat has been added because the seat is already built-in at the end of the tub. In both adapted bathrooms, no changes have been made to the floor space, the location of the fixtures, the size of the door, or the floor coverings.

Removable vanity cabinets, like removable kitchen base cabinets, are not yet available commercially, and construction methods for grab bar reinforcing are not well-known. Following are two suggested methods for providing wall reinforcing and a description of one method for modifying a vanity cabinet to be removable.

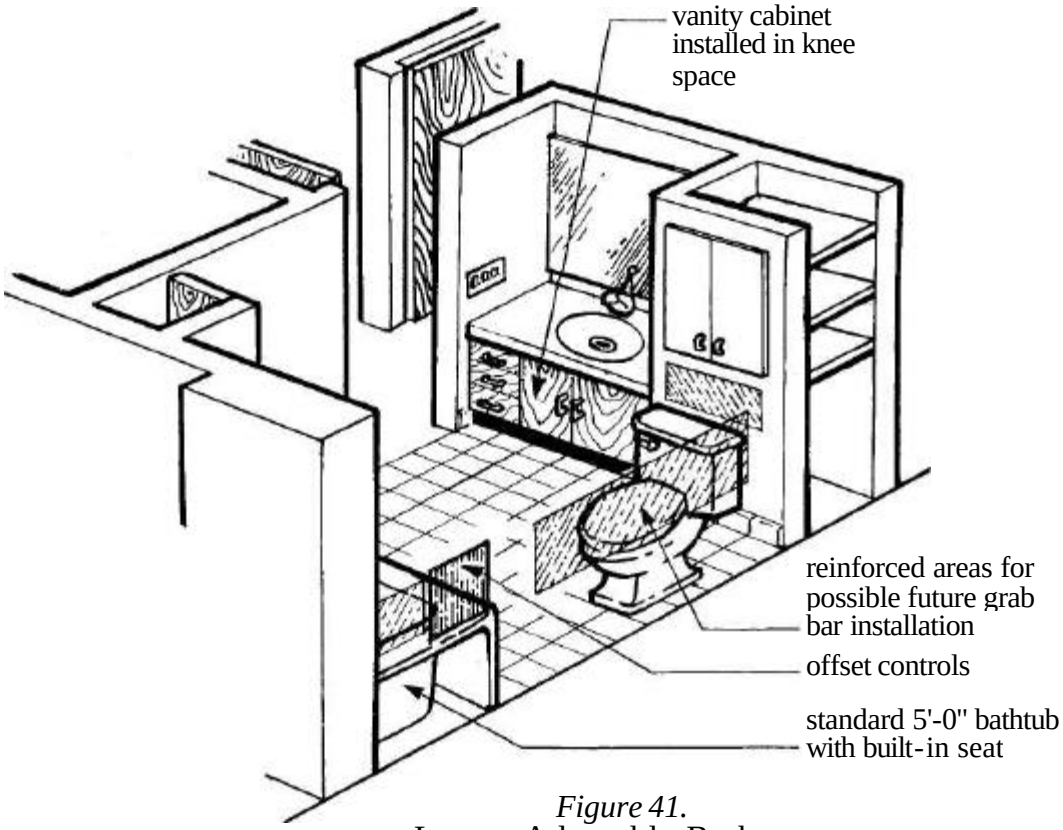
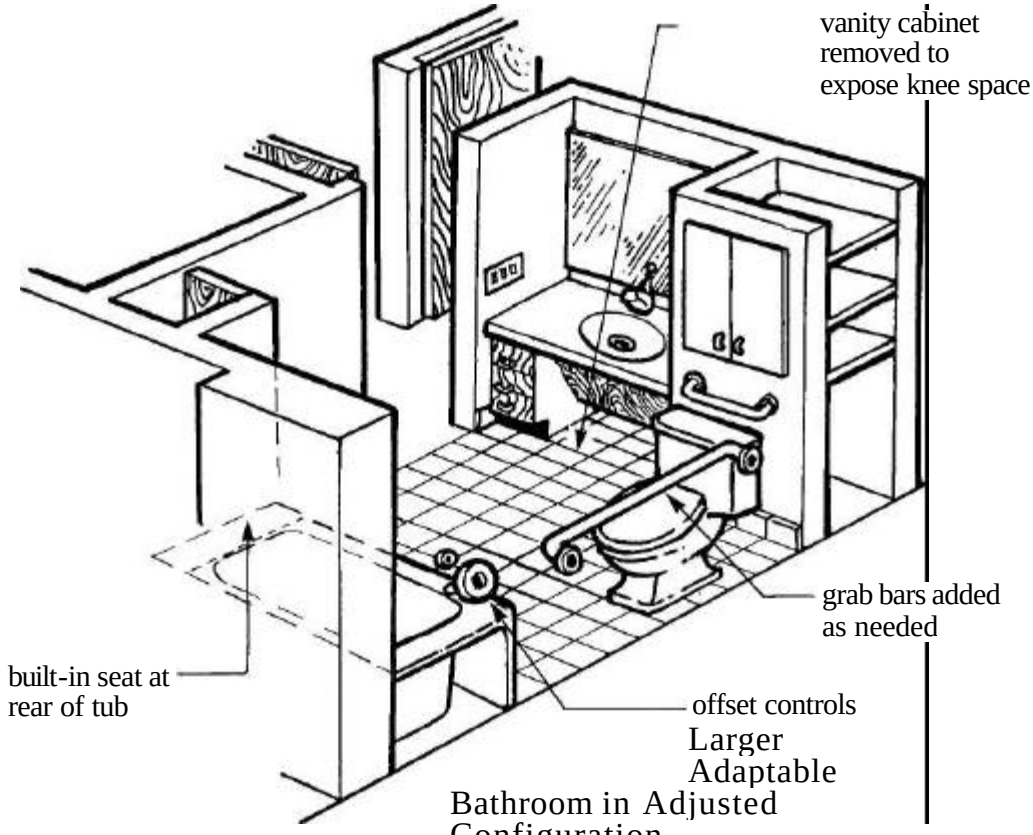


Figure 41.
Larger Adaptable Bathroom
in Conventional Configuration

Figure 42.



Larger
Adaptable
Bathroom in Adjusted
Configuration

Methods for Reinforcing Walls for Grab Bars

Many disabled and non-disabled people need grab bars to use a bathtub, shower, or toilet safely. Some people need several grab bars, while others need only one. Conventional wall finish materials such as gypsum, plaster, wood, tile and plastic are not structural materials and cannot adequately support grab bars and other accessories.

The ANSI and UFAS standards have provided for a range of needs by requiring that limited areas of specific walls at plumbing fixtures be reinforced so that grab bars can be added as they are needed by the occupant. With wall reinforcing installed, grab bars can be added, adjusted, or removed as needed without modifications being made to the wall. When the proper reinforcing is used, grab bars can be securely fastened to withstand the necessary forces and normal use over a long time.

An example of the limited area reinforcing specified by ANSI and UFAS is shown in figure 43. The exact location and size of the required areas for all fixtures are specified in ANSI 4.32.4 and UFAS 4.34.5, and the minimum forces they must be able to withstand are specified in ANSI 4.24 and UFAS 4.26.

Method one addresses solid wood blocking behind the specified areas and method two presents an alternative approach using plywood over a larger area.

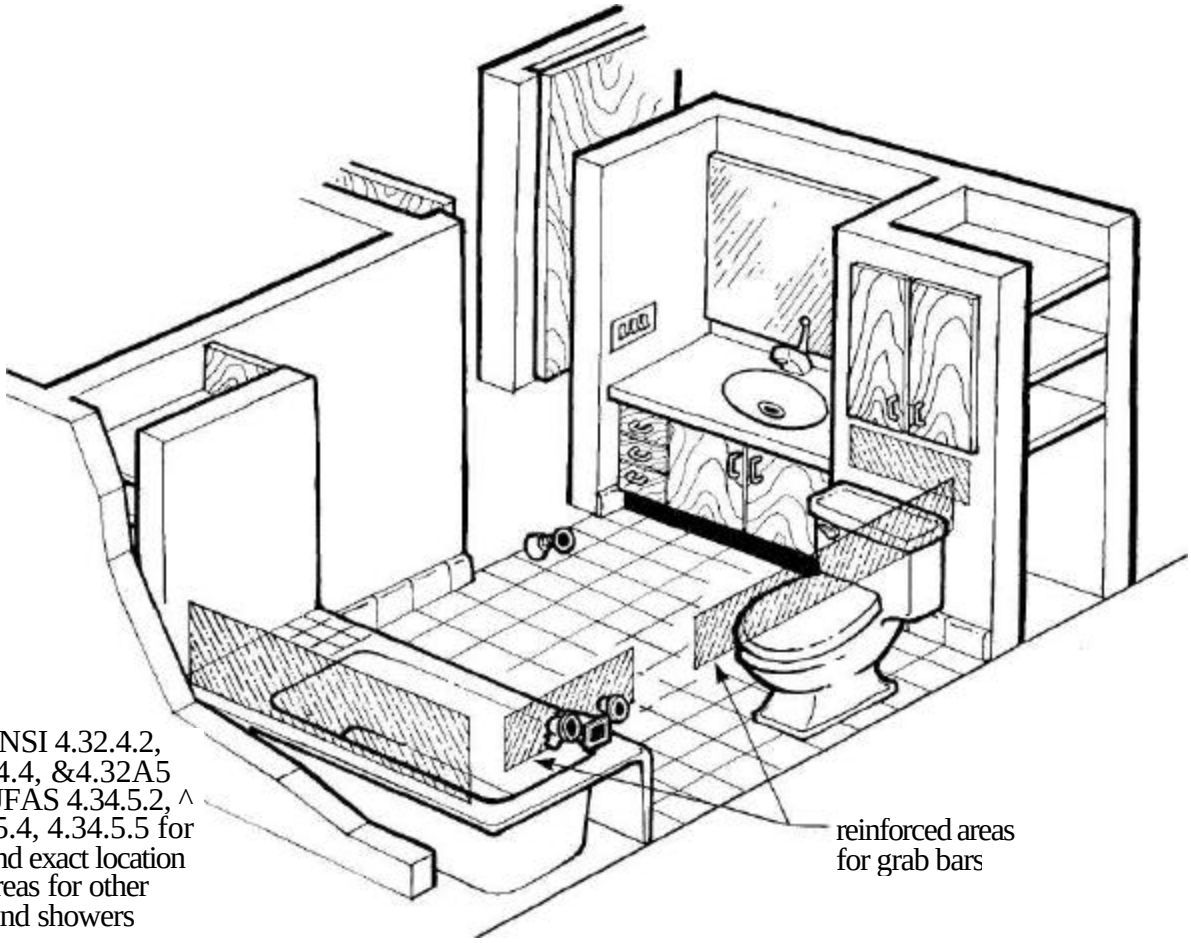


Figure 43.
Example of Minimum Reinforced Wall Areas at Bathtub and Toilet

Method 1. Limited Area Reinforcing with Solid Wood Blocking

Stud wall. In wood frame construction, a grab bar mounting area can be reinforced by installing solid wood blocking either between or let into the studs and fastening the blocking securely to the studs. In either way, the solid wood reinforcing is installed flush with the face of the stud so finish materials can be applied to the studs and blocking in the normal manner. (Figure 44)

Molded fixtures. Fiberglass and acrylic bathtubs and showers with integral wall panels are common in both new construction and remodeling. The panels alone are too thin to support grab bars, and because they do not touch the stud wall except at the top, there is a space between the panel and the stud wall. To attach grab bars to these surfaces, an area of solid wood blocking must be installed in the cavity between the fiberglass or acrylic wall and the wall.

Since the space between the panels and the stud wall gets narrower as it approaches the top of the panels where they are fastened to the studs, this blocking must be cut to fit snugly in the space between the studs and the panel. The blocking must contact the plastic panel over the entire reinforced area. (Figure 45)

Some fiberglass and acrylic tubs, showers, and wall sections are now made with reinforcing already in the walls to stiffen the fixture. If the reinforced fiberglass or acrylic wall is not specifically labeled as built for grab bars and meeting the ANSI/ UFAS load requirements, then additional reinforcing may need to be installed.

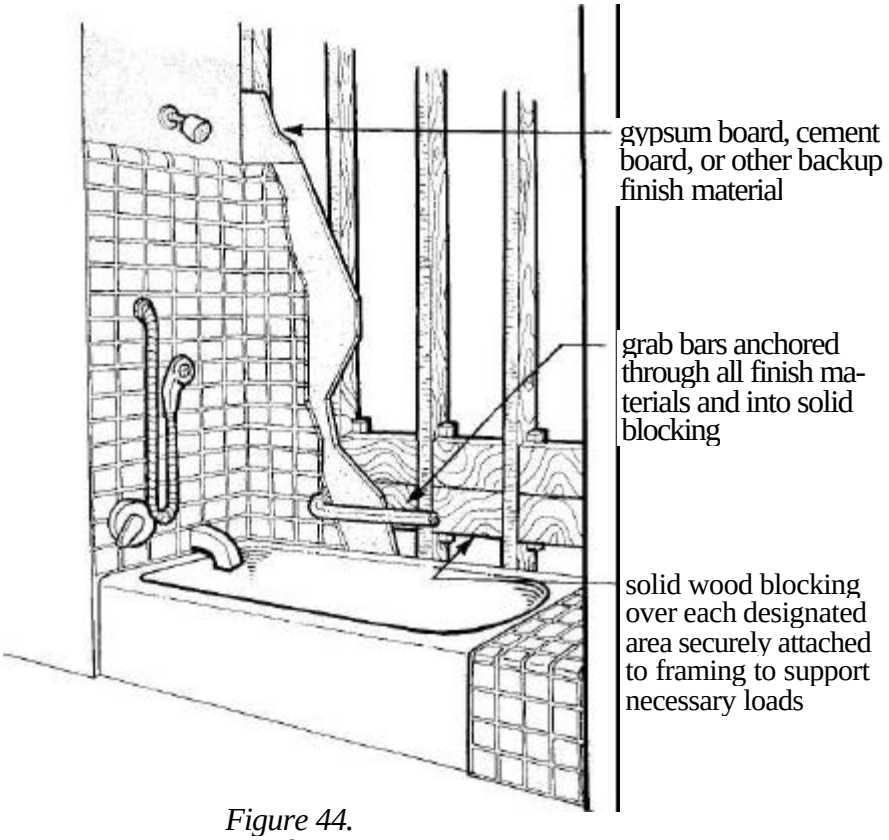
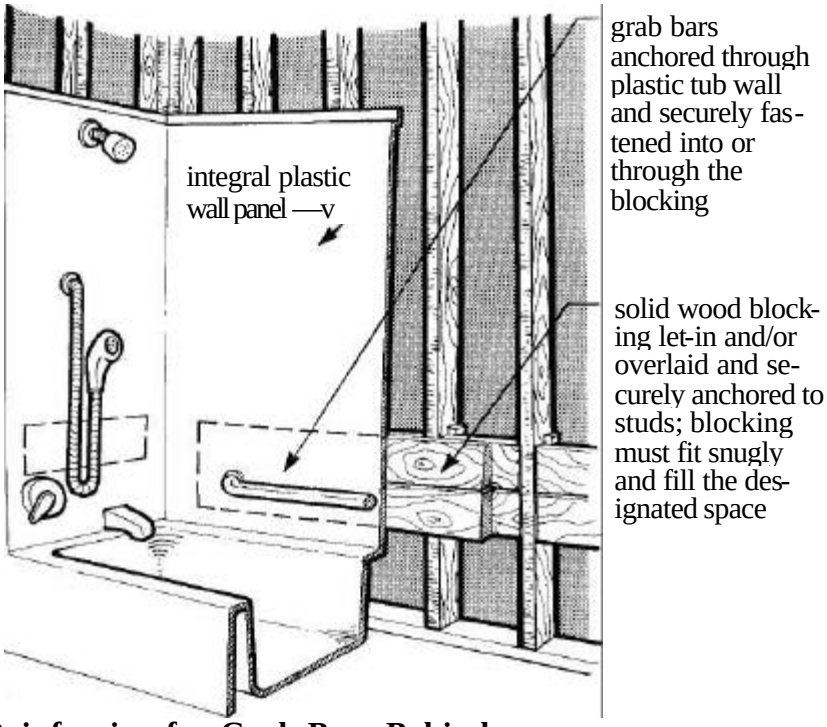


Figure 44.
Solid Wood Reinforcing on Wood Stud Walls

Figure 45.



Reinforcing for Grab Bars Behind Fiberglass or Acrylic Tub and Shower Surrounds

Method 2. Whole Wall or Large Area Reinforcing with Plywood

Although the location and the limited size of the wall areas that must be reinforced is specified by the standards, it may be necessary or desirable to extend the reinforcing over a larger area or throughout the entire wall. Some people may want to locate grab bars in areas other than those specified in the standards. Other people may have difficulty finding the minimum reinforced wall areas concealed inside a finished wall and install the grab bars incorrectly on an unreinforced area. A larger reinforced area provides greater flexibility in placement and easier installation of grab bars.

Heavy plywood applied to the studs over the larger reinforced area can support grab bars and provide a base for the installation of finish materials such as ceramic tile or plastic wall panels.

Plywood can be applied to the face of studs or let in. (Figure 46) In either case the plywood must be of sufficient thickness and securely attached to withstand the forces specified in ANSI 4.24 and UFAS 4.26. Anchors for securing the grab bars to the reinforced walls should be through-the-wall type or another type capable of meeting the ANSI/UFAS force requirements.

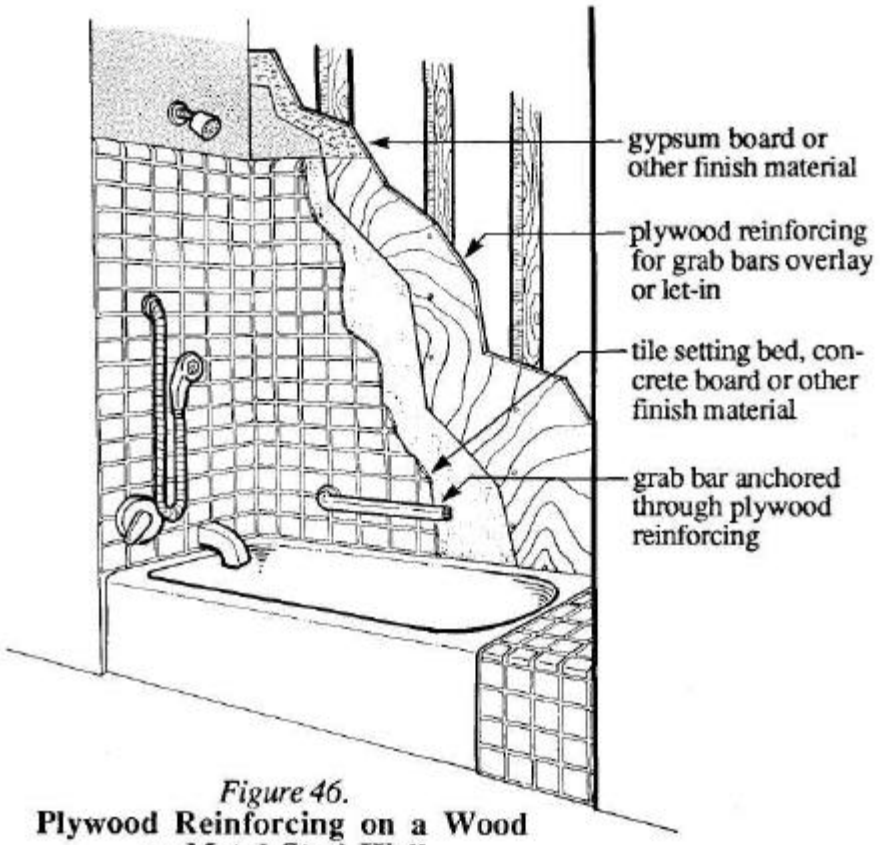


Figure 46.
Plywood Reinforcing on a Wood or Metal Stud Wall

Method for Providing a Removable Vanity Cabinet

The ANSI and UFAS standards require a knee space under a lavatory. The dimensions and shape of the knee space are specified and illustrated in ANSI 4.19.2.1 and UFAS 4.19.2.

Knee spaces are particularly important in bathrooms which are generally small and have little maneuvering space. The knee space under the lavatory provides clearance for turns as well as space for a close approach to the lavatory by people using wheelchairs.

Standard wall-hung or countertop lavatories can be used in accessible bathrooms as long as the knee space is provided so that seated people do not have to twist and reach to use the lavatory. If vanity cabinets are installed under countertop lavatories, they must be removable to reveal the knee space when needed.

Unlike kitchen sinks, the ANSI and UFAS adaptable specifications for lavatories do not require adjustable height lavatories. In some facilities adjustable height lavatories may be preferred and they can be easily provided by using a countertop lavatory and one of the methods shown earlier in

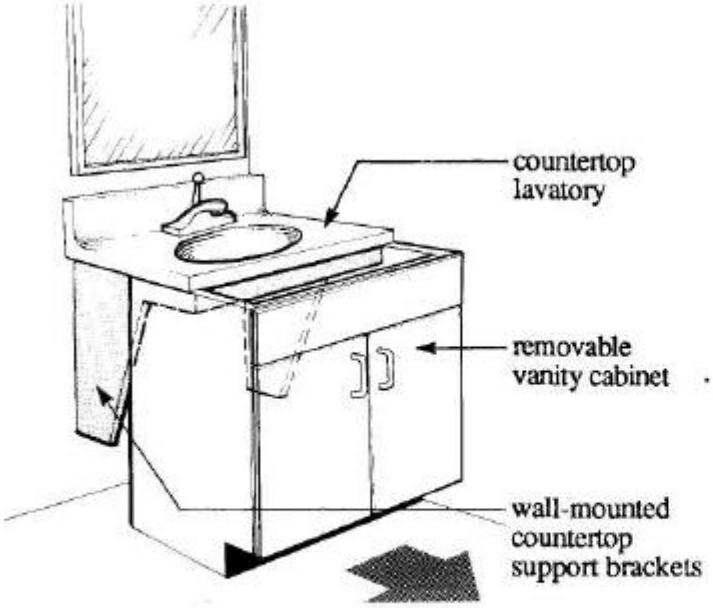


Figure 47.
Removing Vanity Cabinet to Expose Knee Space

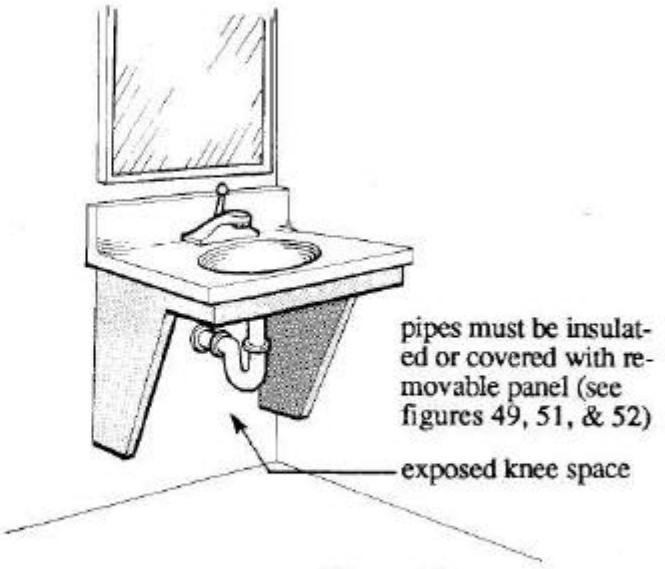


Figure 48.
Exposed Knee Space Under Bracket-supported, Countertop Lavatory

this chapter for adjustable height kitchen counter segments (see page 30).

When a removable vanity cabinet is used, the countertop and lavatory can be supported by concealed, wall-mounted brackets that fit inside the cabinet. These brackets are hidden when the base cabinet is in place. (Figure 47) When the cabinet is removed, the brackets which support the lavatory and countertop are exposed. (Figure 48) The brackets can also support a panel that covers the water pipes and drain. (Figures 49& 50)

The plumbing below the lavatory must be covered to prevent burns and abrasions. This can be done by using removable insulation to cover the hot water pipe and the drain (figure 51), or by adding a fixed, one piece cover (figure 52). For countertop lavatories, an appearance and protection panel similar to that used in the kitchen is useful and attractive. (Figure 49)

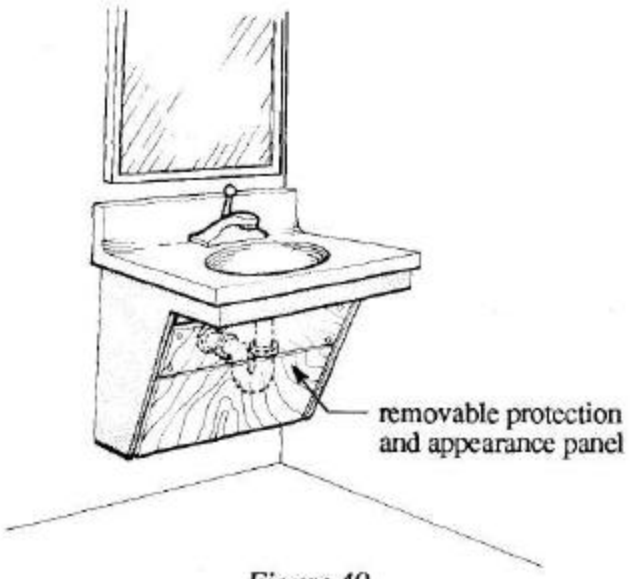


Figure 49.
Countertop Lavatory with Wall Brackets and Appearance and Protection Panel

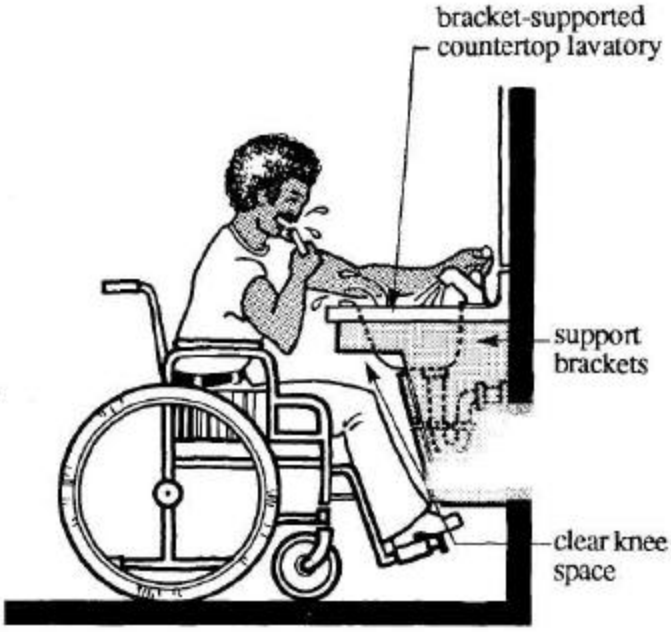


Figure 50.
ANSI and UFAS Required Clear Knee Space at Lavatories

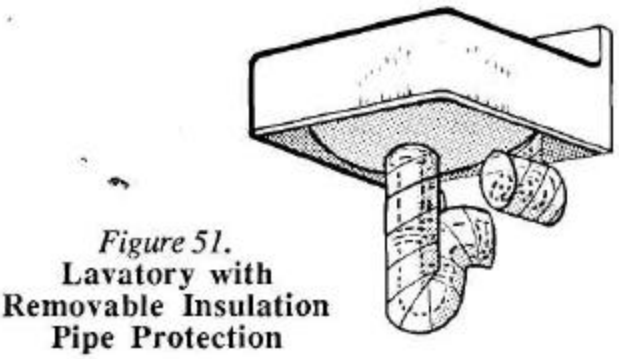


Figure 51.
Lavatory with Removable Insulation Pipe Protection

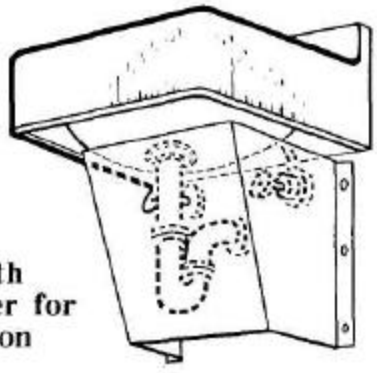


Figure 52.
Lavatory with Removable Cover for Pipe Protection

Costs for Providing Grab Bars and Removable Vanity Cabinets in Bathrooms

Costs for Removable Vanity Cabinets

Cost estimates for removable vanity cabinets were obtained from the same sources that provided cost information for the kitchen cabinetry (see page 30). These estimates were for a standard 36 inch removable vanity cabinet modified by removing the back and top support rail and by adding extra side bracing (see page 20).

Each supplier quoted a price for a standard 36 inch vanity cabinet for comparing the cost of the adaptable vanity cabinets with a standard vanity cabinet. The standard vanity from the custom cabinet supplier was $153.60 and the same type of cabinet from the supplier of stock cabinets was $165.30.

The cost for the custom made, removable vanity cabinet was no more than the cost of the standard custom vanity as long as the necessary modifications were specified when the cabinet was ordered. The cost for the removable vanity from the stock cabinet line was 10% more than the standard 36 inch vanity.

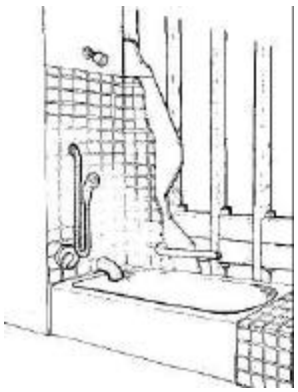
The wooden counter supports shown on page 26 were estimated by the custom cabinet shop to cost $40.00.

Costs for Wall Reinforcing

The cost information for reinforcing walls for grab bars is based on prices obtained in Raleigh, North Carolina in July 1987. These estimates are per item prices quoted by two large building supply companies. Per item prices are usually higher for small orders than for large orders. If these reinforcing materials were purchased in quantity, as for reinforcing many apartment units, the per unit price would probably be discounted.

The following costs are for materials only. It is difficult to estimate labor costs accurately because they vary widely from area to area and from season to season. However, the labor cost for installing wall reinforcing should not be substantial because with either method for reinforcing walls, the materials can be easily installed as the walls are being built.

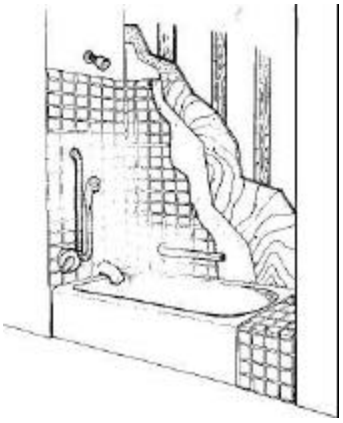
Limited area wall reinforcing. Partial wall reinforcing can be installed using 2x10 fir. The estimates for 2 x 10 construction grade fir, 12 feet long, were $9.69 and $10.74. Based on the lower estimate of $9.69, the material

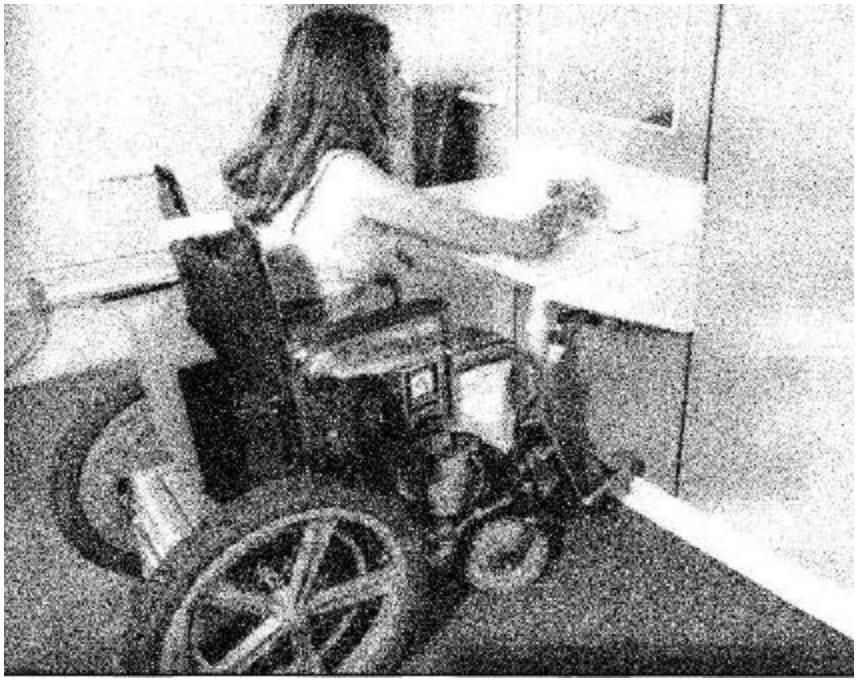


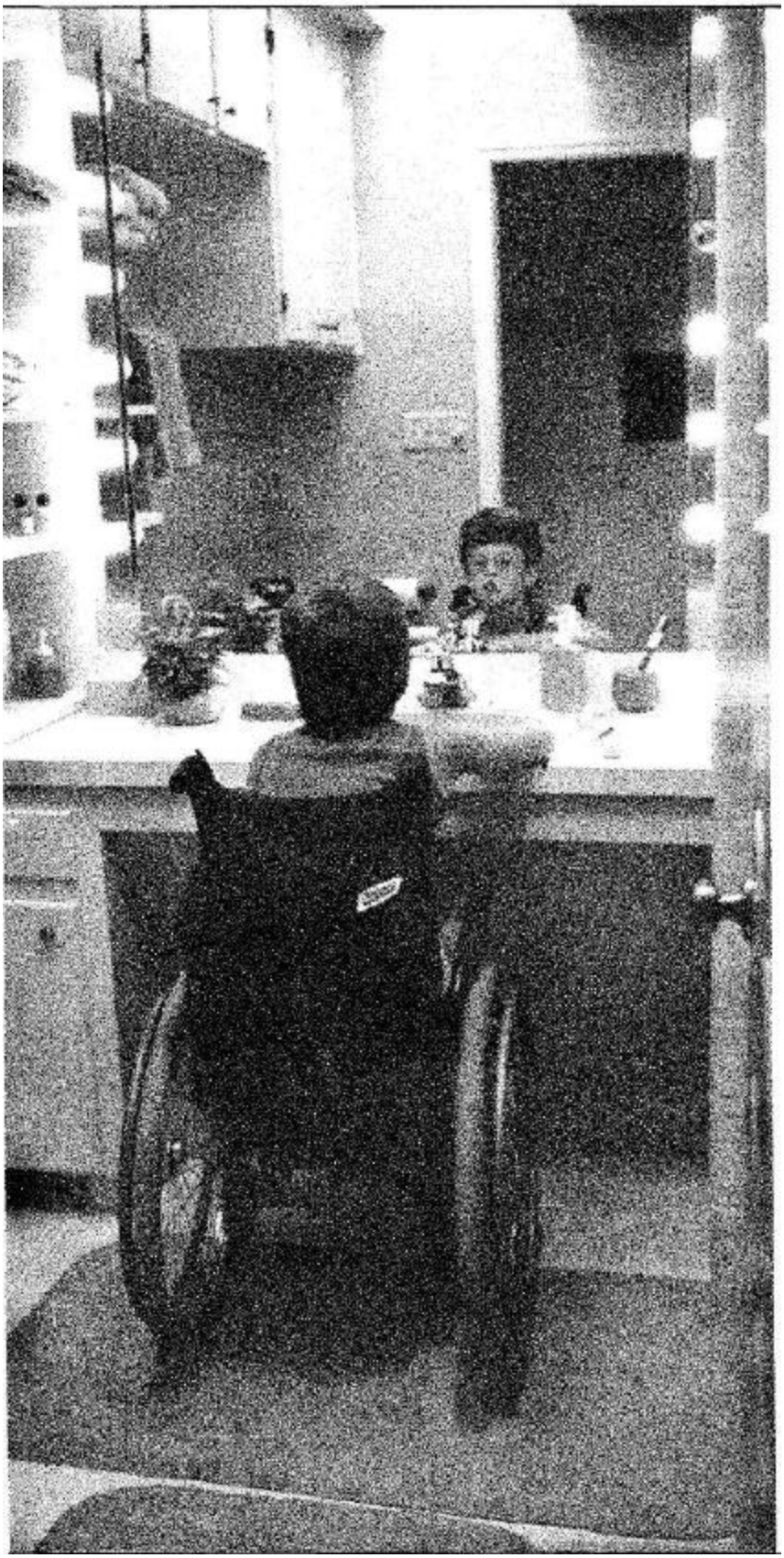
cost for reinforcing the minimum required wall area for a five foot bathtub is $15.00. The estimate for minimum reinforcing for a 36 inch stall shower is $10.00 and the estimate for reinforcing two walls next to a toilet is also $10.00.

Whole wall or large area wall reinforcing. Whole wall reinforcing is provided by using continuous sheets of heavy plywood to surround a bathtub, stall shower or toilet. One way this can be done is to install sheets of 3/4 inch B-C grade exterior glue plywood.

When plywood is installed around the three sides of a bathtub to a height of 6 feet 6 inches from the floor, then two four foot by eight foot sheets are needed. The estimates for the plywood were $21.75 and $22.99. Based on the lower price, the materials for full wall reinforcing at five foot bathtubs would cost $43.50. Reinforcing for a 36 inch stall shower would use three sheets of plywood and would cost $65.25. Reinforcing at a toilet would use two sheets of plywood and would cost $43.50.







Bathing Fixtures and Grab Bars in the Adaptable Bathroom

The ANSI and UFAS standards allow a choice of three bathing fixtures for accessible bathrooms — bathtubs, transfer showers, and roll-in showers. These bathing fixtures are installed as fixed accessible features in any accessible or adaptable home. All are available as manufactured products and each has several options. The choice of fixture and options can affect the appearance, cost, and usability of the adaptable unit. Following is a brief description of the acceptable features, their options, and some implications of their selection. Since grab bars are also available in a variety of materials and styles, a short discussion of their selection is also included.

Bathing Fixtures in Adaptable Bathrooms

Bathtubs. In both ANSI and UFAS, standard five foot long bathtubs are acceptable but must be installed with a seat. The seat allows people to sit down and then transfer their feet over the tub rim, eliminating the need to step over the rim. Some people will remain seated while they bathe; others may transfer from the seat down into the tub. Many people can use a tub only if it has a seat.

Two types of seats can be used. One type is placed into the bathtub and can be portable and removable. (Figure 53) These seats must be placed in the tub and fastened securely enough to withstand a 250 pound load in any direction and to ensure that

they will not tip over or move during use. The removable seat does not require additional space in the bathroom and allows the tub to be adapted to the occupant's bathing needs.

Seats meeting these specifications are not generally available. Most tub seats are medical products sold only by durable medical equipment suppliers and are light weight, do not attach to the tub, and are not likely to meet the force requirements.

The other type of seat is built in at the rear of the bathtub by creating a shelf behind the fixture. (Figure 54) A built-in seat requires more space for the tub and seat than a standard tub and usually makes a bathroom larger. While this seat is not usable for showering because it is too far from the controls at the head of the tub, it does serve well as a staging point for people who can transfer down into the tub.

Several manufacturers make molded fiberglass and/or acrylic tubs that meet the tub specifications. Only one company has a molded tub with a built-in seat. Another company manufactures a tub equipped with an attachable/removable seat that meets the specifications. Both are made of fiberglass and come in matching or contrasting colors.

Controls for tubs are offset toward the outside so they can be easily reached by everyone from outside the tub without much bending and reaching. A hand-held shower head on a flexible supply hose is also required. (Figures 53 and 54)

See ANSI 4.20 and UFAS 4.20 for dimensions and additional details of bath tubs.

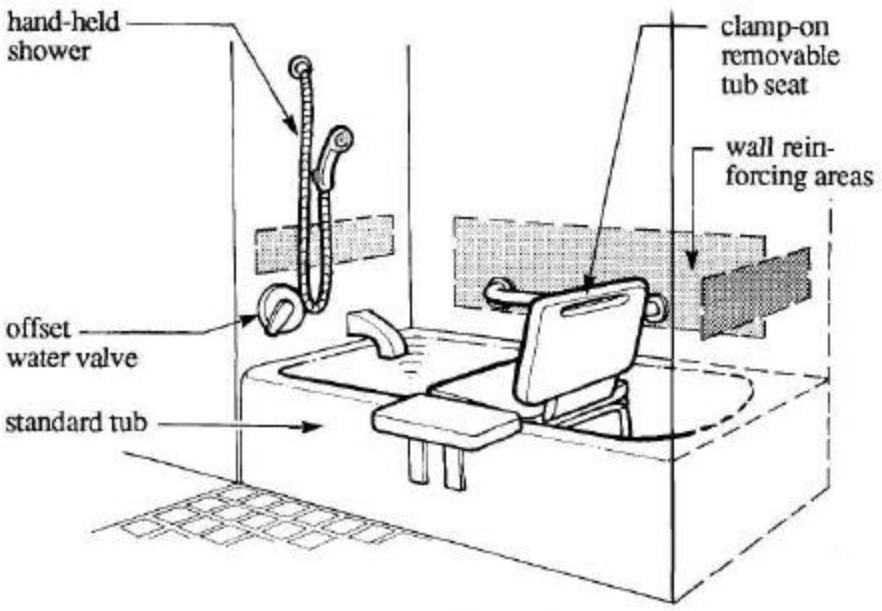


Figure 53.
Standard Bathtub with Removable Seat

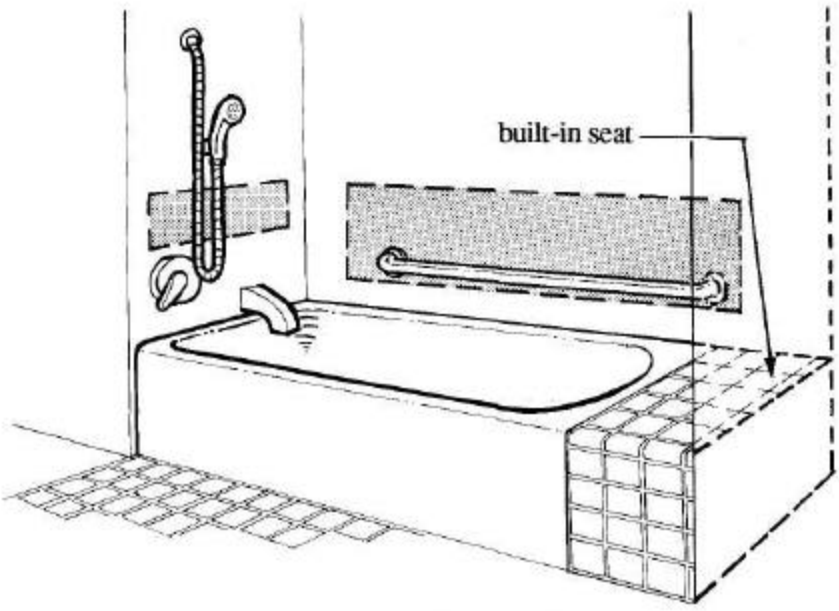


Figure 54.
Standard Bathtub with Built-in Seat

Transfer showers. The transfer stall shower specified by ANSI and UFAS is 36 inches square and should never be made larger or smaller. It has one L-shaped seat on the wall opposite the controls and an L-shaped grab bar mounted on the wall below the controls and continuing around to the back wall. (Figure 55) The seat extends from the back wall to the opening of the shower stall and is designed to permit a person to transfer directly from a wheelchair to the seat. Once on the seat the user can slide around and sit in the corner using the walls for balance and support. The controls are within easy reach of most adult users. The transfer shower is also excellent for walking people who must or prefer to sit while showering.

ANSI allows the stall to have a maximum 4 inch high sill at the opening to the shower whereas UFAS allows only 1/2 inch. It is best if a 1/2 inch or lower sill is used.

The 36 inch stall shower is available in molded fiberglass or acrylic. In these models the seat can be a fixed seat molded into the unit, or the unit can be manufactured without the molded seat so that a separate folding seat can be added. (Figure 56) The fold-up seat has advantages for those people who prefer to stand while showering or who have other family members who stand.

See ANSI 4.21 and UFAS 4.21 for dimensions and details of showers.

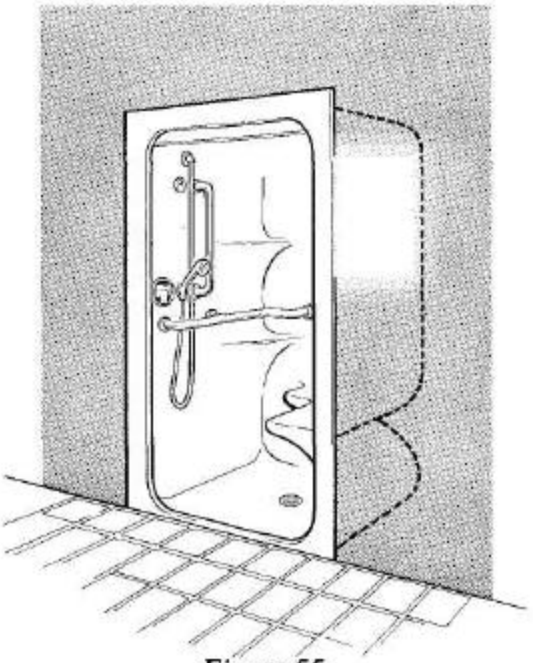


Figure 55.
Transfer Shower with Molded L-shaped Seat

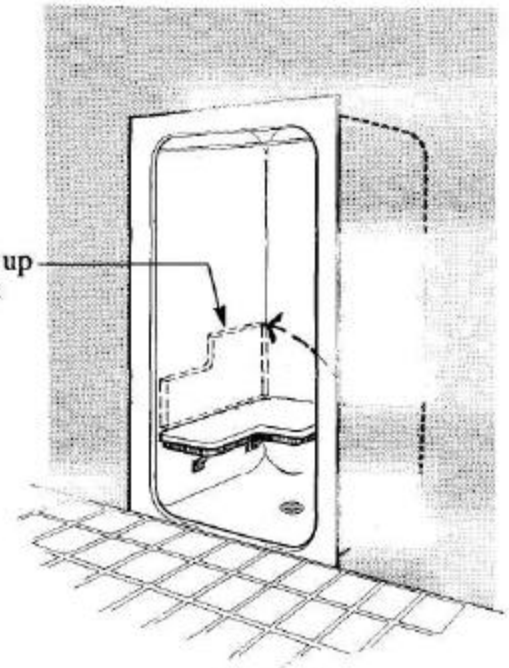


Figure 56.
Transfer Shower with Folding L-shaped Seat

Roll-in showers. Roll-in showers have no raised curb or sill and are intended for people in wheelchairs who cannot transfer into a stall shower or a tub and must use a special shower wheelchair.

ANSI 4.21.2 and UFAS 4.21.2 specify a roll-in shower at least as large as the space occupied by a bath tub (30 inches by 60 inches). The size was included in the standards to allow renovation to remove an existing tub and to waterproof and tile the floors and walls to form a roll-in shower. (Figure 57)

While a person in a wheelchair can get into a 30 inch by 60 inch space easily enough, they cannot contain the water from the shower in this small space. It is best, therefore, when installing a roll-in shower to waterproof and tile the entire room and slope it to the shower drain so the floor area acts as a part of the shower.

Roll-in showers are best made deeper than 30 inches to provide enough room for the wheelchair, the shower curtain and for elbow room while showering. A depth of at least 42 inches is preferred. (Figure 58)

Several manufacturers make molded fiberglass or acrylic roll-in showers in a variety of sizes and colors. They are all usable as both standing showers or showers for people who bathe in a shower wheelchair. Roll-in showers are not good for use as transfer showers because the open side puts grab bars, which are essential for safe transferring, too far away from any wall-mounted seat.

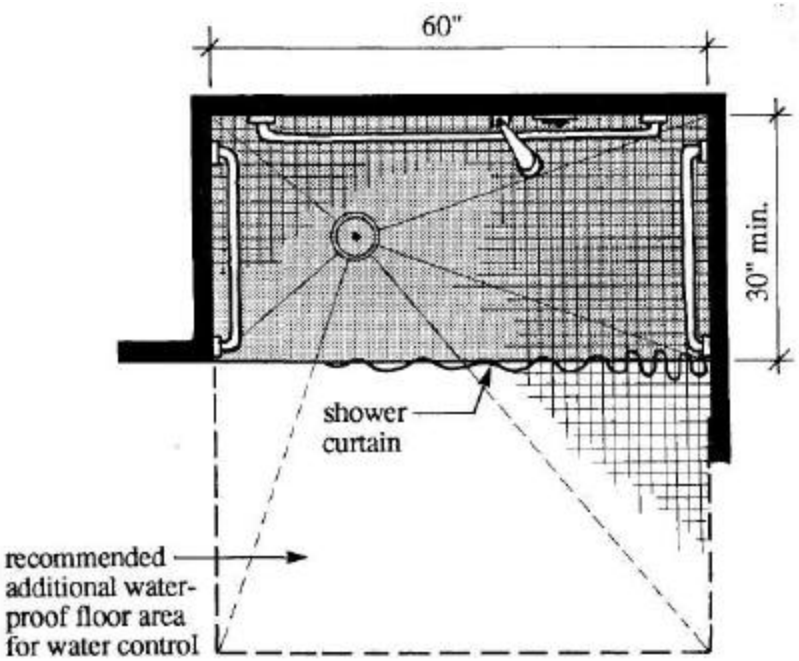


Figure 57.
ANSI Minimum Roll-in Shower

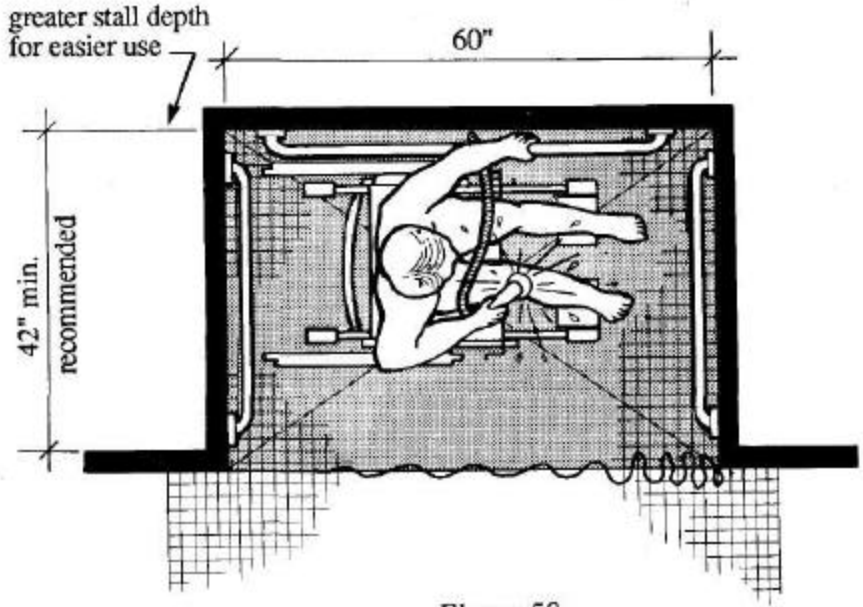


Figure 58.
Preferred Deeper Roll-in Shower

Grab Bars

Many people need grab bars at bathing fixtures and toilets to maintain their balance and to lean or pull on while transferring onto the fixtures. Grab bars were originally a medical product and, until recently, they were made only in stainless steel or chrome and many people objected to such institutional looking items in residential bathrooms.

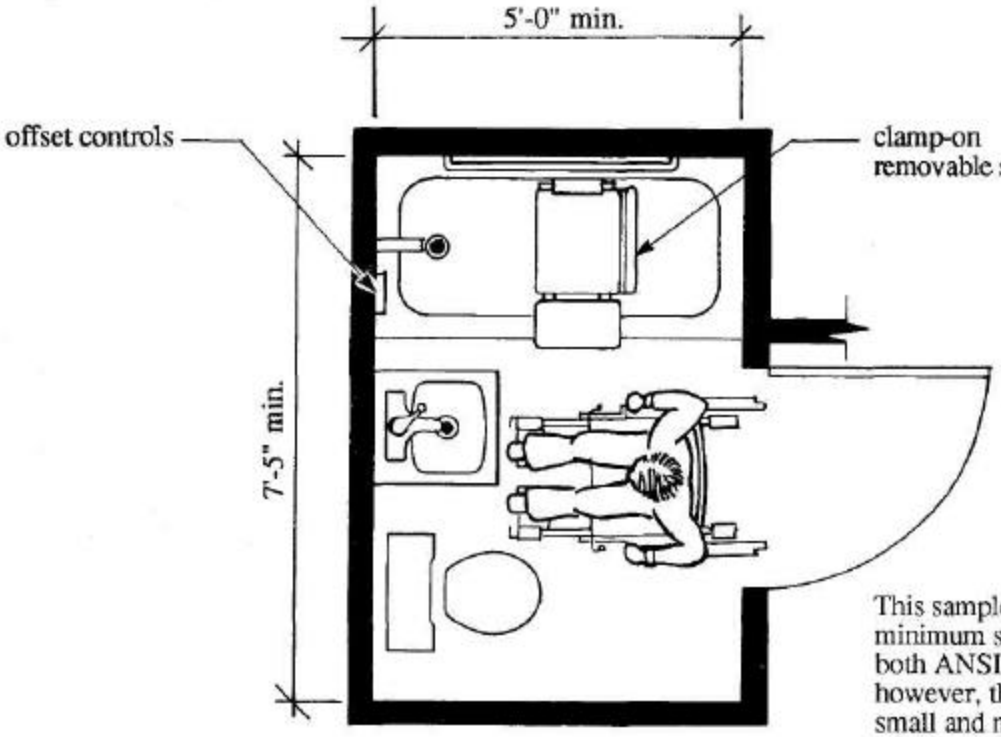
Grab bars are now available in a variety of shapes, colors, and materials including metal, nylon, and plastic. Some are decorative and can double as towel bars. Others can be furnished as an integral part of a shower or tub wall with colors that match or contrast with the fixtures. Grab bars can even be custom made into innovative forms to suit individual preferences or design styles. With these greater choices in grab bar design, owners can now coordinate the grab bars with interior finishes and styles.

Two Examples of Adaptable Bathrooms

In the examples that follow, the standards have been used to develop two bathroom designs: one that is a minimum sized bathroom and the other a more luxurious bathroom with extra features. Notes on the two illustrations explain the features and show the items specified by the standards as accessible or adaptable features. Other notes point out additional recommended features.

An Example of a Minimum Size ANSI/UFAS Adaptable Bathroom

The small bathroom shown in figure 59 is just one example of a minimum size adaptable bathroom with basic features that meets the standards. Other arrangements that meet the standards are also possible.



This sample bathroom meets the minimum space requirements of both ANSI and UFAS; note, however, that the space is very small and many wheelchair users will have difficulty using such a bathroom. More space should be allocated when possible.

Figure 59.
A Small Bathroom with Adaptable Features
Plan

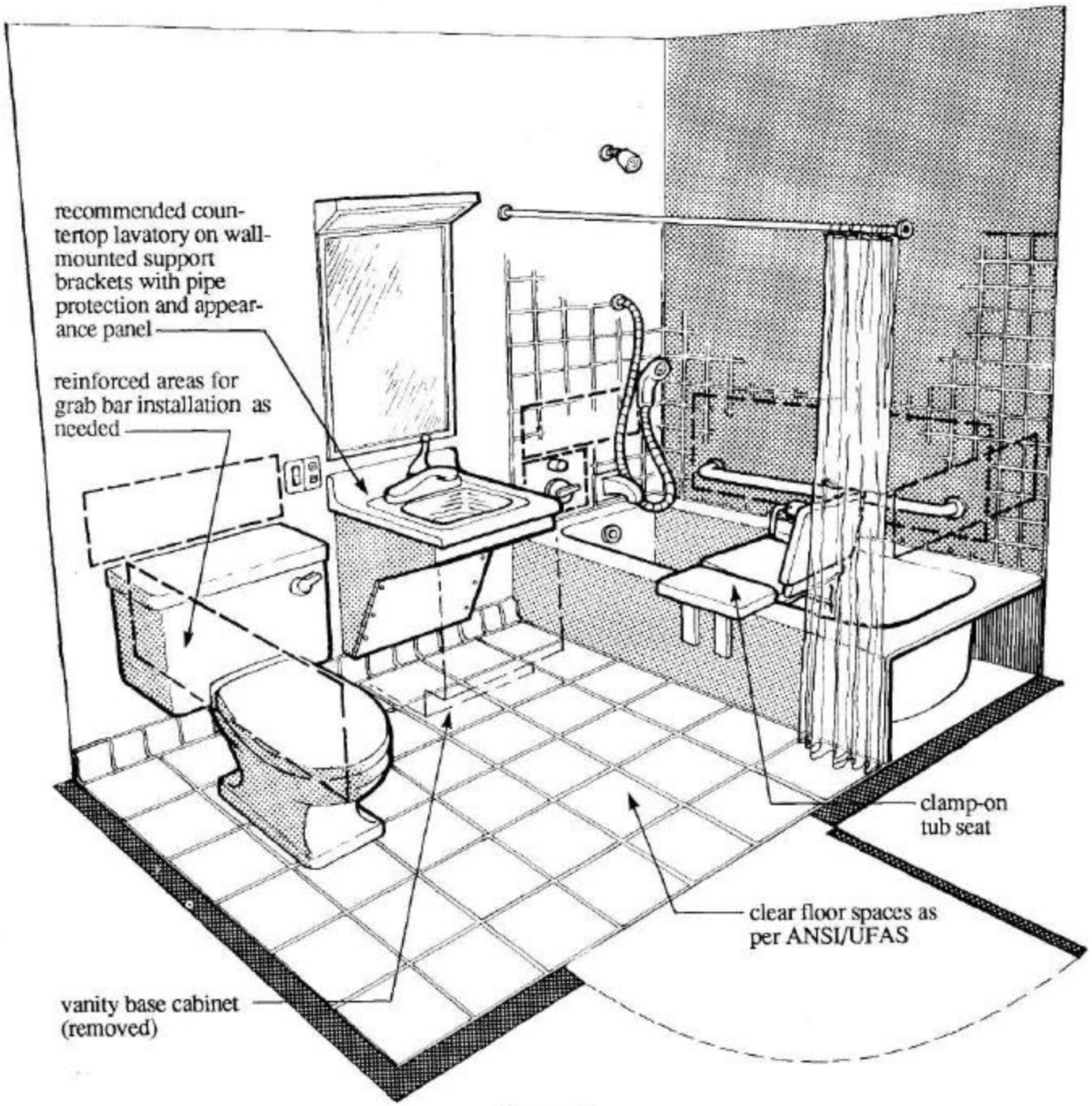


Figure 59.
A Small Bathroom with Adaptable Features Perspective

An Example of a Larger Bathroom with Adaptable Features

The bathroom shown in figure 60 is an example of a larger bathroom having ANSVUFAS accessible/adaptable features. This bathroom exceeds the ANSI/ UFAS minimum requirements and includes recommended **features** as **well.**

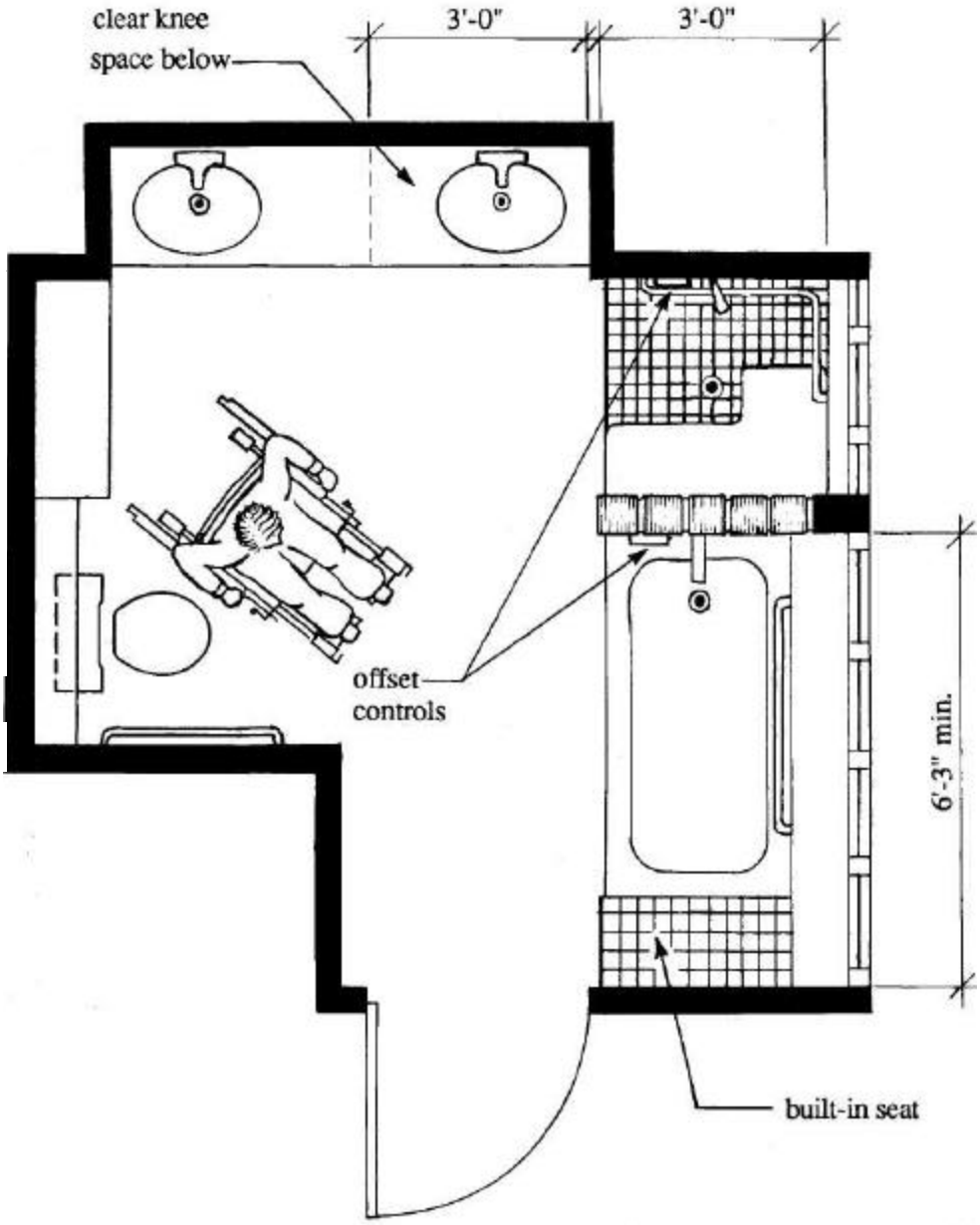


Figure 60.
A Larger Bathroom with Adaptable Features Plan

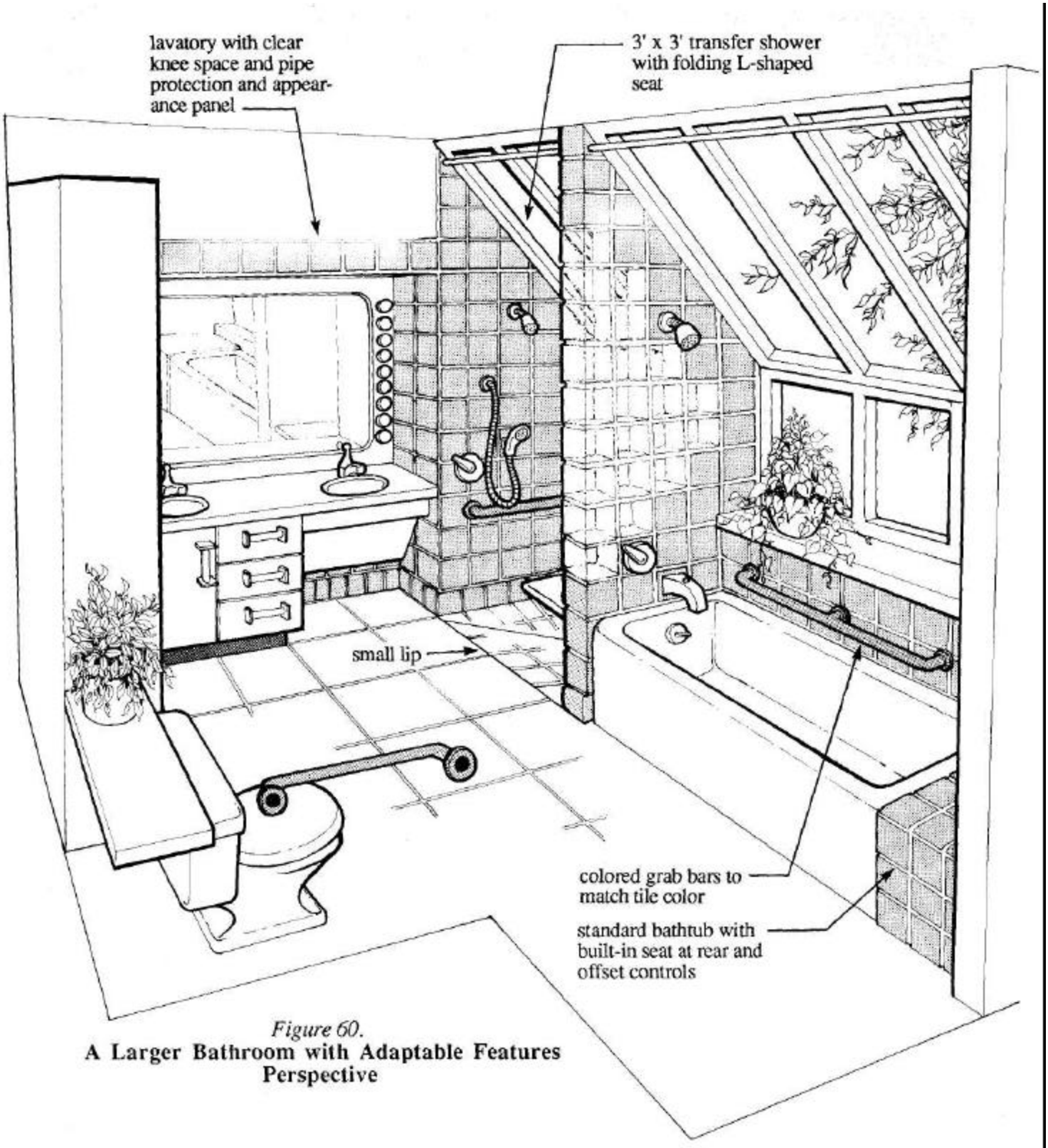


Figure 60.
A Larger Bathroom with Adaptable Features Perspective

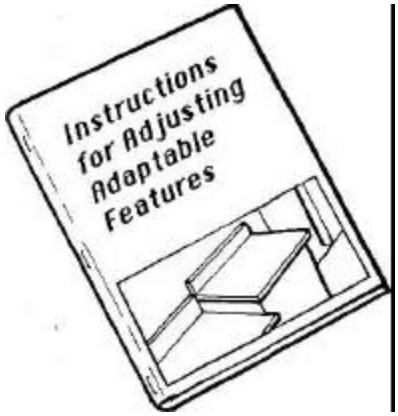
UFAS 4.34.4 requires that each adaptable unit be provided with a list of the adaptable features included in the unit and the location of the instructions for changing them. In addition, the list must include the heights available for kitchen counters and sink.

The list must be located in the unit where it can be seen by all occupants and where it is not likely to be removed, painted over, or otherwise destroyed. Some suggested locations are inside closets or cabinets, on or inside electrical panels, and inside utility spaces such as laundries and furnace areas. (Figure 61)

UFAS also specifies that the owner or manager of the dwelling unit be provided with written instructions that explain the various features for each dwelling and how they are adjusted, adapted, or removed. The instruction should be illustrated.

If the adaptable features are not labeled, and instructions for their adjustment are not available, owners and managers either may not be able to identify the adaptable units or may not adjust or adapt them correctly. In time the adaptable units may be "lost" or might be so poorly adjusted that they would be unusable by disabled people.

Al 17.1 (1980) also specified that the adaptable features be permanently identified for consumers but the latest version, ANSI Al 17.1 (1986), has deleted this requirement. It is recommended that the UFAS provisions for identification of adaptable features be used in all adaptable projects so that occupants and managers will know how to find and adjust the adaptable features.



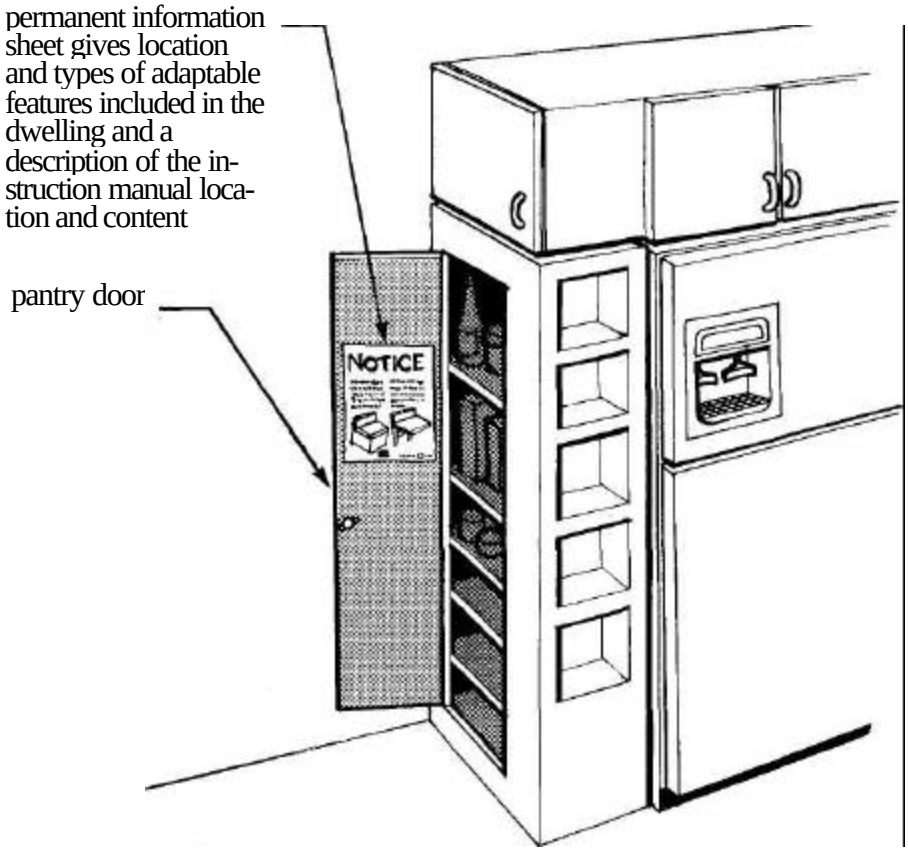


Figure 61.
One Permanent Location for Notification of Adaptability Provisions

OTHER FEATURES WITH ADAPTABLE CHARACTERISTICS

Although ANSI and UFAS specify as adaptable only those features presented in the kitchens and bathrooms sections of this chapter, two other required features can be made adaptable. In the standards both these features — receptacles for alarms and storage —are fixed accessible features because they are required. Through careful selection and placement of components, both can be made adjustable and/or usable by everyone.

Alarms and Signals

Both UFAS and ANSI require that either auxiliary visual or sensory (vibratory) alarms be provided for hearing impaired people or that a 110V electrical receptacle be provided to power such an alarm. Sensory alarms may be devices such as electrical solenoids placed on bed frames to vibrate when activated or fans that move air. Visual alarms in this context are strobe lights or other bright lights capable of waking a sleeping deaf person. UFAS requires alarms or receptacles only in sleeping rooms. ANSI does not specify where such alarms are required but implies wherever hearing impaired people may work or live. See ANSI 4.32.3 (Table 4) and 4.26, and UFAS 4.34.2(10) and 4.28.4. In both standards the auxiliary alarms and the optional receptacles are required to be connected to the building emergency alarm system. In buildings not having a central alarm system, these requirements cannot be met. In buildings having an alarm system, they can be met minimally by installing in sleeping areas one or more receptacles that are energized only when the building alarm system is activated. (Figure 62)

These receptacles can be considered another adaptable feature allowing a deaf person to adapt the unit to his or her particular need by connecting a strobe, fan, vibrator, or other device to the emergency alarm system. Please note that ANSI and UFAS do not specify where such receptacles must be located nor that any dwelling units be designated for deaf people. Local jurisdictions or common sense will dictate which units and how many receive alarm receptacles. Also the alarm receptacles must be in addition to any other emergency alarms provided for hearing people.

Since some buildings will not have central alarm systems, and many alarms and signals can be powered by the regular electrical service in each room, some owners may consider installing extra receptacles in a few key locations.

Receptacles located high on walls or in the ceiling may be used for adding visual smoke or fire alarms. Another good location is on the wall outside at the major entrance doors. These outside receptacles can be used to power a removable emergency flashing light and bell which can be controlled by a tenant using a common wireless control device to signal neighbors or service providers of any need for assistance. When not used for emergency signals, these outside receptacles are convenient for lighted decorations, outdoor cooking devices, electric leaf blowers, etc.

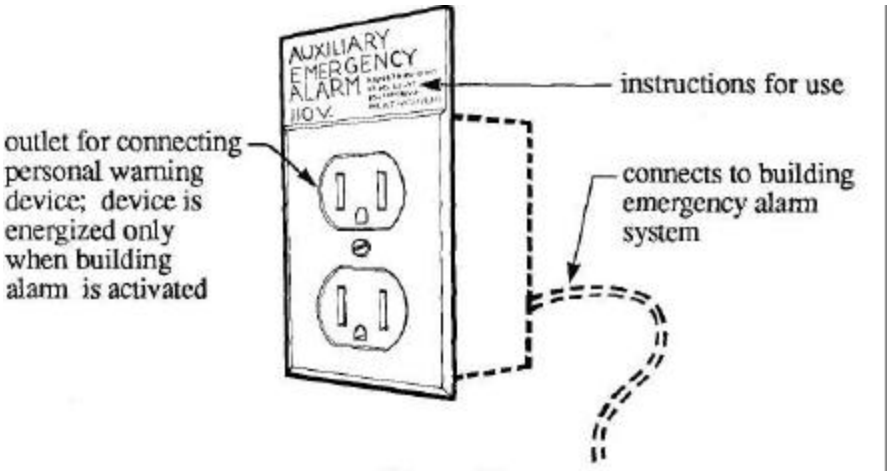


Figure 62.
110V Emergency Alarm Receptacle for Hearing Impaired People in Sleeping Areas of Buildings Having Central Alarm Systems

Storage

Both standards require that 50% of the storage in a dwelling be accessible. This is a fixed, permanent feature that must be available without adapting the unit. Accessible storage must be provided wherever storage is provided in the dwelling including the kitchen, bathroom, bedrooms, and hallways. Several methods can be used to provide storage that can be adapted to the needs of the occupant.

One method is to use ventilated shelving which is available in pre-packaged or custom fitted versions. These products provide shelves that can be easily changed in height, both low and high closet rods, and add-on baskets that can increase the amount of storage at any height. (Figure 63)

Standard closet storage can be made adaptable with shelves and closet rod supports that adjust in height to meet the needs of seated and standing people. (Figures 64 &65)

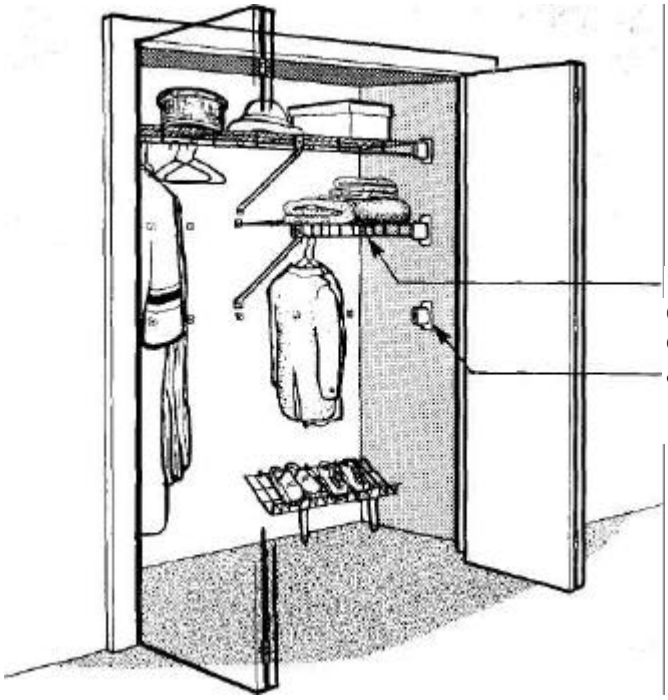


Figure 63.
Accessible Storage in Closets Using Vinyl-coated Wire Shelving

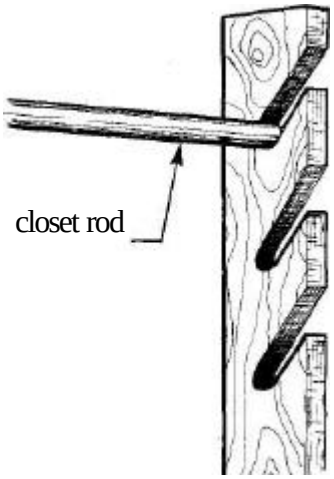


Figure 64.
Recommended Adjustable Closet Rod Detail

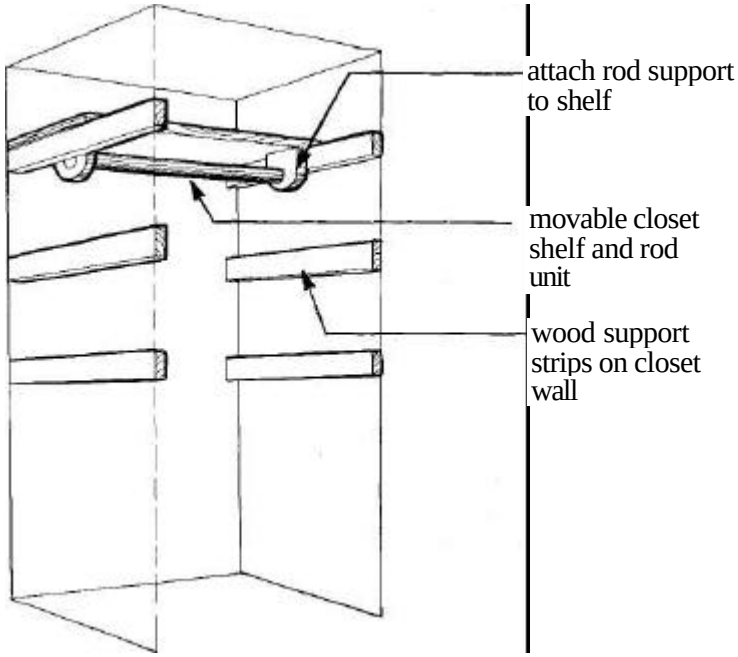
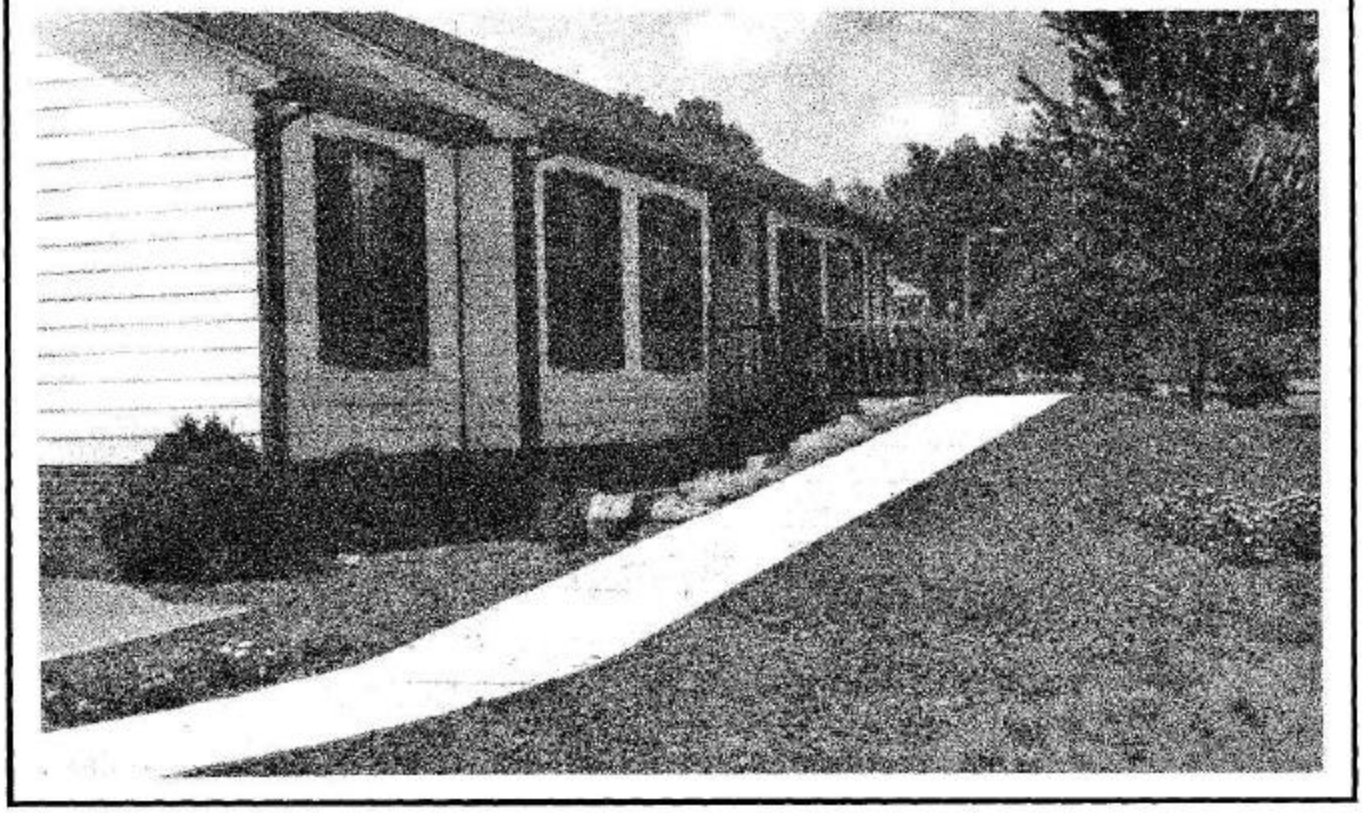


Figure 65.
Recommended Adjustable Closet Shelf and Rod Unit

CHAPTER THREE
PRODUCTS

CHAPTER THREE
PRODUCTS AND ADAPTABLE HOUSING



THE ROLE OF-PRODUCTS IN THE GROWTH OF ADAPTABLE HOUSING

Making the Adaptable Unit Standard

Adaptable housing can accommodate the needs of many people: it adjusts to suit non-disabled and most disabled people; it adapts to the changing needs of older people allowing them a choice of whether or not to stay in their homes; it permits non-disabled people to entertain disabled friends in their homes with ease, and it permits the family of a disabled person to adjust parts of the dwelling to meet that person's needs.

Adaptable housing also benefits developers and builders. Because the adaptable units can be used both as accessible units which meet minimum code requirements and as standard units which can be used by anyone, the adaptable unit could become the standard dwelling that is used throughout a project. Because only one type of dwelling would be needed, the adaptable units could be built at lower per unit cost compared to the costs of providing both "standard" and fixed accessible dwelling units.

For adaptable housing to benefit both disabled people and builders and developers, large numbers of adaptable units must be built. If adaptable housing becomes a standard type of housing,

then disabled people will have an adequate selection of housing units to choose from in all price ranges, and builders and developers will be able to build one type of dwelling and no longer have to build special fixed accessible units.

However, if only a limited number of adaptable units are produced, such as the minimal number typically required for fixed accessible units, then no one will benefit. Disabled people will have a very limited supply of adequate housing, builders and developers will continue to build special housing at higher costs using custom built products, and manufacturers will not market new products with adaptable features because of the limited market.

Some states have already recognized the importance of building larger numbers of adaptable units. In New York state, for example, adaptable units have become standard units. In multifamily housing with an elevator, 100% of the units must be adaptable, and in projects without an elevator all ground floor units (which must be at least 25% of all units) must be adaptable. The requirement for a fixed accessible dwelling has been replaced by the adaptable dwelling which has become the standard unit.

The Importance of Mass-produced Products for Adaptable Housing

If adaptable housing is to become a standard type of housing, then products having adaptable features must be mass-produced and become widely available. When this occurs, building adaptable units will be much easier and less expensive because builders and developers will purchase these off-the-shelf products locally at their building materials supplier or from their cabinet subcontractor.

Although it is not well-known, some mass-produced cabinet lines already have components such as separate sink front panels and lowered desk units which may be used in adaptable housing. Other mass-produced products with adaptable features, such as removable base cabinets and sink cabinets, adjustable height countertops, and removable vanity cabinets, are needed.

Expanding the Demand for Adaptable Products

Typically for new products to become available, manufacturers must see that a significant market exists or that it will soon exist. One problem with manufacturing new products for adaptable housing is determining market demand. Steady increases in the population of older and disabled people suggest that there could be an enormous demand for adaptable housing. However, because relatively few adaptable housing units have been built, the current and potential markets are difficult to estimate. The situation comes down to one where adaptable housing needs the new products so that more units can be built nationwide while the manufacturers of these new products need more adaptable housing units to be built to justify development of the new products.

Products with adaptable features are not special products for a limited number of people but are universally usable products that can be used by everyone in all types of housing. By including adaptable features in standard housing products, manufacturers will increase their market for standard products.

The market for some specific products with adaptable features is already significant in states like New York where codes and regulations mandate that large numbers of adaptable housing units be built. As more states mandate this type of housing, an even larger market for adaptable products will develop and then manufacturers will have an even better opportunity to mass-produce new products.

EXISTING PRODUCTS FOR ADAPTABLE HOUSING

Very few manufactured products with adaptable or adjustable features are currently available. Many of the available products are specialty items that have been designed mainly for institutional markets such as hospitals, nursing homes, and rehabilitation centers. These products are often complex, mechanical designs which are moderately expensive and may not be suitable for use in some homes.

Three types of products are listed in this section. The first type includes existing products with adjustable features. The second is cabinet hardware that can be used to provide adaptable features in base cabinetry. It is included because these components are important for the fabrication of new base cabinets and adjustable height counters described in chapter two. The third is generic products such as ovens which can be used in adaptable housing.

The following lists of products are examples only and are not complete. Other products with similar features may be available. These products may be used to comply with some of the requirements of the ANSI and UFAS standards and may be useful for adaptable housing. No endorsement of the products or recommendation for use of the products is given nor implied. Names and addresses of manufacturers of some of the existing products are listed in Appendix B.

Examples of Existing Products with Adjustable Features

Kitchen Cabinets and Counters

Medinorm adjustable height kitchen counters and cabinets. The Medinorm kitchen is a wall-mounted kitchen cabinet and counter system which uses a wall-mounted motor to adjust the

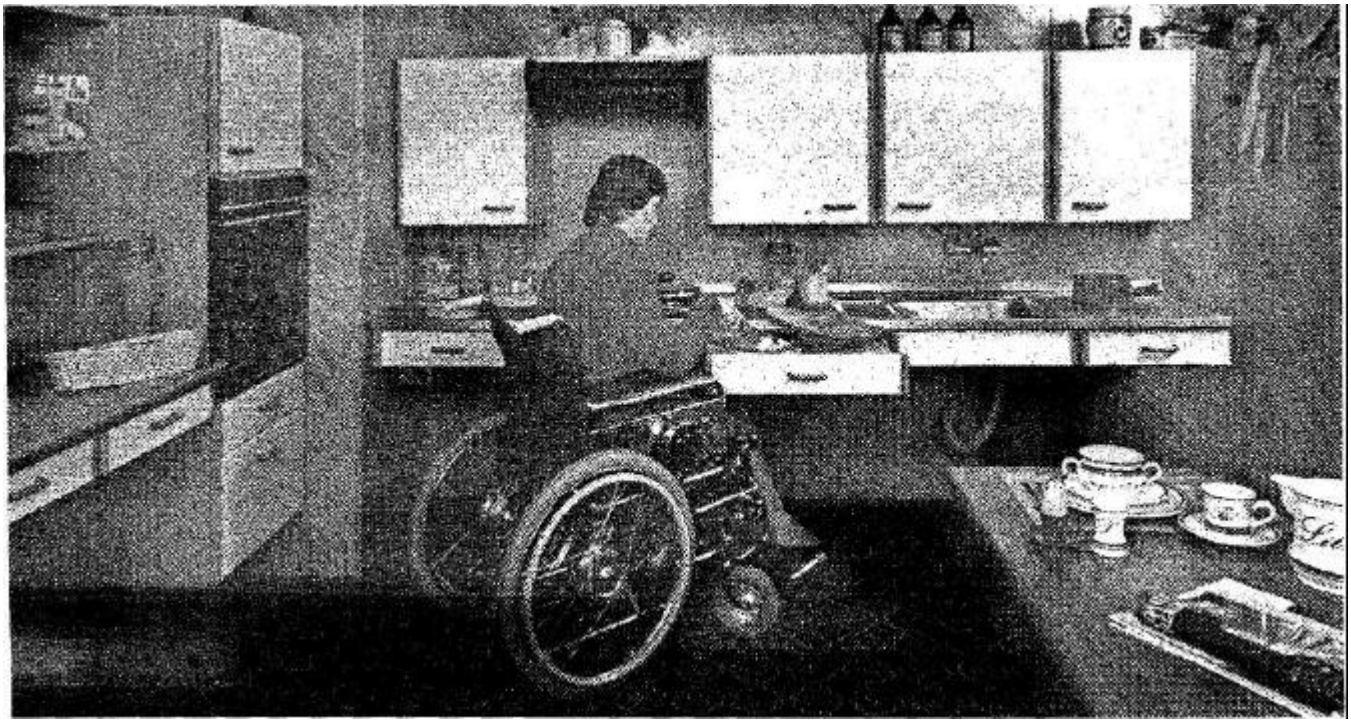


Figure 67. **Medinorm Adjustable Height Kitchen**

counter height from 27-1/2 inches to 35 inches as the height of the wall-mounted cabinets also changes by the same amount. The cabinets are available in various finishes for residential and institutional applications.

Dwyer convertible kitchen. The Dwyer kitchen is a small kitchen which has an adjustable height counter with built-in sink and a removable base cabinet under the sink. As it is designed, this kitchen is too small to meet the standards because there is no adjustable height work surface with knee space. However, this product could be suitable if the kitchen were enlarged and an additional adjustable height work surface installed.

Constella adjustable counter and wash basin. The Constella wash basin is a wall-mounted adjustable counter with an optional wash basin that uses a hand crank to raise and lower the counter. The product is made in Sweden and is primarily for an institutional market.

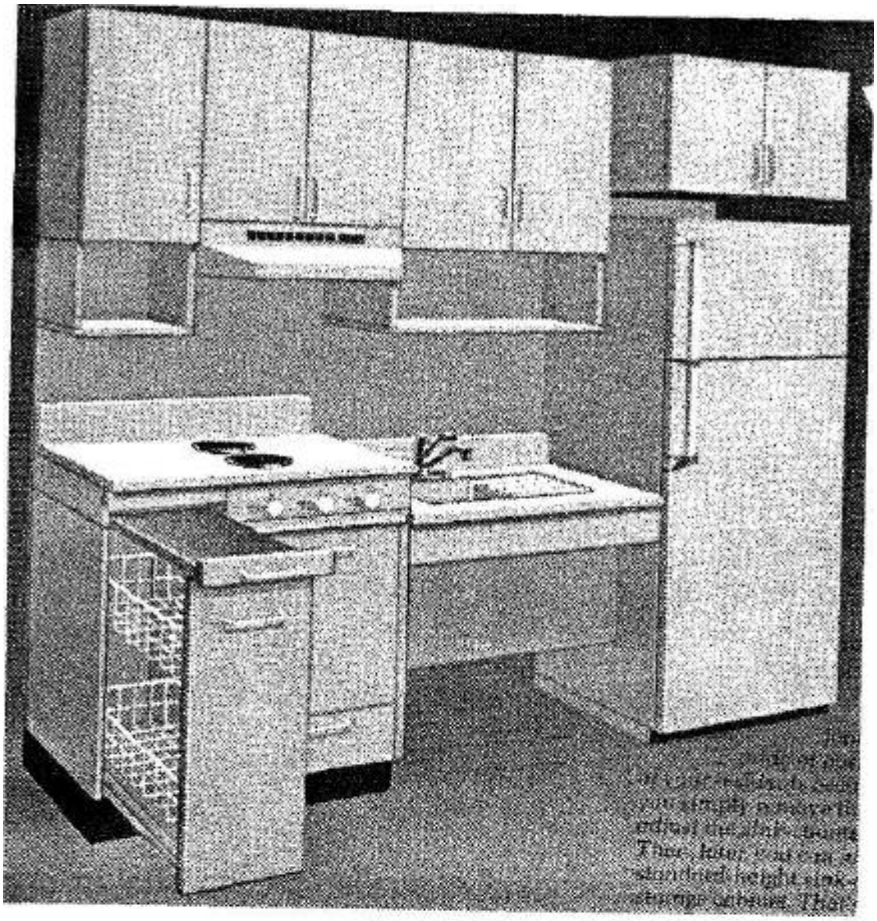


Figure 68.
Dwyer Convertible Kitchen

Adjustable Height Lavatory for Bathrooms

Pressalit adjustable height lavatory. The Pressalit lavatory is an adjustable height lavatory which is mounted to a wall-mounted movable frame. The height of the lavatory is adjusted by sliding the fixture on two support rails. Plumbing and drain lines are flexible.

For information on manufacturers and suppliers of existing products, see Appendix B.

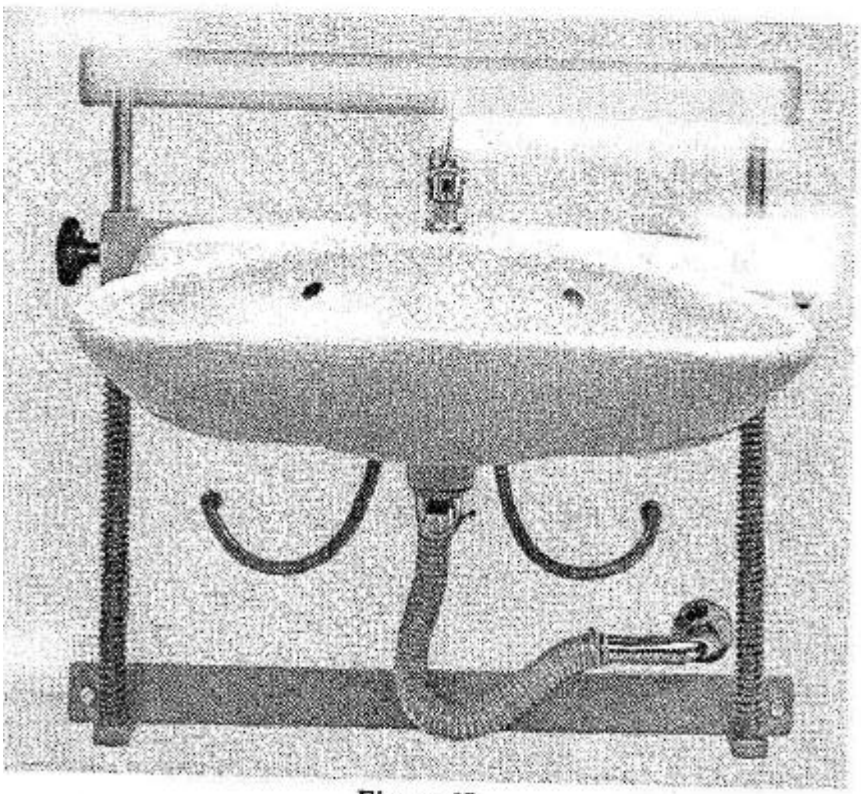


Figure 69.
Pressalit Adjustable Height Lavatory

Cabinet Hardware for Providing Adaptable Feature

Metal Threaded Screw Inserts

Brass threaded screw inserts with internal and external threads allow the insert first to be screwed into a wooden panel and then to receive a machine screw. With the brass insert, additional pieces can be attached periodically without weakening the fastener or the wood surface.

Figure 70. **Hafele Screw Inserts**

Self-storing Door Hardware

Self-storing hardware permits base cabinet doors to be folded out of the way as shown on page 23. The doors are used in a normal way but when a knee space is needed the doors can be folded and stored.

Commercial Wall-mounted Shelf Brackets

Commercial wall brackets can be used to support and adjust the height of counters as shown on page 28. These brackets fit into slots on a wall-mounted track system which permits the height of the counter to be adjusted and locked in place. Commercial brackets are different from common shelf hardware which cannot be used for counters.

For information on manufacturers and suppliers of hardware, see Appendix B.

Generic Products Used in Adaptable Housing

Some products which are not specifically adaptable or adjustable may be useful when building or designing adaptable housing. These products can be used in conjunction with removable base cabinets, adjustable counters, or reinforced walls in bathrooms. The following list includes descriptions of generic products that may be useful.

Kitchen Sinks and Disposals

Sinks. Single, double, and triple bowl sinks are permitted by the standards if the depth of at least one main bowl is not greater than 6-1/2 inches. Kitchen sinks with bowls deeper than 6-1/2 inches must not be used because the knee space under the sink will be inadequate. Generally, the less expensive models of stainless steel sinks found in many lumber and building supply stores have bowl depths that meet the standard. Many of the more expensive sinks tend to be too deep to be used.

Disposals. Disposals can be used in adaptable units if enough knee space is provided. To minimize the amount of space used by the disposal, smaller diameter units are preferred over large diameter disposals. These units have a smaller enclosure than the premium models because they have less sound insulation but still have powerful motors.

Please see page 37 for more information on the installation of sinks and disposals in adaptable housing.

Cooktops and Ranges

Both cooktops and ranges are permitted by the standards. If cooktops are used, they must have the controls mounted in the front or along the side of the unit so that they can be easily reached without accidently touching a hot burner. If a range is used, the controls must be located along the front of the unit and not behind the burners.

Touchpad or dial controls are permitted by >he standards. The touchpad controls are sometimes difficult for visually impaired people to use because they cannot easily tell which setting they are selecting and dial controls are sometimes difficult for people with poor hand function to push and twist.

Please see page 34 for more information on using ranges and cooktops in adaptable housing.

Self-cleaning and Continuous-cleaning Wall Ovens

The use of self-cleaning or standard wall-mounted ovens is permitted by the standards. When a self-cleaning oven is not used, the oven must be installed next to a knee space which permits a seated person to clean the inside of the oven.

Both bottom-hinged and side-hinged ovens are permitted by the standards. If a side-hinged oven is used, a pull out shelf must be installed just below the oven to hold hot pans as they are removed from the oven.

Controls can be touchpad or dial (with the same limitations as mentioned for cooktops) and can

be mounted on either side of the oven. Ovens with controls mounted at the top of the oven should not be used because the controls will probably be out of reach of some people.

Please see page 32 for more information on the use of wall ovens in adaptable housing.

Grab Bars

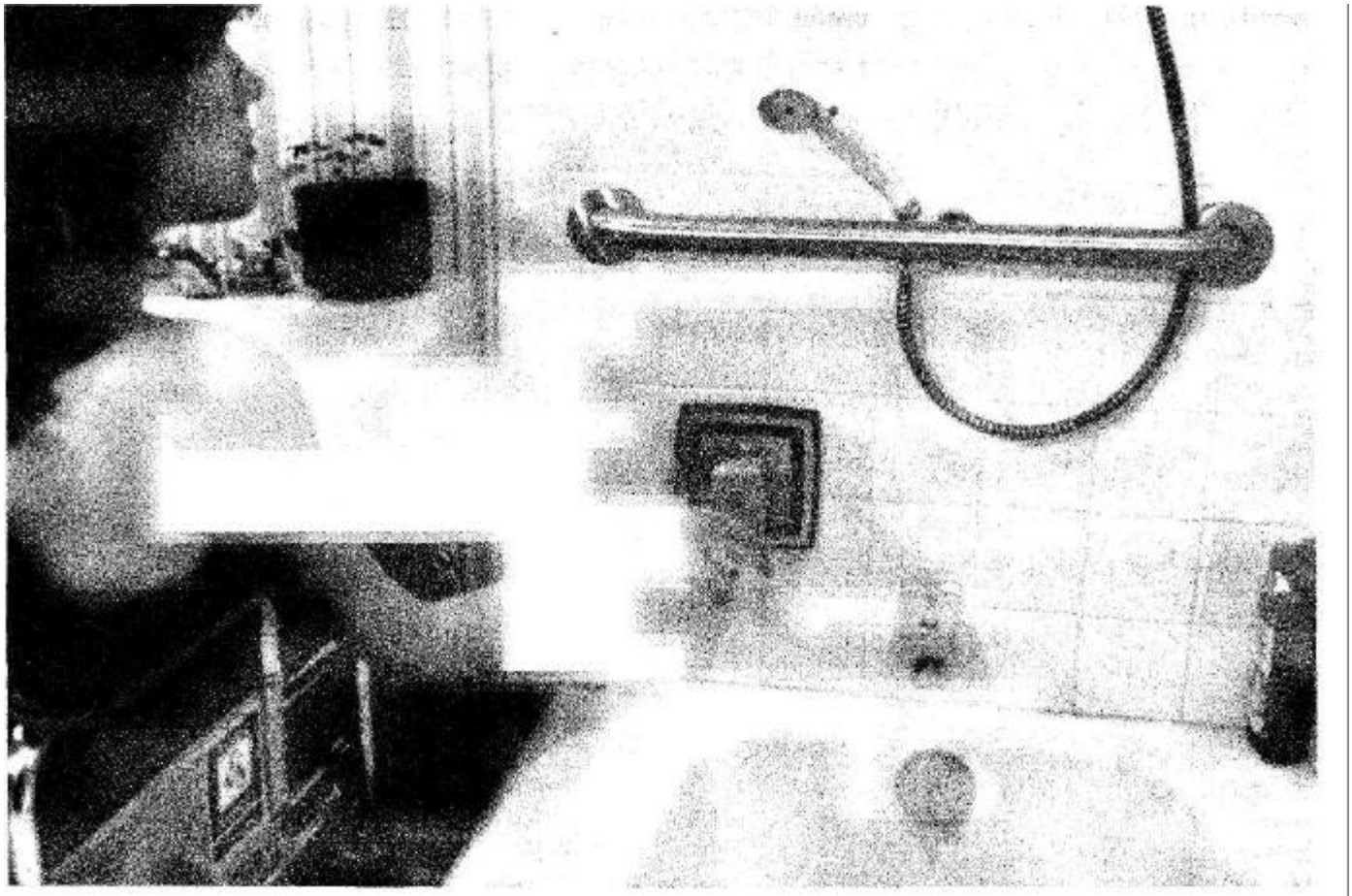
Many different manufacturers produce grab bars made of stainless steel, vinyl coated metal, or plastic. People who use grab bars now have a choice of color, finish, and shape of grab bar. The colored grab bars are very well suited to homes. They can be color coordinated so that they blend in with the other colors in the room.

Please see Appendix B for a source for colored grab bars.

Fiberglass Bathtubs with Seats and Roll-in Showers

Several manufacturers of fiberglass and acrylic bathtubs and showers market bathing fixtures that may be used in adaptable housing. A bathtub is available which has an integral seat at the rear of the fixture as specified in the standards. Several roll-in showers are marketed as a cost saving alternative to the site-built roll-in showers often used in special housing.

Please see Appendix B for sources of fiberglass bathtubs with seats and fiberglass roll-in showers.



PRODUCTS FOR THE FUTURE

The concept of adapting or adjusting to suit the needs of people who live in a dwelling is the basis for adaptable housing and for products with adaptable features. During the next decade this concept will become increasingly important as the populations of both older people and disabled people increase.

Long accepted stereotypes about older people and disabled people are being abandoned as people realize that everyone, regardless of age or physical ability, demands the freedom to be as active and as independent for as long as possible. Older people are no longer content or willing to accept retirement housing as an inevitable situation. More and more, older people are choosing to stay in their own homes and are adapting them to meet their changing needs. Disabled people are also no longer willing to accept being segregated in specialized housing or being limited to living with family because housing is not available.

Changing attitudes and changes in population are having an affect on the type of housing that is built in this country. Development of the concept of adaptable housing will continue as more people understand the benefits of having a home which can adjust to some of the needs of the occupant.

As the concept develops, many new products with adjustable features will be needed both for adaptable housing and also for changing the existing homes of older people. Some of these products will be similar to those described in this book: cabinets, countertops, grab bars and closet rods. Others will be a new generation of products that use both complex and simple technologies. Most of these products will be sold to a standard market as products that improve the quality of life for everyone.

The new products may have interesting features. For example, thermostats may have both visual and auditory cues so that someone adjusting the temperature in the middle of the night or someone who has poor eyesight would easily know the correct setting. Storage systems may be available which can be adjusted easily as children's toys accumulate or when lower storage is needed for a spouse who uses a wheelchair. Many of these new products will be purchased because they will make life much easier for everyone. People will also buy the products because they are attractive or innovative, or because they improve the quality of life.

The concept of adaptable housing will develop during the next few years to include much more than multi-family dwellings. With the shifts in the population that are already occurring, single family homes, retirement homes, and other specialized forms of residential and recreational housing are likely to have adaptable features. As the concept develops, larger numbers of people will realize the many benefits of a home that can adjust to their changing needs.

APPENDIX

APPENDIX A. DESIGN STANDARDS FOR ADAPTABLE HOUSING

Two national standards contain specifications for adaptable housing: the American National Standards Institute Al 17.1 -1986, *Providing Accessibility and Usability for Physically Handicapped People,* (ANSI 1986), and the 1984 *Uniform Federal Accessibility Standards* (UFAS 1984). Thirty-eight states have adopted, either completely or partially, the ANSI (1980) or the ANSI (1986) provisions both of which include the section on adaptability. The UFAS standard applies to all federally funded construction subject to the architectural barriers act.

Copies of the ANSI standard are available from:

American National Standards Institute
1430 Broadway New
York, NY 10018

Copies of UFAS are available from:

The Architectural and Transportation Barriers Compliance Board
5th Floor
1111 18th Street, NW
Washington, DC 20036-3894

General Services Administration
Commissioner, Public Buildings Services
General Services Administration 18th and
F Streets, NW Washington, DC 20405

Department of Defense
Handicapped Individuals Employment Program
ODASD (CPP)
Department of Defense - Pentagon
Room 3A272 (S. Parking)
Washington, DC 20301-4000

Department of Housing and Urban Development
Special Advisor for Handicapped Programs
Department of Housing and Urban Development
451 7th Street, SW, Room 10140 Washington, DC
20410

U. S. Postal Service
Architectural Barriers Compliance Program
Facilities Department
U.S. Postal Service Headquarters
475 L'Enfant Plaza West, SW, Room 4130
Washington, DC 20260

APPENDIX B. SOURCES OF AVAILABLE PRODUCTS FOR ADAPTABLE HOUSING

Kitchen Cabinets and Counters

Constella
Swedish Trade Office 333 North Michigan Avenue Chicago, IL 60601 (312)372-1680

or

Constella- Verken AB
Paketgatan 1 S-78140 Borlange Sweden

Dwyer Products Corporation
Calumet Avenue Michigan City, IN 46360 (800)348-8508 (219)874-5236

Medinorm USA: H.EL Inc
10300 Westoffice Drive Suite 200B Houston, TX 77042 (713)781-4772

Adjustable Height Lavatories

Pressalit
Dansk Pressalit A/S August Enforgade 11-13 DK 8000 Arthus C Denmark

Hardware

Hafele screw inserts and self-storing door hardware

Hafele America Co. 203 Feld Avenue High Point, NC 27261 (919) 889-2322

or

Hafele America Co. Western Division P.O. Box 1590 16926-A South Keegan Ave. Carson, CA 90746 (213)604-8125

Commercial wall-mounted shelf brackets (24 inch)

Knape and Vogt Manufacturing Company 2700 Oak Industrial Drive, N.E. Grand Rapids, MI 49505 (616)459-3311

Plumbing Fixtures **Tub with integral seat**

Kimstock Southwest, Inc. 2200 South Yale Street Santa Ana, CA 92704 (800) 854-0355 (714)546-6850

Tub with attachable/ removable seat

GlasTec P.O. Box 28 Middlebury, IN 46540 (800) 348-7464 (219)825-9451

Showers

Aqua Glass Corporation P.O. Box 412 Industrial Park Adamsville, TN 38310 (901)632-0911

Kimstock Southwest, Inc. 2200 South Yale Street Santa Ana, CA 92704 (800)854-0355 (714)546-6850

Colored and Metal Grab Bars

Tubular Specialties Manufacturing, Inc
13011 South Spring Street Los Angeles, CA 90061 (800)421-2961 (213)515-4801

APPENDIX C. SELECTED REFERENCES

American National Standards Institute. *American National Standard for Buildings and Facilities - Providing Accessibility and Usability for Physically Handicapped People* (ANSI Al 17.1-1986). New York: ANSI, 1986.

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Jones, Darrell L. (Ed.) *Insight.* Quarterly publication available from the Association of Independent Living Centers in New York, Inc. Rochester, New York. Fall 1984.

New York State Division of Housing and Community Renewal, Fact Sheet: Accessibility/Adaptability and the New York State Uniform Fire and Building Code. December 1983.

New York State Office of Advocate for the Disabled. *A daptability - a New Concept in Housing Design.* New York.

Peoples Housing, Inc. *Housing Adaptability Guidelines: A Concept to Make All Housing Accessible.* Topangas, California: Department of Rehabilitation, State of California. September 1979.

Steinfeld, E. *A Cost-Benefit Analysis of Accessibility* (Contract No. H-2200). Washington, D.C.: U.S. Department of Housing and Urban Development, Office of Policy Development and Research. 1979.*

Steinfeld, E. *Adaptable Dwellings* (Contract No. H-2200). Washington, D.C.: U.S. Department of Housing and Urban Development, Office of Policy Development and Research. 1979.*

Steinfeld, E. *The Estimated Cost of Accessible Buildings* (Contract No. H-2200). Washington, D.C.: U.S. Department of Housing and Urban Development, Office of Policy Development and Research. 1979.*

Uniform Federal Accessibility Standards. Washington, D.C.: U.S. Government Printing Office. 1984.

* available from HUD USER, P.O Box 280, Germantown, MD 20874.