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Kitchen Planning

New and Remodeled

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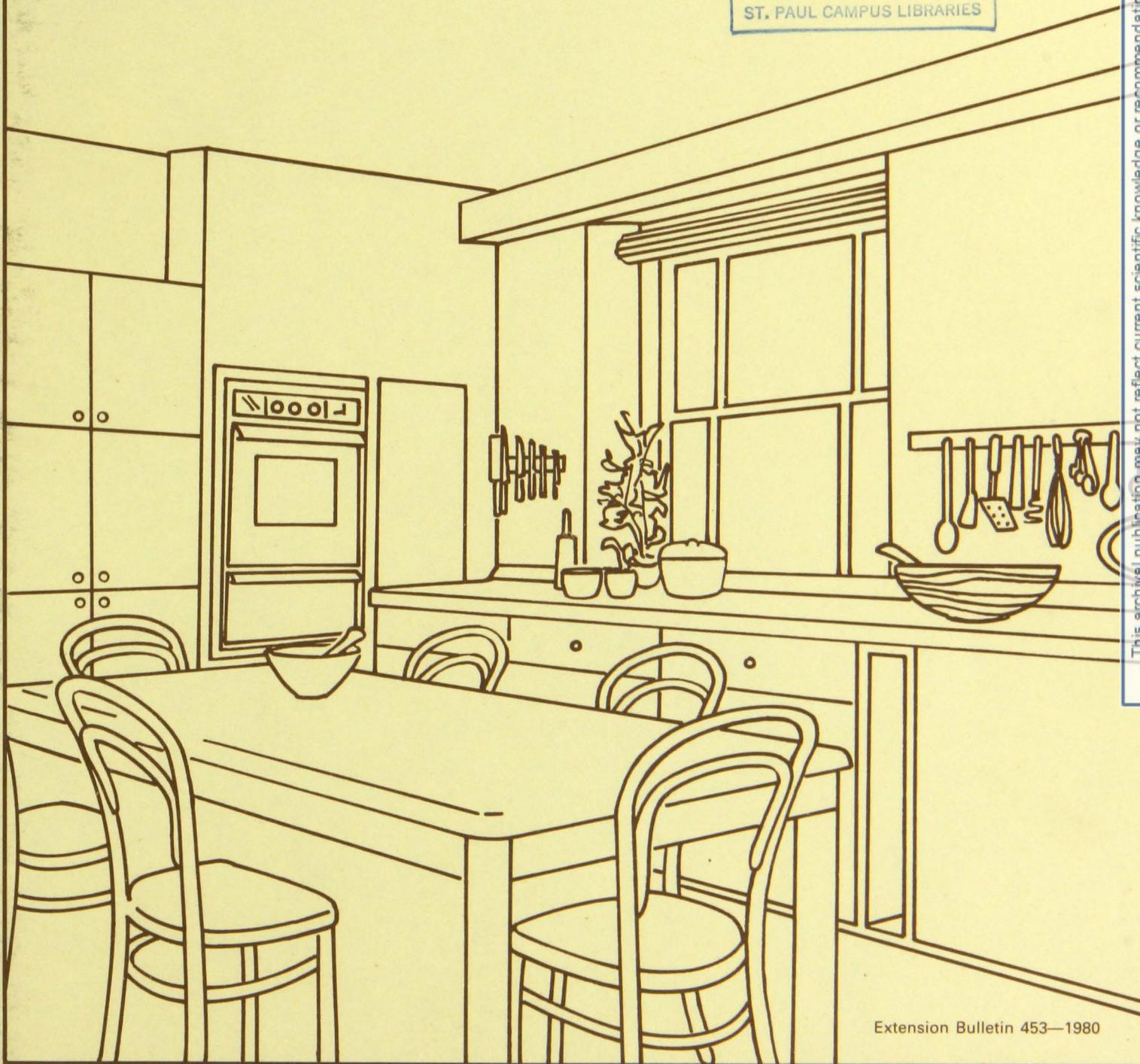
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General Order of Work to Complete a Kitchen

Be prepared for everything to take longer and cost more than expected.

Planning Phase

- identify family needs
- determine general location of the kitchen and actual kitchen space
- develop the plan including work and storage areas, plumbing, wiring, and lighting
- secure needed building permits

Construction Phase

- lay foundation
- construct or change exterior walls, roof, and floor framing, install or change windows and doors

- install plumbing and wiring
- install plaster board—sub flooring
- install cabinets and appliances—cabinets may take up to six months after placing order. Exact measurements for cabinets are taken after the plaster board is installed, or measure from the stud wall and adjust for the thickness of the plaster board.
- install floor covering—some types may be installed before cabinets
- install counter tops
- install sinks
- install wall covering—some types such as paneling may be installed before the cabinets

Kitchen Planning: New and Remodeled

Today's kitchen is often part of a family-living area. The location and many other decisions depend upon family needs, lifestyle, and the physical limitations of the house.

A well designed-kitchen should be functional as well as aesthetically pleasing. From the beginning one must realize how materials and furnishings affect the overall appearance or character of the kitchen.

The character of the kitchen should relate to the rest of the house and the family life style. The relationship of the other areas of the house and the kitchen should be harmonious for a consistent "total look." To establish a theme or style analyze the needs and living habits as individuals and a family. Hobbies or special interests

may play an important part in the establishment of character. For example, if the family emphasized natural materials in the rest of the house, and they enjoyed an informal, warm, contemporary feeling, the cabinets might be natural wood without molding or ornate hardware, wood planks at 45° angle on walls and/or ceilings, warm colors, macrame hangers for plants, baskets or pottery as accessories.

Kitchens will be completed with fewer problems and less delay if you follow the general order of work as listed on the inside cover. Many kitchen professionals are helpful in the early planning stages, including identification of family needs.



The clean lines of the cabinets and the architectural features give this kitchen a contemporary feeling.



The style of the cabinets, the hardware, the wall covering, and the accessories give this kitchen a traditional feeling.



Identification of Family Needs

A good kitchen plan is your best investment in time and later money. Planning a kitchen requires decisions balancing the scope of intended use, good design, and cost. List your needs in relation to use, appearance,

and cost and then decide the importance of each. Only after considering your family needs can you analyze your situation and determine the help you will need.

CONSIDER:

How many people use the space and share in food preparation?

What is the size of the household?

What are the heights of the people?

What are the ages of family members?

Who cleans the kitchen and how much time is spent in this task?

What activities must the kitchen space accommodate in addition to cooking?

Are there special storage needs?

How often do you entertain and how?

What are family's eating habits?

What are the preferences in terms of color and design?

What character or style is desired?

What fits within your budget?

How long do you expect to use the furnishings and materials?

Will the total plan be completed immediately?

IMPLICATIONS:

If several people cook you may need larger work areas.

Larger families may need more eating and storage space, depending on lifestyle.

If the primary cook is much shorter than average, some lower work surfaces should be incorporated.

With young children and older people there will be higher priority for surfaces that are easily cleaned, accessible, and safe.

If time is minimal, it will affect all choices.

Hard wearing materials are important and usually expensive.

It may be necessary to include a study and home office area, television viewing, an intercom, a place for sewing, laundry, household business, pet feeding, and storage for related items.

Storage may be necessary for canning, freezing, and food drying equipment, as well as for coats, boots, brooms, etc.

Entertaining large groups means storage for serving pieces, additional counter space, and easy access to dining area.

A snack counter may function best for families that eat at different times.

Consider this as you choose colors, lines, shapes, textures, and patterns.

Select an overall feeling that blends with your lifestyle and the rest of the house—formal or informal, traditional or contemporary, etc.

There is a range in cost with all choices; sometimes cost makes your decision.

Durability and cost over time affect the initial purchase price.

Set priorities. Some things are needed immediately, others may be added as finances permit.

Getting Professional Help

How big is the project you have in mind? Will you be developing a total kitchen plan which includes selecting cabinets and appliances? Will you also be improving or replacing wiring, plumbing and duct work, changing or reinforcing walls, and changing windows and doors?

Find, then hire the professional service and experience you need. Select professional help if you lack the skills, experience, knowledge, and the time. It is essential to have a well-designed plan to meet your needs. Expensive cabinets and appliances won't improve a poor plan. To avoid unnecessary expenses, plan the entire kitchen before any actual work is done, even if you plan to do the work in stages. Kitchen professionals who will be working on your project should be a part of the early planning. Before selecting professionals to help you, check their business reputation with your mortgage officer, local housing authority, or the Better Business Bureau. If you are remodeling, ask about their experience in remodeling kitchens.

Written agreements should indicate specifically:

- what will be done and how it is to be done
- what equipment and materials will be used and how the materials will be finished
- the work schedule and that all work is in compliance with any applicable codes
- the method of payment

In some cases, the agreement may stipulate what is not to be done or what is the owner's responsibility.

People vary greatly in experience and skills, but you can expect the following professionals to have capabilities in these areas:

- architects, interior designers
identification of family needs, relationship of the kitchen to the total house, preparation of complete kitchen plans and specifications.
- contractors
coordination of all phases of building or remodeling from start to finish, including hiring subcontractors and getting permits.
- certified kitchen designers (CKD)
identification of family needs, preparation of complete kitchen plans and specifications, hiring subcontractors and getting permits. Today, CKDs meet stringent requirements assessing their knowledge and ability to design kitchens and must have established a reputation for high quality work and satisfied customers.
- kitchen planners
some identify family needs and relate the kitchen to the total house. Some prepare complete plans and specifications, others prepare only limited plans.

Kitchen Remodeling Considerations

Remodeling a kitchen is time-consuming, dirty, messy, and may mean going without water and electricity in the kitchen for several days. It also means:

- you do not need to move from the neighborhood.
- you avoid costs associated with selling, moving, building, or buying (may also avoid financing another house at a higher interest rate—BUT home improvement financing, unless part of a special program, generally carries a higher interest rate than that of a home mortgage).
- you may be able to do some of the work yourself. Consider skills, experiences, time, and energy you have available for this project.

Remodeling which improves the kitchen may increase the resale value of the house. Usually remodeling is a good investment when the kitchen is in poorer condition than the rest of the house and the mechanical systems are not up to code. It may not be a good investment when all of the house is in poor condition, or if remodeling increases the value of the house far above the value of the existing houses in the neighborhood.

Most remodeling is done within the present kitchen area. Additional space may be added from a pantry, hallway, or an adjacent room. Removing an interior wall is not difficult if it is not a major support to the structure and does not contain plumbing, gas lines, wiring, or ductwork for heating. Support walls usually are perpendicular to the joists.

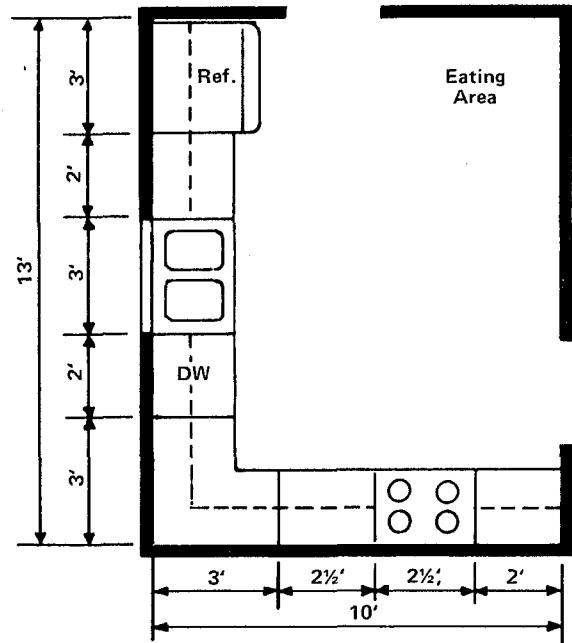
Moving the kitchen to a totally different space, such as converting a dining room, depends somewhat on the location of the present or proposed kitchen to the rest of the house. Consider also the space needed, traffic patterns, and the willingness to rewire and replumb. If your remodeling includes rearranging or adding cabinets and appliances, you will probably need to make changes in wiring, lighting, and plumbing. Moving the sink to a more convenient location is a major consideration; sinks need to be located near the vent stack and a drain pipe. Adding a dishwasher may require changes in both the plumbing and electrical systems. The simplest improvement may involve replacing or rearranging some or all of the cabinets and appliances. Before you do only this, check to see if your work and storage space, wiring, lighting, and plumbing are adequate.

Remodeling may be an opportune time to reduce the heat loss from your house and make it more energy efficient. Three main factors affecting the energy used for home heating are:

- size of house.
- number and size of windows (location of windows is critical because a south window can add heat from the sun if the window is not shaded during the day, and if it is covered at night to prevent heat loss).
- insulation and air leakage.

Kitchen Remodeling Costs

To give some idea of relative costs in kitchen remodeling, the following illustrate costs for an L-shaped kitchen. (1980 costs)



	Post-Formed Plastic Laminate	Self-Edged Plastic Laminate	Acrylic Corian®
Countertops (Installation)	\$100.00-\$180.00 \$150.00	\$250.00-\$330.00 \$150.00	\$680.00* \$530.00
*Does not include a molded sink			
Flooring (Installation)	Vinyl Asbestos Tile	Vinyl Sheeting	Carpet
Plumbing \$350.00 Including hook ups and redoing water supply and drain lines (Specifications did not include relocating sink)			
Electrical \$600.00-\$650.00 Up to code with 3 wire service, an appliance circuit, adding a couple of outlets, undercabinet lights.			
	Materials	Labor	
Sheetrocking, Taping Walls and Ceilings (3-4 hours/two people sheetrocking, 3 days/one person taping and wall preparation)			
	Low	Middle	High
Cabinets	\$1000.00-\$1700.00 Installation of cabinets ranges from \$195.00-\$390.00	\$2600.00-\$3500.00	\$4300.00-\$5400.00
Appliances:			
Range (30" freestanding)	200.00- 350.00	400.00- 700.00	800.00- 1200.00
Refrigerator (19 cubic feet)	400.00- 550.00	600.00- 800.00	900.00- 1600.00
Dishwasher	225.00- 300.00	325.00- 400.00	450.00- 600.00
Sink & Faucets (33" double sink)	80.00- 110.00	140.00- 165.00	190.00- 220.00

Plan Development

Determine the Location of the Kitchen and the Actual Space Needed

Locate the kitchen to avoid general traffic through its work area and to be convenient to the dining and living area(s) of the house.

In addition the location of the kitchen depends upon:

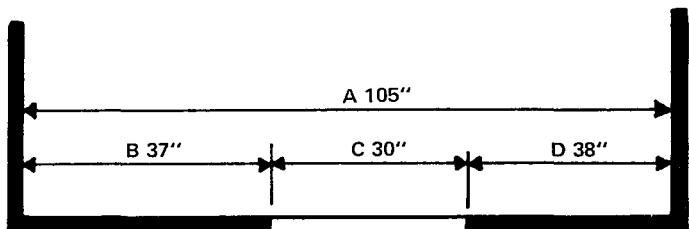
- convenience to yard or outside work area; if important, does a window look out into the yard or work area?
- convenience for unloading of groceries and disposal of garbage and trash.
- accessibility to the front or back door.

Kitchen areas which become part of a larger living space need a ventilating system to remove odors and quietly operating appliances installed to reduce the noise level (example: rubber mountings).

Measure the kitchen space and make a scale drawing of the room. Blueprints will give room dimensions, but more exact measurements, taken after the interior walls are in place, are needed for a good cabinet fit. Many kitchen professionals will also take these measurements.

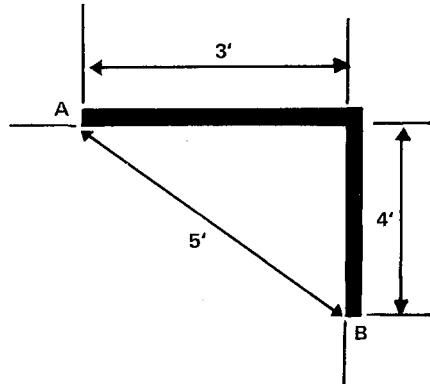
1. Measure the length and width of the rooms. Measure the full distance from corner to corner and the distance of the subsections within. (As a double check on your measurements, compare the overall with the total of the subsection).

2. Measure walls with windows in this manner:



- A from wall to wall
- B from corner to outside trim of window
- C outside window trim to outside window trim
- D outside trim of window to corner

3. Measure all corners for squareness. To do this, find points A and B. The distance between the points should equal 5 feet. NOTE: If corners are not square, some adjustments will need to be made during installation (or problems requiring adjustment will arise).

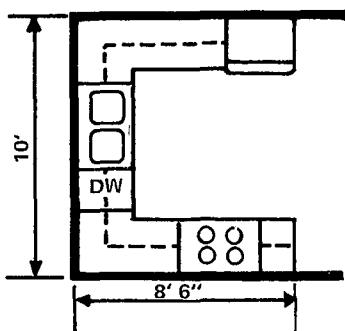


4. In addition, two other measurements should be taken:
the distance from the top of the window trim to ceiling and from the bottom of the window trim to the floor, and
the dimension of the soffit, if there is one, and the distance from the soffit to the floor (measure at several locations).
5. Make a scale drawing of the room, $\frac{1}{2}$ inch to 1 foot. Draw in all windows and doors, note the direction of the door swing and the room or area into which the door opens. Draw in any chimneys, radiators, air ducts in walls, location of water supply, drainage pipes and vents, gas pipes, and electrical outlets. Indicate wall thickness and whether interior walls are bearing or non-bearing walls.

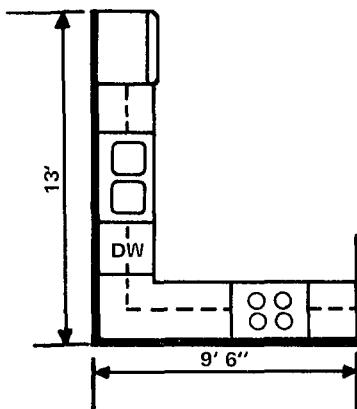
Test Possible Kitchen Shapes

The actual arrangement depends greatly on the room dimensions and the door and window placement. Changing the location of doors or windows may be necessary for a more efficient arrangement. Kitchens designed to be used for more than one person need more space for movement and efficient use of equipment. The following diagrams illustrate the approximate space needed for 8 feet of base and wall cabinets

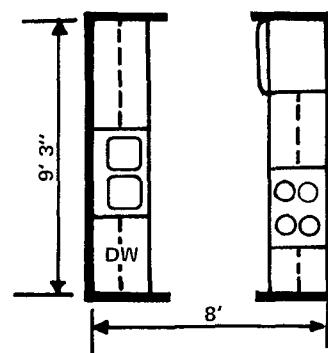
and refrigerator, range and dishwasher arranged in the "L", "U", corridor, and island shapes.



"U" Shape
Allows short distance between work centers and eliminates traffic through the work area. Two corner installations have potentially difficult access for storage.

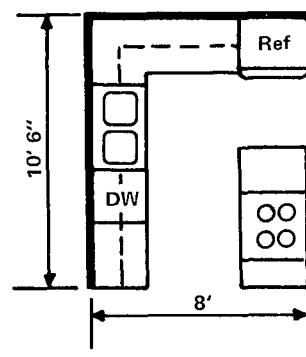
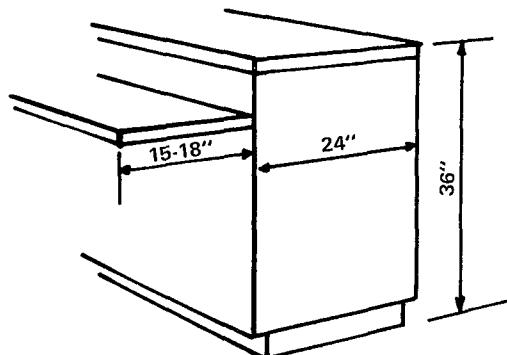


"L" Shape
Easy arrangement if more than one person uses the kitchen, one corner installation has potential difficult access for storage.



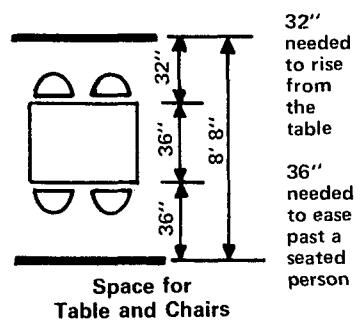
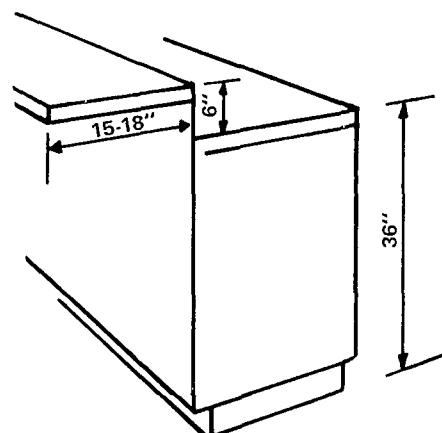
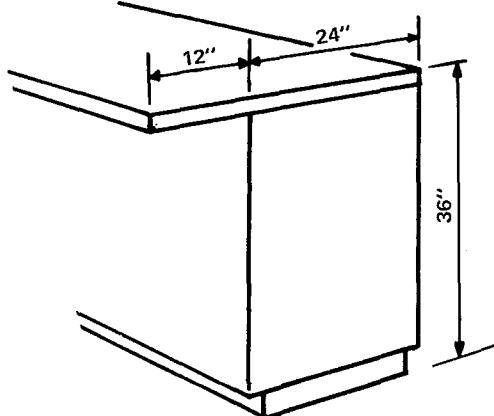
Corridor Shape
Can be used in a minimum amount of space; better if the corridor is not a traffic thoroughfare.

Eating Counters



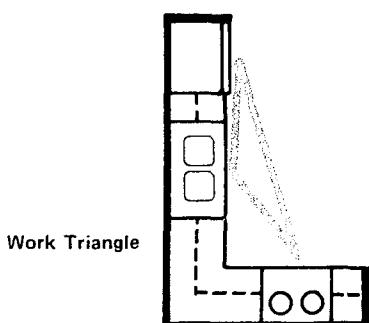
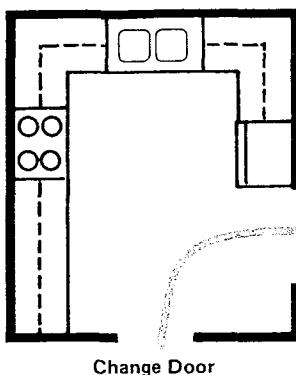
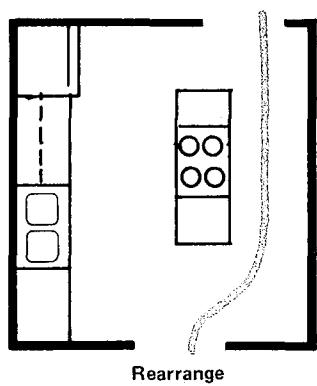
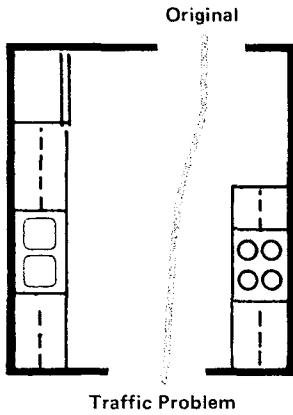
Island or Broken "U" Shape

The minimum counter dimension for an island is 2'6" x 3'; larger spaces are required when the island includes an appliance.



Space for Table and Chairs

Determine Work Center Arrangement



The kitchen is the most intensively used space in the home. Efficient kitchens need well developed work centers. These centers include sink and cleanup, mix and preparation, range and cooking, and refrigerator and storage; serving is often combined with the range.

The microwave oven may be a separate center or replace the range in the range and cooking center. Evaluate the intended use of the microwave before choosing the location for this appliance. If it is used primarily by several persons preparing snack foods or individual items, consider locating it out of the central work area. Many foods heated in the microwave come from the refrigerator/freezer and need little preparation before going into the microwave. However, if the microwave oven will be replacing many of the uses of the range top in meal preparation, it may replace the range in the central work area.

Arrange the work centers to reduce the amount of walking in the kitchen and to allow work to flow easily from one center to another. The work areas should not be split by traffic (see illustrations). Normally the largest number of trips during meal preparation occurs between the sink and the range top; many trips occur between the mix center and the sink and between the mix center and the refrigerator.

Do not install the range next to the refrigerator, it will make the operation of the refrigerator more costly and reduce its life time.

Measure the distance between the sink, range top, and refrigerator; this space is called the work triangle and should be between 12 and 22 feet. The distance between the sink and the refrigerator should be 4-7 feet, between the sink and the range top 4-6 feet, and between the range and the refrigerator 4-9 feet.

Solving Design Problems

For Very Small Kitchens

- Use smaller sized appliances. Appliances are available in widths as narrow as 18 inches for dishwashers, 18-20 inches for ranges, and 24 inches for refrigerators. Small sized appliances are available separately or as part of a combination unit frequently used in efficiency apartments or in businesses. A 48-inch unit may contain a range and a sink with a dishwasher below. An 84-inch unit may contain a range, sink, dishwasher, and a 30-inch undercounter refrigerator. a portable oven takes less space than a built-in oven.
- Use fewer major appliances—do not separate range top and oven.
- Use specialized storage, such as a full storage cabinet or pantry unit or build shallow storage in walls between studs.

- Use a fold down table or a table that pulls out of the base cabinet for eating.
- Relocate or eliminate doors or windows; remove a dividing wall and make into one room.
- Use light colors, no pattern or small patterns, minimize rough textures, and contrast.
- Use enough light to eliminate shadow.

For kitchens with many doors with the window sill 12" from the floor.

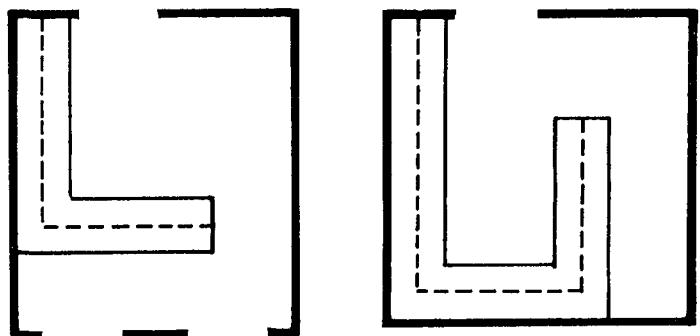
- If the room is large enough, plan the kitchen workspace within a portion of the area.
- If the windows are spaced appropriately, plan a corridor kitchen.
- If wall cabinet storage is minimum, add a full storage cabinet or pantry unit elsewhere in the kitchen.

Check Plans For Work, Storage, And Clearance Space

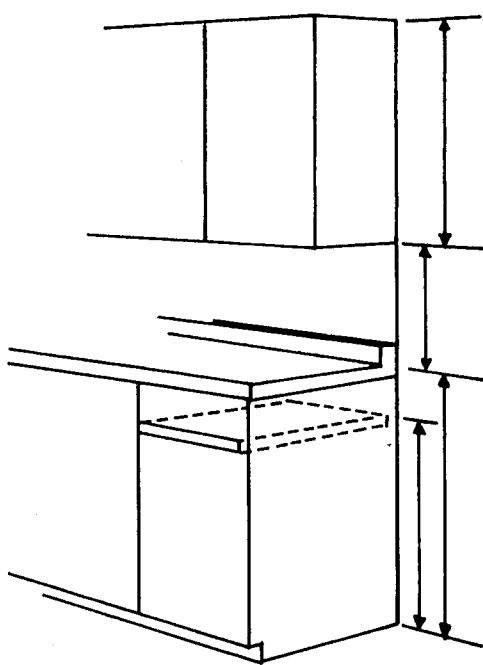
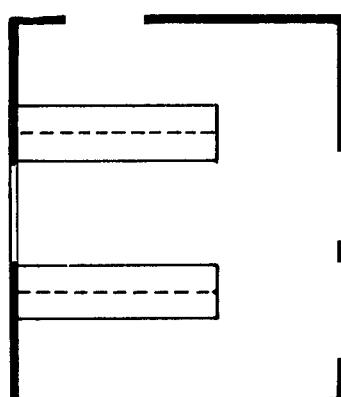
The recommended amounts of work and storage space are listed in Chart I. Storage space should be arranged so that frequently used items are stored at the point of first use and are easily accessible. For example: The mixing center should handle food staples used there, mixing bowls and spoons, measuring equipment, and appliances such as the mixer.

Many small appliances need storage space but only require counter space for short time periods. A portable oven, for example, requires counter space for longer periods of time than a toaster.

Adequate clearance space is needed so that cabinets and appliances can be opened and are accessible for work. Crowded plans create unsafe conditions.



Problem Kitchens



Cabinet Dimensions

Wall cabinets

Depth—12-13 inches

Height—12-33 inches

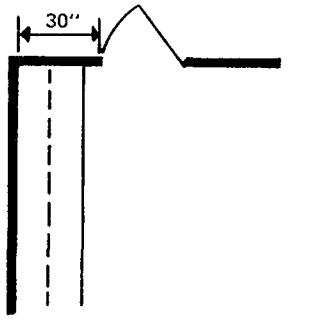
Width—9-60 inches

Clearance 15-18", over sink 24-30"; over range 27-30"
(24" if cabinet is fire protected)

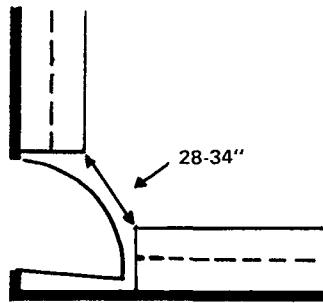
Standard counter height 36". (counter should be 3" below elbow for most tasks, 6" below elbow for rolling out or kneading tasks).

Sit down work surface 30"
Base cabinets;
Depth—24"
Widths—9-60"
(Available in 3" modules)

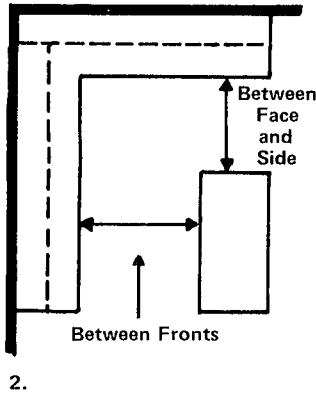
Clearance space requirements are industry recommendations. HUD (Housing and Urban Development) minimums are given in parenthesis. HUD minimums are for new construction of one and two family dwellings and must be met whenever the loan on the property will be insured through a HUD-sponsored mortgage insurance program.



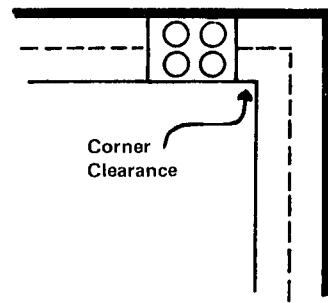
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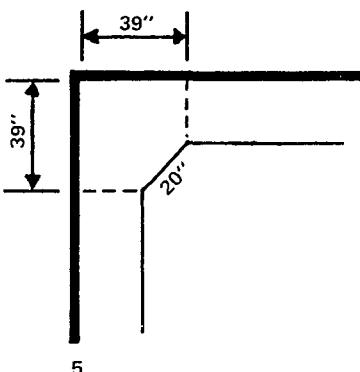
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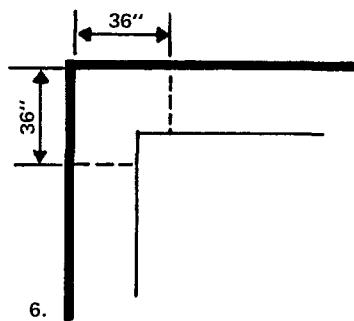
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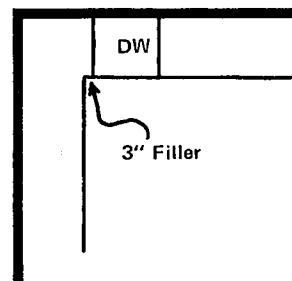
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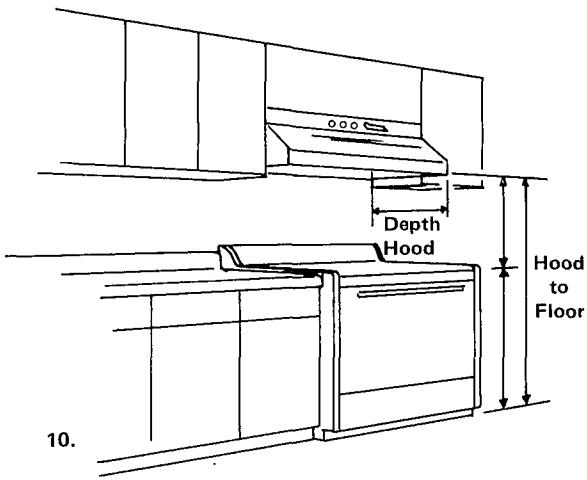
7.

Kitchen professionals should make sure that your plan meets the following space requirements:

1. Doors should not be placed closer than 30 inches from the corner if cabinets are to be extended to corner. Windows should not be placed closer than 12 $\frac{3}{4}$ inches from the corner if wall cabinets are to be extended to corner.
2. Clearance space between base cabinet fronts in the food preparation area is 48-60" (40). If two people are working 48" is minimum. Clearance space between the face of one cabinet and the side of another is 38" (30).
3. Corner to corner clearance space between appliances or base cabinets at right angles to each other is 34" (28).
4. Corner clearances are:
Edge of range and corner cabinets 12" (9).
Edge of refrigerator to corner cabinet 15" (15).
Edge of sink and corner cabinet 9-12".
5. A diagonal cabinet of 20" requires 39" on either wall. A diagonal cabinet or appliance of 30" requires 45" on either wall.
6. 36" on each side is needed for a lazy susan.
7. Use fillers or extended stiles to insure full operation of cabinet or appliance drawers and doors in the following situations:
 - appliance, such as a dishwasher, is placed too close to a cabinet intersection.
 - cabinet is placed too close to wall that is out of square, or has door or window frames that interfere with pullout drawers and shelves.
 - hardware projects.
8. A built-in conventional oven should be placed so that the top side of the fully opened door is between 1-7 inches below the user's elbow.
9. The microwave oven should be at a height which allows the user to visually inspect foods during cooking and to safely insert and remove heavy

utensils and foods without spilling or losing control of the item. Stretching and stooping should not be necessary. The microwave may be built-in to an oven or wall cabinet or be recessed into an interior wall. It needs work space, counter, pull-out tray or drop leaf, near the access side of the door.

10. The depth of the range hood determines the height at which it is located. A hood 17" or less in depth should be placed no less than 56" above the floor, hoods 18" or more in depth should be installed no less than 60" above the floor.



Develop the Design

Choose materials that show respect for the inherent properties of the material. Plastics often try to imitate other materials, e.g., new or used bricks on vinyl flooring or wallcoverings, ornate molding and carving on cabinets, or marble on plastic laminate countertops.

Even in a house emphasizing traditional design, there will be some 20th Century appliances. Most people that like an Early American look want that feeling but aren't willing to cook over an open fire. It is not necessary to cover a refrigerator in an Early American cabinet. That look can be achieved by selecting patterns and accessories that were used in that period. Be especially careful when selecting traditional cabinets. Generally these are adaptations of a particular style, taking motifs from that period and applying them to our contemporary cabinets.

When selecting cabinets choose moldings that are well proportioned in relation to the cabinet doors. The lines and shapes should relate to each other and to the overall cabinet door front. There should be repetition of line, shape, and form to create unity. The hardware should relate to the cabinet door in terms of form and style. Avoid the overly ornate; an excess of grooves can be a grease and dust catcher. A plate installed under the door pull will protect the finish. Select a form that fits the hand comfortably.

Form and Function

In all choices, think about the function of that item and how well the form expresses that function. In a kitchen

the textures are especially important; all materials should have surfaces that are easily cleaned. It is difficult to clean spills from rough textures on both counters and floors. Select chairs and stools with the comfort of the people using them in mind. Storage should be easy to use in relation to location, height, and its appropriateness for the items stored.

Patterns

When selecting wall coverings, or other materials with patterns, look at the design carefully and evaluate the quality of the design. Avoid patterns for kitchens that are cliches, i.e., pots, pans, spice jars, and other typical kitchen motifs. There are many well designed patterns on the market—the size of the pattern should relate to the size of the space. In small spaces, generally, select no pattern or small patterns, and minimize the amount of contrast while larger spaces can generally handle more contrast, larger and bolder patterns.

Accessories

Accessories in a kitchen contribute to the character and should be consistent with the overall feeling. These may be functional accessories, i.e., canisters, spices, utensils, wine racks, clocks, pottery, baskets, and other serving pieces or purely decorative, i.e., plants, art work, collections, or items related to hobbies and other interests.

Color

Choosing the colors for a living space should be done with care and skill. Color drastically affects appearance of the area, as well as moods. There is no limitation and no "right" color. In other words, a perfect color for all kitchens does not exist. Pick colors you like that are satisfying to you. Colors change under natural and artificial lighting and when seen in relation to other colors. Some colors (hues)—red, orange, and yellow—appear to be warm and are considered *advancing and active* colors. The cool colors—blue, green, and violet—*appear to recede* and feel more relaxing. If the kitchen is on the north side of the house, cool colors will make that area feel cooler. Remember, increasing the amount of the color increases the impact of that color.

Value, the lightness or darkness of a color, affects appearance and mood. Light colors generally make an area more spacious and can feel bright and cheerful, but without care they can be stark and cold. Dark colors make a space cozy, give a sense of solidity but, without care, can be depressing. Dark colors absorb more light and if mostly dark colors are used, more artificial light will be necessary.

The intensity, the brightness or dullness of a color, also affects appearance and mood. Very bright colors are stimulating, active, and advancing while grayed, dull colors seem subdued, quiet, and tend to recede.

Generally, cool, light, and dulled colors tend to make rooms look larger. Warm, dark and bright colors tend to make rooms look smaller. Rooms that appear too long can be visually shortened by adding a warmer, darker or brighter color at one end.

Selection of Equipment

Chart II lists the utility and space needs of kitchen equipment. New equipment should be purchased on the basis of usefulness and energy efficiency. New refrigerators, freezers, and water heaters, clothes and dishwashers now carry energy labels helpful in purchasing the most energy efficient models.

Appliances

Keep an old appliance if it still serves your needs and its appearance is satisfactory. If the appearance is not satisfactory, some improvements can be made. Refrigerators, freezers, and dishwashers can be spray painted using paints developed for appliances. Some models of these appliances are also designed to apply front surfaces of plastic, wood, or metal to match the cabinets. A wood front for a dishwasher should have both sides and edge finished with sealer (moisture resistant), or be metal to match the cabinets. Ranges which are chipped must be reporcelanized by a specialized company.

Consider a new appliance if the old is wearing out or if it is important for the appliance to be the same depth as the cabinets. Free standing ranges and refrigerators may be 27-30 inches in depth; models made to be built-in are the same 24-inch depth as cabinets. Later replacements may have different widths or heights, for example a common width for a drop-in range or free standing is 30 inches, older models may be 40 inches wide.

Wiring

A new or remodeled kitchen must meet the National Electric Code. It must be serviced by at least two 20 amp small appliance circuits (110/120 volts). There should be at least one convenience outlet for each work surface, and they should be spaced every 12-36 inches along counters.

An electric range requires a 50 amp circuit, a dishwasher and disposer require one 15 amp circuit. It is desirable to provide separate circuits (110/120 volts) for the microwave oven and for the freezer. If you use several portable cooking appliances at the same time, you may wish to install more than the minimum of two appliance circuits.

You may wish to include an outlet for a phone.

Ventilation: Natural or Mechanical

Kitchens need natural ventilation (windows) or mechanical ventilation (fans) to remove odors and smoke from range-top cooking. If windows are used, HUD recommends a size equal to or greater than 4 percent of the floor area. Mechanical ventilating systems use filters to clean the air before recirculating it back to the room or may exhaust the air to the outside through a duct. The ducted system removes heat and moisture in addition to odors and smoke. It is helpful in controlling the moisture level in homes with a low rate of air exchange, such as in well insulated and weather-stripped homes. A manufacturer's specified maximum duct length for efficient operation is based on the diameter of the duct work and the number of elbows installed.

Hood fans are more efficient than wall or ceiling fans, because they trap the smoke and grease-laden air before it circulates to the rest of the room. Wall or ceiling fans must be located so that the air they exhaust is drawn directly over the top of the range.

Ventilating systems are categorized according to capacity by a cfm rating (cubic feet per minute).

The hood fan capacity is determined by the size of the hood. Industry recommendations are 100 cfm for each lineal foot except that peninsula and island hood fans should be increased to 120 cfm per lineal foot. The corresponding HUD minimums are 40 cfm per foot, increased to 50 cfm in an island or peninsula location and at least a 450-600 cfm rating over an indoor barbecue.

Wall or ceiling fan capacities are determined by the volume of the room and desired number of air changes for kitchens. HUD recommends 15 air changes per hour.

$$CFM = \frac{\text{cu. ft. of room} \times 15 \text{ desired air changes per hour}}{60}$$

Additional ventilation requirements determined by HUD are:

1. Discharge openings to exterior must be protected against rain entry and have automatic backdraft damper or louvers.
2. Kitchen air must be exhausted directly to outdoors, either by vented range hood or a ceiling

or wall fan, if natural ventilation is not provided.

3. Exhaust air opening (grilled) should be located either in the ceiling or wall, not more than 4 feet from the center of the range or in the wall directly above the back of the range.
4. A range hood must be at least as long as the range, at least 17 inches wide and the bottom of the hood rim must not be more than 30 inches above range top.
5. Sound levels on kitchen exhaust and range hood fans rated 500 cfm or less shall not exceed 9.0 sones.

Fire Extinguisher

Locate fire extinguisher in the kitchen on or near the doorway to the nearest exit. According to the Fire Center at the University of Minnesota, a 2½ pound ABC dry chemical extinguisher is sufficient; a 5 pound one would service the garage also.

Lighting

Efficient lighting systems provide the needed light by taking advantage of available daylight or using efficient artificial light sources and fixtures that emit the most light. Take advantage of light colored ceiling and wall surfaces which reflect light and provide a pleasing environment.

Light colored surfaces reflect 80-90 percent of the light, while dark colored surfaces reflect 25-30 percent. Three times more wattage may be needed to adequately light a dark paneled open plan area than a light colored, four-walled room. The ceiling must be light colored to reflect light from hanging ceiling fixtures. The amount of light reflected from counters and floors is a major factor affecting available light in down lighting, i.e., from recessed lighting.

Lighting affects people, space, and the overall mood, as well as the appearance of colors and food. Incandescent, the common light bulb, is warm and flattering to skin tones, wood, and warm colors. If you are planning to use a dimmer switch, incandescent dimmers are less costly. Fluorescent light, a better choice for energy conservation, provides three to four times as much light per watt of electrical energy. Fluorescent tubes are available in a variety of colors; cool white and

warm white are the most common; however, warm white deluxe and cool white deluxe are more flattering to skin tones. Warm white deluxe blends well with incandescent and brings out warm colors. Cool white deluxe makes cool colors more vibrant. Most lighting and hardware stores can order deluxe tubes if they do not have them in stock.

A total lighting plan includes general, task, mood, and accent lighting from either fixtures or built-in lighting. General and task lighting are essential. General lighting contributes to the overall mood. General lighting often comes from centrally located fixtures, but it is not effective in lighting the work surface, as the body frequently shields the light. It is wasteful also to have general lighting at the level needed for specific work or task areas. Task lighting may be part of the accent lighting.

General lighting can be provided with one fixture for each 50 square feet of floor area. The fixture should contain 175-200 watts of incandescent or 60-80 watts of fluorescent light. Task lighting is needed at the mixing area, over the range, and over the sink and could be provided:

Work centers	Location	Amount Needed
Mixing area	Under wall cabinets	One 30 watt fluorescent
Over the range	In hood or under wall cabinets	One 30 watt fluorescent
Over the sink	In ceiling or soffit	Two 40 watt incandescent or one 30 watt fluorescent

Incandescent light sources could be used or see diagrams on next page illustrating some uses of fluorescent light sources for task lighting.

Track lighting can be easily added to existing kitchens. The fixtures can be located on the track and aimed in the direction needed, but may extend down too far for standard ceiling heights. You may wash a wall with light to accent walls or to highlight a wall mural. As a rule of thumb, the distance between the fixtures is equal to the distance between the track and the wall. The use of 75 watt flood light bulbs with a 30" spacing is common. If the ceiling height is higher than 9 feet, the track should be moved further out from the wall. Track lighting can also be used to accent accessories with "spot" light bulbs, which give a more defined beam of light.

Built-in lighting (undercabinet, bracket, or soffit) is effective in kitchens for task lighting because the light is located so the person working is not working in his/her shadow. Built-in lighting needs to be a part of early planning, because it is permanently wired and switched and has some specific requirements. Three types of built-in lighting are illustrated:

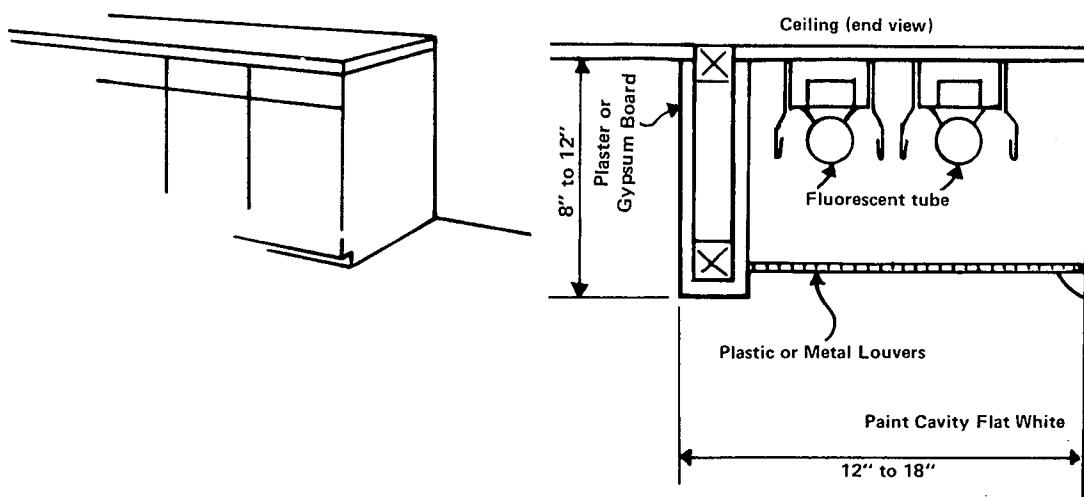
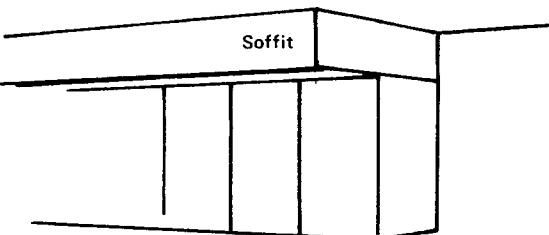
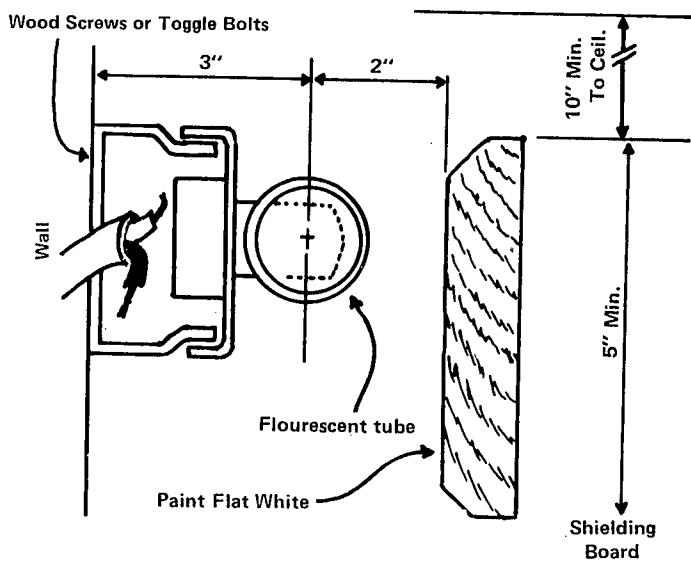
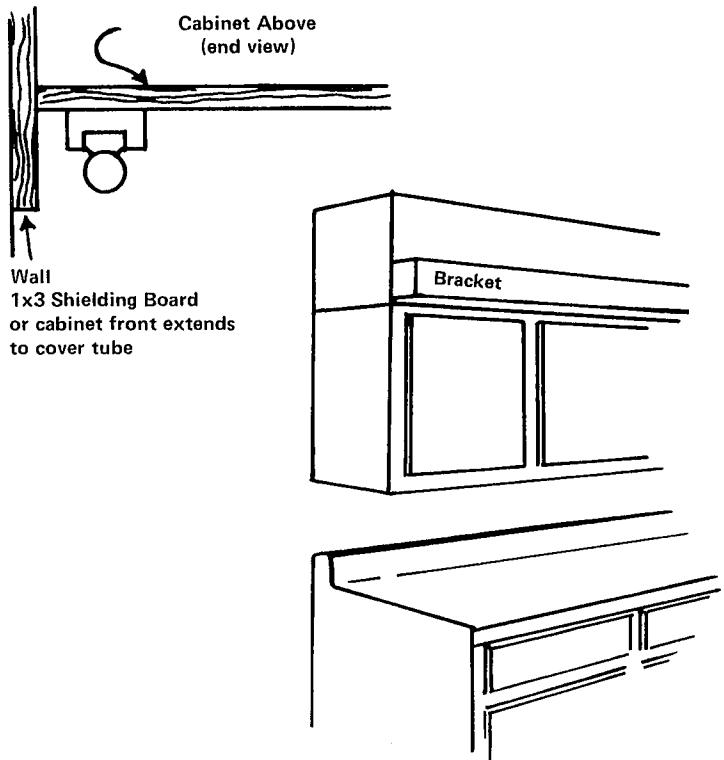
Undercabinet lighting: The fixture is placed under the cabinet at the front (preferably) or directly under the cabinet on the back wall. There are shallow fixtures (only 1"-1½" deep) with diffusers available for under-cabinet lighting (e.g., Alkco, Eclipse). Undercabinet lighting is very efficient since the source is close to the task.

Bracket: A minimum of 10" between the top of the shielding board and the ceiling is recommended. In this location the fixture should be mounted even with the top of the shielding board

Soffit lighting is placed in the underside of a furred out area.

Locate lighting so that when standing or seated in an eating area you are not exposed to the bare tube or light bulb—they cause glare and discomfort.

Caution: If using recessed lighting, the code states that in ceilings with insulation, there must be sufficient space to dissipate heat properly. If there is adequate space, fixtures with enlarged housings which meet the code are available, or a box could be built to keep the insulation away the necessary distance (24" above and 3" around is recommended).



Selection of Furnishings

Cabinets

Cabinets are usually the most expensive item in the kitchen. Normally, kitchen storage is provided with cabinets having door fronts, but some people enjoy the convenience and appearance of some or all open shelves, and/or some hanging storage. For the well-organized and well-kept kitchen, the nuisance of opening and closing doors could be avoided with the benefit of lower cost by using open shelves. Style and design are a personal choice, but should blend with other selections in the kitchen and the entire house.

There is a range in cost and quality in all three types of cabinets. A top line stock cabinet may cost more than a custom or special order cabinet. To judge the quality the consumer must look at how well they fit the kitchen, special features, and construction. United States, Canadian, and European manufactured cabinets are available. Imported cabinets may be in stock, but special orders may take up to six months. Due to shipping costs they tend to be more expensive than

domestic cabinets of similar quality. Imported cabinets are usually contemporary, many are very unique and exciting in design, offer a variety of storage devices, and all are sold in metric measurements (10 cm modules).

Some cabinet manufacturers have chosen to be certified by the National Kitchen Cabinet Association which means the cabinets have passed industry minimums related to performance and durability. Some cabinet dealers have chosen to become members of the American Institute of Kitchen Dealers (AIKD). It is a prestigious organization and means quality work for the consumer. Members have reputations for following good business practices and doing quality work.

Considerations in judging the quality of cabinets:
Cabinets:

- The whole box of the cabinet should look and feel sturdy; the drawer is a good indication of the quality of construction used in cabinets.

TYPE OF CABINETS AVAILABLE

Type of Cabinets	Description	Price Range	Fit to Kitchen	Delivery Time	Storage* Devices	Style, Color and Finish
Stock	Mass manufactured, available in std. sizes	Low to middle	If not exact use fillers	Short if not immediate	Limited	Seldom unique, choices range from very limited to a wide choice
Special order (some special order cabinets—makers will also custom build)	Manufactured in standard & non-standard sizes for a specific order	Middle to high	If not exact use fillers and extended stiles**	4 to 8 weeks and up	Great variety including plastic, metal & fiberglass	Wide choice, finishes and color match exactly***
Custom	Made by local cabinetmakers	Low to high	Fits exactly, some use extended stiles**	depends on work load	Variety depends on craftsman	Great variety, complete freedom within limits of talents of cabinetmaker

*e.g. pull out trays, tracks, dividers, utility compartments

**Stiles are the vertical members in cabinets

***Manufactured finishes can have the advantage of precise quality control

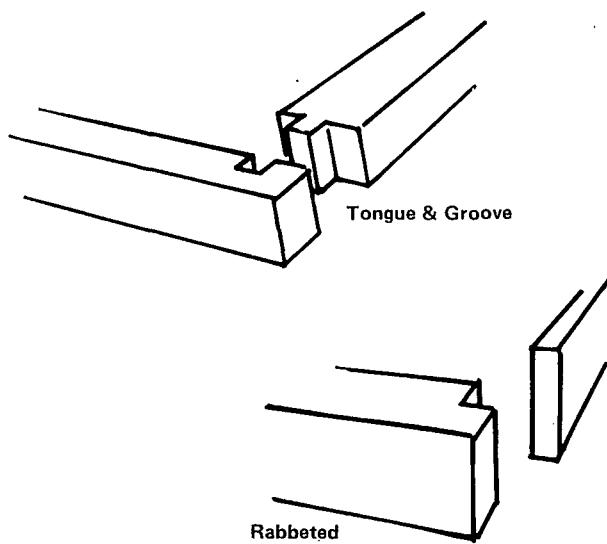
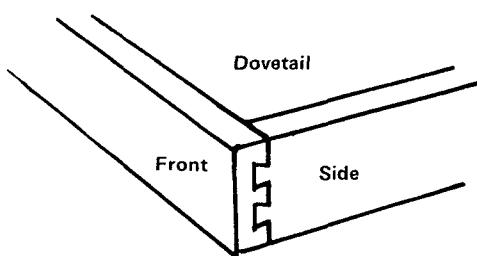
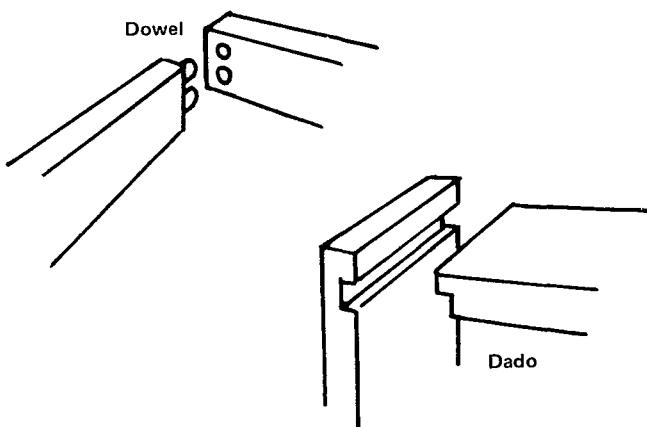
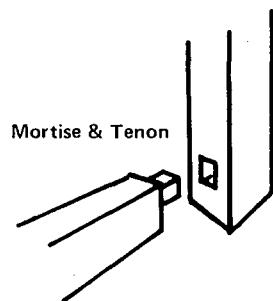
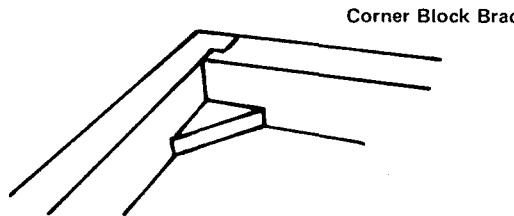
- Corner of wall and base should be braced with corner blocks.
- Where there is stress or a major joint, the stiles and rails (the vertical and horizontal framing) should be joined with mortise and tenon or dowel joints.
- Tops and bottoms should be dadoed into the sides.
- Hinges should be strong, swing freely and be silent in operation.
- Hardware should be conveniently located and be comfortable to the hand.
- In addition to quality if under cabinet lighting is being considered select wall cabinets with an apron large enough to cover the light (See figure page 16.)

Drawers:

- They should be removable, but with an automatic stop and of sturdy construction.
- The easiest sliding drawers have double metal tracking with nylon and ball bearing rollers or wood with plastic rollers. Over time drawers that slide directly on wood will not slide as well.
- The sturdiest drawers have dovetail joints in all four corners and have $\frac{1}{2}$ inch thick wood for the sides and backs with wood or plywood bottoms (fiberboard is less sturdy).
- Tongue and groove joints are sturdy, butt and rabbeted joints are the least sturdy.
- Plastic is easy to clean and can have molded plastic compartments which are useful. However, light weight plastic can break if heavy objects are dropped in them.

Shelving:

- Better quality wood cabinets have solid wood shelves. Cabinets wider than three feet should have a shelf support in the center.
- Wall cabinet shelves should be removable and adjustable, attached with clips or grooves.



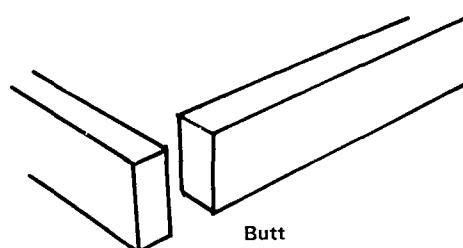
- In base cabinets, sliding shelves are more useable and convenient than stationary shelves and may be vertically adjustable.
- If there will be a corner in the kitchen cabinetry, lazy susans or pull-out shelves make that space more easily accessible.

Finish:

- In wood there is a great range in the quality of the finish; many times you are paying for a better, more durable finish.
- Some stock cabinets are available unfinished which can save on cost.
- Cabinets finished on site are subject to dust, etc., in the air. Prefinished cabinets often have a baked on finish.
- Look for wood that is sanded smooth, with a richness and depth of tone.

Materials:

Material	Durability	Cleanability	Do-it-yourself Repair
Wood	Very good to excellent Scratches can be touched up Can be refinished	Very good	Easy
High pressure plastic laminates	Excellent Could scratch and chip but not easily	Excellent	Difficult
Rigid vinyls and low pressure plastics laminated to particle board	Good, will scratch and chip off	Good	Difficult
Steel	Excellent, if finish is damaged could rust if not touched up	Excellent	Moderate



Wood

Wood is the most popular material for cabinets. It is available in softwood and hardwood; softwood scratches more easily. Solid wood is not used for certain purposes since large wood pieces may warp. Plywood and particle board may be used also.

High pressure plastic laminates (e.g. Formica, Nevamar)

The $\frac{1}{32}$ inch thick plastic laminate on a rigid material is highly suitable for kitchen cabinets. Plastic laminate cabinet doors need a backing sheet to prevent warping.

Other plastics

Polystyrene, a heavy, durable plastic is sometimes used to imitate wood. Rigid vinyls in sheet or roll, and low pressure plastic laminates are sometimes laminated to a substrate or corestock, i.e., particle board, but are not as durable as the high pressure plastic laminates.

Steel

Steel cabinets are durable, washable, and retain no odor. Textured steel gives a warmer look and finger prints are less of a problem. It is also available with laminated or wood fronts. Better quality steel cabinets are higher in cost and are quieter when opening and closing doors and drawers.

Installation

Cabinet installation requires skill. Cabinets must be installed level, plumb, and true, or doors will hang crooked and not operate properly. Corners must be square. It may be necessary to sand or add shims between cabinet walls and floors. Check warranties carefully because do-it-yourself installations may void warranty.

The space above the wall cabinets may be used for storage or closed with a soffit. Closed storage is available in custom cabinets and some special order cabinets; open storage for serving pieces or accessories can be very decorative.

It is possible to extend the soffit to accommodate soffit lighting.

Remodeling

Check with a custom cabinet maker if you need to add or replace some of the cabinets and the original model is no longer available. Sometimes old cabinets must be refinished to match new finishes. The process is expensive if not done by the owner. If the base cabinet storage is in poor condition, i.e., the drawers do not slide well, replace those and save the wall cabinets. If cabinets are in good condition, it is possible to improve the storage within existing cabinets.

Refinishing Wood Cabinets

If the wood is in good condition, one may either sand and paint using a semi-gloss or gloss finish, or remove old finish, stain, and seal. If the doors are in poor condition, new, standard size, wood door and drawer fronts are available.

condition, new, standard size, wood door and drawer fronts are available.

Cabinet refacing with plastic laminates

Plastic laminate door and drawer fronts can be used over old wood or plastic laminate fronts.

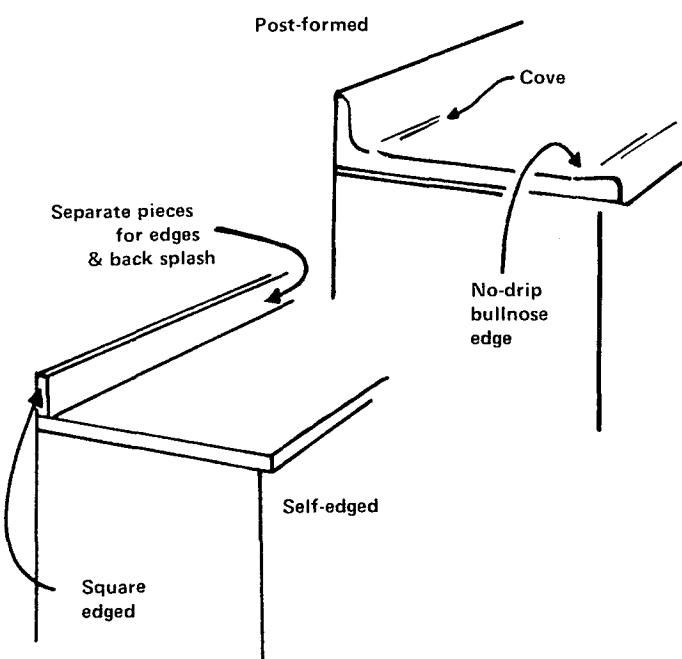
Countertops

Countertops must be easily cleaned and able to withstand punishment, i.e., heat, staining, moisture, scratching, and cutting. To achieve a standard height of 36", the countertop, including the subsurface, should be 1½ inches thick. Remember, the lighter colors reflect more light which is important for a work surface. Dark colors show food spills more readily. Think about how food will look next to the color you select. Glossy, shiny surfaces may be easier to clean, but a matte finish reduces glare. Textured rough surfaces or grooves and seams are harder to clean. Commonly used materials for countertops are plastic laminates, butcher block, ceramic tile, cast acrylic (Corian®), stainless steel, ceramic glass, (Pyroceram®). Ceramic tile and cast acrylic are extremely heavy and must have sturdy cabinets to support them. See Chart III for additional information on these materials.

Plastic Laminates (e.g., Consoweld, Formica, Nevamar, Textolite, Wilsonart)

High pressure melamine laminates are the most popular countertops. The surface may be glossy, matte, or textured. For horizontal surfaces, laminates should be $\frac{1}{8}$ inch thick ($\frac{1}{32}$ inch thick is suitable for vertical surfaces). The laminate is adhered to a material, i.e., particleboard or plywood, to give it rigidity.

The plastic laminate may be post-formed or self-edged. There may be a dark line showing laminate thickness where edges are joined on the self-edged.



Butcher Block

Get a good grade of laminated maple, 1½ inch thick and well sealed on all sides. Caution: standing water will cause the wood to discolor. Treat with mineral oil (non-toxic and will not turn rancid) after it is installed; repeat periodically.

Ceramic Tile

This is a hard surface, but if heavy objects are dropped the tile could break. Damaged tile can be replaced. Choose tiles with a glazed finish and use an epoxy grout to resist stains and moisture. For other grouts use a silicone sealer. Some tiles are available with no-drip, edge trim. In remodeling, tiles can be installed directly over a plastic laminate.

Cast acrylic (e.g. Corian®): is available in ½ inch and ¾ inch thicknesses. It can have a single or double molded integral sink, but is costly. This material can be worked like wood, routed, sanded, etc.

Combinations

The above and other materials may be chosen as sections or inserts of a counter; however, this would add seams which are more difficult to clean.

Brushed stainless steel, cast acrylic, or ceramic glass near the range or oven are useful for hot pots and pans. Butcher block, cast acrylic, and ceramic glass inserts can double as pastry boards. For appearance reasons, you may choose to edge a counter with some other material. Use inserts or sections as an alternative to replacing entire countertops.

Floorings

Many types of floor coverings can be used in kitchens. Besides the obvious concerns of cleanability and durability, think about, how easy will it be on feet and legs? How much noise can it absorb? The more resilient materials absorb more noise than hard materials. It is easier to wipe up spills on smoother surfaces. Medium value (the lightness or darkness of a color) and pattern do a better job of hiding soil (see Chart IV).

Resilient Flooring

Vinyls are very satisfactory in high traffic areas. One measure of quality is thickness (1/16-1/4") with the thicker gauged vinyls more durable.

Vinyl Asbestos Tile

The better qualities have color and patterns extending through the tile.

Vinyl Tile and Sheeting

There are two processes for creating the color and pattern on vinyl: (1) Rotogravure, the colors, and patterns are reproduced on the surface with a process much like printing, then protected with a vinyl coating(s). (2) Inlaid vinyl, the color and pattern extend through the tile or sheet, thus it wears better.

Not all vinyls have a no-wax finish. Buyers should be aware that the no-wax finish on vinyl sheets is not permanent. To judge the quality ask to see specification sheets or rely on a reputable dealer who has experience to judge the quality. A vinyl dressing is available to restore shine; however, the vinyl dressing won't last as long as the original no-wax shine. Vinyl which is cushioned with foam on the back and the no wax finish add to the cost—and remember, cushioned vinyl can be cut if a sharp object is dropped on it. Embossed patterns are more difficult to clean. Tiles are easier for the do-it-yourself installation, and self-sticking ones are available. Sheet flooring is more difficult to install but easier to maintain since there are fewer seams to catch dirt and moisture.

Hard Tile Flooring (e.g., ceramic, quarry)

Tile is very durable but make sure the tile is meant for floors; all tile can be used on walls but not all tiles on floors. Tiles designed for floors are harder and more durable. Try to be conservative when choosing color or pattern in ceramic or other hard tiles, because they are permanent and difficult to cover later if you decide you do not like them. Buy some extra tiles because colors may not match at a later date. To resist staining and moisture select glazed tiles and use an epoxy grout or use silicone sealer on other grouts. Due to weight, use slate and brick only over extremely sound sub-floors.

Kitchen Carpeting

Carpeting is not as long lasting, but very resilient for ease of standing, warmth, and deadening sound. To hide soil, select soil hiding nylons (e.g., Antron, Anso X), a print or tweed, and cut, short, unsculptured, dense pile. Cut pile also eliminates the problem of snagging. Wall to wall carpeting can be laid with two sided tape or with adhesive, which is more permanent but is more difficult to handle.

Wood and Parquet Flooring

Wood floors in kitchens require protection with polyurethane, a minimum of three coats, wood wax, or dressings. The beauty of wood lasts only as long as the finish that protects the wood. Coating must be repeated after wear. For easy care, some wood floorings have been impregnated with acrylic, and some floorings have a wood veneer with vinyl overlays which make for easier care. Prefinished tiles are available and easier for do-it-yourself installations. Some tiles are cushioned, and some are self-sticking.

Poured Acrylic Flooring (seamless)

This is a hard and relatively permanent material. It is waterproof and requires neither waxing nor buffing. It needs a minimum of three top or surface coats (preferably more). High wear may mean adding surface coats to restore shine in 5 to 7 years. Make sure it is guaranteed. It may be difficult to find an installer if you are not in an urban area.

Sub-flooring

Most floor materials can go over plywood or concrete.

In most cases, poured flooring, carpeting laid without adhesives, and some vinyls are the only floorings that can go directly over particle board. For other floorings, $\frac{1}{8}$ "- $\frac{3}{8}$ " plywood should be glued and nailed over the particle board before applying the new material. Flooring can go over existing flooring if it is smooth and level; wax must be removed if an adhesive is used. If the kitchen is on or below grade, use flooring that is suitable for that application.

Walls

Wall coverings in the kitchen should be scrubbable and smooth for easy cleaning. Paint is usually lowest in cost and easiest to install. Cast acrylic (Corian®) is high in cost and more difficult to install. If walls are in poor condition, but are not going to be replaced, they can be covered by using a heavy weight vinyl. If walls are in very poor condition, cover with a rigid material, such as paneling.

Paint

Use gloss or semi-gloss; gloss reveals more imperfections. There are two basic types of paint: latex (water-based) and alkyd (oil based). Latex is easiest to apply and to clean up. Oil base is more difficult to apply and smell may linger, but it will withstand more scrubbing than latex; however, it may become duller with repeated scrubbing. Before repainting wash walls with a solution of trisodium phosphate (T.S.P.) or all purpose cleaner to remove grease and oil.

Wall Coverings (wallpaper)

Use vinyls or a wall covering with a vinyl coating. A strippable covering is easier to take down in the future. Some wall coverings are prepasted. Foils are also suitable for kitchens since they are waterproof, but they will water spot when there is a large reflective area. They are much harder to hang since creases become permanent, and foils reveal every flaw on a wall. In all wall coverings there are differences in colors on each run, so order enough rolls to complete the job.

Wood

Wood planks and other types of wood used on floors can be used on walls. Planks used vertically, horizontally, or at an angle are warm and interesting. Paneling is available in a wide choice of colors and textures, usually in 4' x 8' sheets. Wood veneers on paneling are the most expensive. Low cost paneling is usually printed grain on a hardboard base; it chips easily in installation. All wood requires some upkeep, rough or grained surfaces collect dirt and can be difficult to clean.

Laminates

If countertops are a plastic laminate, you may want a laminate between the wall cabinets and the backsplash. Laminates are available in a thinner $\frac{1}{32}$ inch gauge for vertical surfaces. They do not come longer than 12 feet.

Cast Acrylic (Corian®)

This is available in 1/4 inch thickness for walls, 30 inches wide and up to 98 inch lengths. It may require

special bracing and glueing. It will chip and break if not supported during installation.

Ceramic Tile

For easy installation, look for tiles on pre-patterned sheets. Colors won't match at a later date if more tiles are needed; buy extra tiles. Some may break during installation, and you may need to replace some during the life of the tile. To resist staining and moisture, select glazed tiles and use an epoxy grout, or use a silicone sealer on other grouts.

Ceilings

Ceilings are usually white or a very pale color since light values reflect light well and add spaciousness. Many of the same materials used on walls can be used on ceilings. Paint and wallpaper are the most common. There are many textured paints and some can be sprayed on plasterboard; however, textured ceilings are difficult to clean. When remodeling the kitchen in an older house with high ceilings, it may be desirable to lower the ceiling to change the room proportions, or to reduce the area to be heated. Acoustical tiles are another alternative for the ceiling. All ceiling tile is not acoustical, so if sound absorbing qualities are desired check for tiles that absorb about 50-75 percent of the sound waves that strike them. Acoustical tiles may be glued or stapled to the ceiling or suspended on a metal grid. They are a good choice for cutting the noise level and covering imperfections.

Window Treatments

Select window treatments that will maximize the use of natural light, allow ventilation, permit a view, and minimize heat transfer. Good natural light can eliminate the need for lighting during the day. Choose window treatments that control light if the kitchen has an east or west exposure. The treatment shouldn't interfere with opening the window, but some type of covering is needed to reduce heat loss. The view may be desirable for enjoyment, to watch children, or may need to be blocked for privacy or an undesirable view. It is important to select a window treatment that is washable, especially if the window is near the range. Near ranges, select a window treatment that cannot blow near the flame and become a fire hazard. The use of plants or no window treatment can be interesting but does not control light, ventilation, or view and has the added problem of not controlling heat transfer.

When the kitchen is part of another area of the house, it may be desirable to choose the same window treatment for both areas. The window treatment affects the overall character of the room by its color, texture, pattern, and whether the lines are dominantly vertical or horizontal. The window treatment can open horizontally or vertically. Treatments might be a shade, such as roller, bamboo and woven woods, Roman shades, Austrian shades, blinds, shutters, curtains or draperies. Some of these will be much easier to clean. Consider the window hardware and placement because it may interfere with window treatment.

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Books and Manuals

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Galvin, Patrick J. *Kitchen Planning Guide for Builders, Designers, and Architects*. Farmington, Michigan: Structures Publishing Co., 1978. Covers planning, materials and installation.

General Electric. *The Light Book*. Cleveland, Ohio: Nela Park, #146-1220.

Small Homes Council-Builder Research Council. *Kitchen Planning Standards*. Urbana-Champaign, Illinois: University of Illinois.

Kitchen Industry Technical Manual SCH-BRC, 1972-75. University of Illinois, Urbana-Champaign, Ill.

- (1) Design Principle and Practice
- (2) Drawing Technique and Standard
- (3) Mechanical System
- (4) Building Materials and Construction Estimates
- (5) Kitchen Planning Principles, Equipment and Appliance

National Handicap Housing Institute, 12 South 6th Street, Suite 1216, Mpls, MN. 55402, has the following materials available for use with special needs:

Product Inventory of Hardware, Equipment, and Appliances for Barrier-Free Design

Survey of Handicapped Individual Housing Preferences

Adaptation and Techniques for the Disabled Home-maker, Sister Kenny Institute Rehabilitation Publication Number 710.

Wise, Herbert H. *Attention to Detail*. Quick Fox, 33 West 60th Street, New York 10023.

Materials available from University of Minnesota Extension Service, contact your County Extension Office or the Bulletin Room, 3 Coffey Hall, St. Paul, MN 55108

Single copies of up to 10 different publications each year are free for Minnesota residents unless the item is marked "for sale only." Non-Minnesota residents must purchase publications ordered.

Consumer Appliances: Energy Labeling and Consumption, Extension Folder 513 (15¢).

Selecting a Microwave Appliance, Extension Folder 353 (10¢).

Selecting a Refrigerator, Fact Sheet HE 5 (5¢).

Selecting a Dishwasher, Fact Sheet HE 15 (5¢).

Selecting and Using a Food Freezer, Fact Sheet HE 28 (5¢).

Selecting a Range, Fact Sheet HE 30 (5¢).

Living with Wood, Extension Bulletin 347 (30¢).

Paints and Painting Interiors, Extension Folder 407 (15¢).

Understanding Heat Loss and Energy Conservation Codes, Extension Folder 389 (20¢).

Owner-Built Housing, Extension Bulletin 429 (60¢).

Remodeling Older Minnesota Homes, Extension Bulletin 417 (30¢).

Evaluating Structural and Exterior Component in Older Minnesota Homes, Extension Bulletin 411 (30¢).

Evaluating Wiring in Older Minnesota Homes, Extension Folder 300 (15¢).

Evaluating Plumbing Systems in Older Minnesota Homes, Extension Folder 343 (15¢).

Heating the Home with Wood, Extension Bulletin 436 (60¢).

Home and Yard Improvement Handbook, Midwest Planning Service-21, Covers planning and installation of kitchen storage (\$3.12).

CHART I Recommended Amounts of Kitchen Storage and Work Space in Inches of Counter Frontage

Kitchen Industry Recommendations		HUD Minimum Standards		
		2 Bedroom	3 Bedroom	4 Bedroom
Sink Center	Counter surface on one side	24 - 36	Counter surface and base cabinet on each side	20 24 30
	Counter surface on the other side	18 - 30	Space allowed for the sink itself	24 32 32
Range Center*	Counter surface on one side	15 - 24	Counter surface and base cabinet on one side	21 24 30
	Minimum on either side for safety	12 - 12	Space allowed for the range itself	24 30 30
Refrigerator Center	Counter surface at latch side	15 - 18	Counter surface at latch side	15 15 18
			Space allowed for the refrigerator itself	36 36 36 or 33" if door opens within own width
Mixing Center	Counter surface	36 - 42	Base and wall cabinet	36 36 42
Total counter surface frontage		72 - 109	When work centers are combined, the counter should be equal to the longer of the counter tops being combined.	
Total Base cabinets		72 - 120	Kitchen storage shelf area**	38 sq. ft.-44 sq. ft.-50 sq. ft.
Wall cabinets		72 - 120	Kitchen storage in drawer area**	8 sq. ft.-10 sq. ft.-12 sq. ft.
	Each inch of frontage in a full height-storage wall at least 20" is equal to 2" of base cabinet, if at least 12" deep it is equal to 2" of wall cabinet.			

*A microwave oven requires counter surface at the latch side of the oven if it is side-hinged. The surface should be large enough to accommodate the utensil plus the cover and be adjacent to the oven or below the oven when the oven is located above counter height. An oven above counter can be built into a wall cabinet, an oven cabinet, or built into an interior wall.

**At least one third of the required shelf area shall be located in base or wall cabinets. At least 60 percent of the required area shall be enclosed by cabinet door. Dishwasher may be counted as 4 sq. ft. of base cabinet storage. Wall cabinets over refrigerator shall not be counted as required shelf area. Shelf area above 74" from the floor shall not be counted as required area. Inside corner cabinet shall be counted as 50 percent of the shelf area, except when revolving shelves are used the actual shelf area may be counted. Drawer area in excess of the required area may be counted as shelf area if drawers are at least 6" in depth.

CHART II Utility and Space Needs of Kitchen Equipment

Equipment	Common Space Requirements <i>In Inches</i>			Electrical Need	Water, Gas, Ductwork and Chimney Needs
	Width	Depth	Height		
Sink single bowl double bowl triple bowl	21-25 33-36 40-48			Sink cabinet must be larger than the sink bowl. Thus a 33" sink requires a 36" cabinet.	Connect to hot and cold water supply. If water is softened in the house, the cold tap in the kitchen is often left unsoftened. Must be connected to a main drain line and to a vent stack.*
Dishwasher (Built-in)	18, 24**	24	34½	One 15 amp circuit (110/120 volts) for the dishwasher and disposer. Dishwasher must be wired direct.	Connect to ½" hot water supply line and to the drain line.
Disposer				Disposer must be wired to an on-off control; this switch should be at least 6 linear feet from the disposer opening.	Requires a cold water supply and be directly connected to a sink base drain opening and drain line.
Trash Compactor	12, 15*, 18	18-24	34½ (without top)	Wire direct or plug into 110/120 volt circuit.	
Refrigerator	24, 30-36*, 48	24-48	54-69	Access to 110/120 volt circuit.	Ice maker feature requires a water line connection.
Freezer (upright) " (chest)	33-36 48-72	28-36 32	54-66, 73, 84 62 (lid open)	One separate 15 amp circuit (110/120). This appliance should not be plugged into a circuit which could be overloaded and cause a fuse to blow or a circuit breaker to trip.	
Range Style					
Freestanding	18, 20, 27, 30*, 36, 40	25, 27	35-36 (cook surface) 70-74 (top of eye level oven)		
Slide-in	30*, 36, 40	24 16-22	35-36 Slide-in 27-29 Drop-in		
Built-in ovens	24, 27, 30	24	30 Single (cut out is less) 50-52 Double (cut out is less)		
Built-in surface units or burner	19-48	19-22			
Built-in grills and barbecue grills	24-48				Ducted ventilating system required
Fuels					
Electric			220/240 volt circuit		
Gas			110/120 volt circuit to operate lights, timer, oven thermostat, and electric ignitions. 110/120 volt circuit is needed for the microwave oven in two oven gas ranges or combination microwave-gas oven.		Gas supply lines

CHART II Utility and Space Needs of Kitchen Equipment (cont.)

<i>Equipment</i>	<i>Common Space Requirements In Inches</i>			<i>Electrical Need</i>	<i>Water, Gas, Ductwork and Chimney Needs</i>
Wood	Check specifications for model; generally the required clearance space between range sides and cabinet furniture is 24"; clearance space for back flue to back wall is 18"; space is less if combustible surface is protected. Floor protection should extend 12" beyond sides and rear of range and 18" beyond the front.			110/120 volt circuit to operate lights and timer on combination gas. 220/240 volt circuit for combination electric.	Stove pipe Class A chimney
	Combination wood with gas or electricity. 36", 43" plus clearance, 30", 34" plus clearance (including flues). The clearance spaces required are the same as for wood except the side with the electrical units or gas burners may be specified as 2½" to 6".				Stove pipe Class A chimney Gas supply lines for combination gas.
Microwave Oven	24-27	12-24	12-18	(Requires space for venting of warm moist air; check specifications if installing a conventional oven.)	Access to a 110/120 volt circuit; a few combination microwave-conventional ovens require a 220/240 circuit or a gas line.
Ventilation System	30-48 (24" distance between bottom of hood and surface units or burners)			Wire directly to 110/120 volt circuit unless the system is part of range.	Ducted ventilation system will require duct work (usually through cabinets) to a roof or wall. This system removes moisture, odor, and depending upon the season, heated or cooled air.
Wall mounted hood	2-6 wider than range top, hood 9" deep				
Hood over peninsula or island	3-6 larger than range top, hood 18-20 deep				

*Most common

**Maximum allowable distance from sink drain for various size of pipe is given below:

Drain line size	Maximum distance trap to vent
1¼ inches	2½ feet
1½ "	3½ "
2 "	5 "
3 "	6 "
4 "	10 "

Source: *Kitchen Industry Technical Manual Mechanical Systems*

Brotherson, A.I.A., SHC-BRC, University of Illinois at Urbana-Champaign, 1972.

Chart III Countertops

Material	Cost Range	Design	Resistance				Scratches and Cuts	Cleanability	Sound	Do-it-yourself Installation	Corners
			Durability	Heat	Stains	Moisture					
Plastics: High pressure melamine laminate 26", 33", 48", and 60" wide up to 144" long	Low to middle	Many colors, patterns and textures	Very good but if damaged must be replaced	Hot pans scorch	Good	Good	Will cut with knives	Good Rough textures present a problem	Quiet	*Power tool skills for cutting. Buy stock slabs that are prelaminated	Mitred. Recommend to have cut professionally for post formed tops
Cast Acrylic (Corian®) 25" & 30" wide-up to 145" long	High	Elegant, limited color range	Excellent	Good	Good	Good	Good	Excellent		**Chips & breaks. Usually professionally installed due to cost of material.	Butted
Butcher Block	Middle	Adds warmth	Shows wear. Can be sanded & resealed. If not sealed moisture can cause warping & discoloration	Will scratch	Shows stains if sealed	Good	Shows wear. Develops patina. Can be refinished easily	Needs periodic resealing	Quiet	*Chips more easily than plastic laminants	Butted
Ceramic Tile Wide range in size	Middle to high	Widest choice of color & patterns	Excellent	Good	Good	Good	Good	Use epoxy grout or a silicone sealer on grout. Needs periodic scrubbing of grout indentations. Can tolerate strong solutions	Noisy	*	Directional patterns are difficult in corners
Brushed Steel	High	Commercial look	Excellent	Good	Good	Good	Brushed surface helps camouflage	Good		**	
Ceramic Glass (Pyroceran®)	High	Suitable as an insert	Excellent	Good	Good	Good	Good	Good		*	

*Requires skill

**More difficult.

Chart IV Flooring

Material	Price Range	Sizes Available	Design	Durability	Maintenance	Ease on feet and Deadening Sound	Installation
Vinyl Asbestos Tile	Low to middle	12" square	Wide range of patterns, printed or embossed	Very good. Resists grease, and moisture. Can be dented by furniture	Easy, very good —sweep, damp mop and wax	Relatively soft, but harder than vinyls	*
Vinyl Tile and Sheets	Middle	12" square 6', 9', 12' and 15' widths	Great variety of patterns and colors	Very good. Resists grease, moisture, and denting even easier	Similar to Vinyl asbestos but no-wax vinyls are	Relatively soft cushioned vinyls are excellent	Tile* Sheet** Large Piece and requires precise cutting for jogs
Ceramic Tile	Middle to high. Product low but installation brings up cost	½" to 12" squares, rectangles, hexagons, etc.	Great variety of patterns and colors	Excellent but depends on the body and hardness of glaze	Easy-dust and wash. Occasionally scrub grout indentation Unless epoxy grout is used, seal periodically with a silicone sealer.	Poor	*Tile mounted on mesh back or paper sheet. **Determining layout for patterns and spacing between tile requires skill
Quarry Tile, Slate & Brick	Middle to high	Variable	Limited range, more natural colors	Excellent	Easy, dust and wash. Occasionally must scrub grout indentations	Poor	**Determining layout and spacing requires skill
Carpeting (Nylon is most commonly used)	Low to Middle	12' widths	Soft and warm. Wide range of color and pattern	Good	Good. Clean spills and stains immediately. Spills that are not cleaned up could draw bugs. A large amount of frying means grease build-up which collects dirt.	Excellent	*
Wood	Middle to high	6", 9" and 12" squares. Pieces 3x6", 3x9", and planks.	Natural beauty. Visually warm	Excellent if properly sealed. Can be sanded and refinished if showing wear. Cannot take standing water	Good. Clean spills and stains immediately. Must be sealed, waxed and polished. if Acrylic impregnated and wood with vinyl overlay—needs minimum care	Good	*Prefinished tiles **Planks and other on site installations
Acrylic (Poured floor)	Low		Wide range of colors. Limited patterns	Excellent	Easy	Fair	*Take time for layer to dry

*Requires skill

**More difficult.

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The authors are grateful to those who reviewed this publication and for the special contributions made by Pauline Nickel, Bo Nic Interiors, Windom, MN., and Judith Bell, Mutschler Kitchens of Minneapolis, MN.

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Norman A. Brown, Director of Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55108. The University of Minnesota, including the Agricultural Extension Service, is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, creed, color, sex, national origin, or handicap. The information given in this publication is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Minnesota Agricultural Extension Service is implied.

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