

Kitchen Planning

New and Remodeled

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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

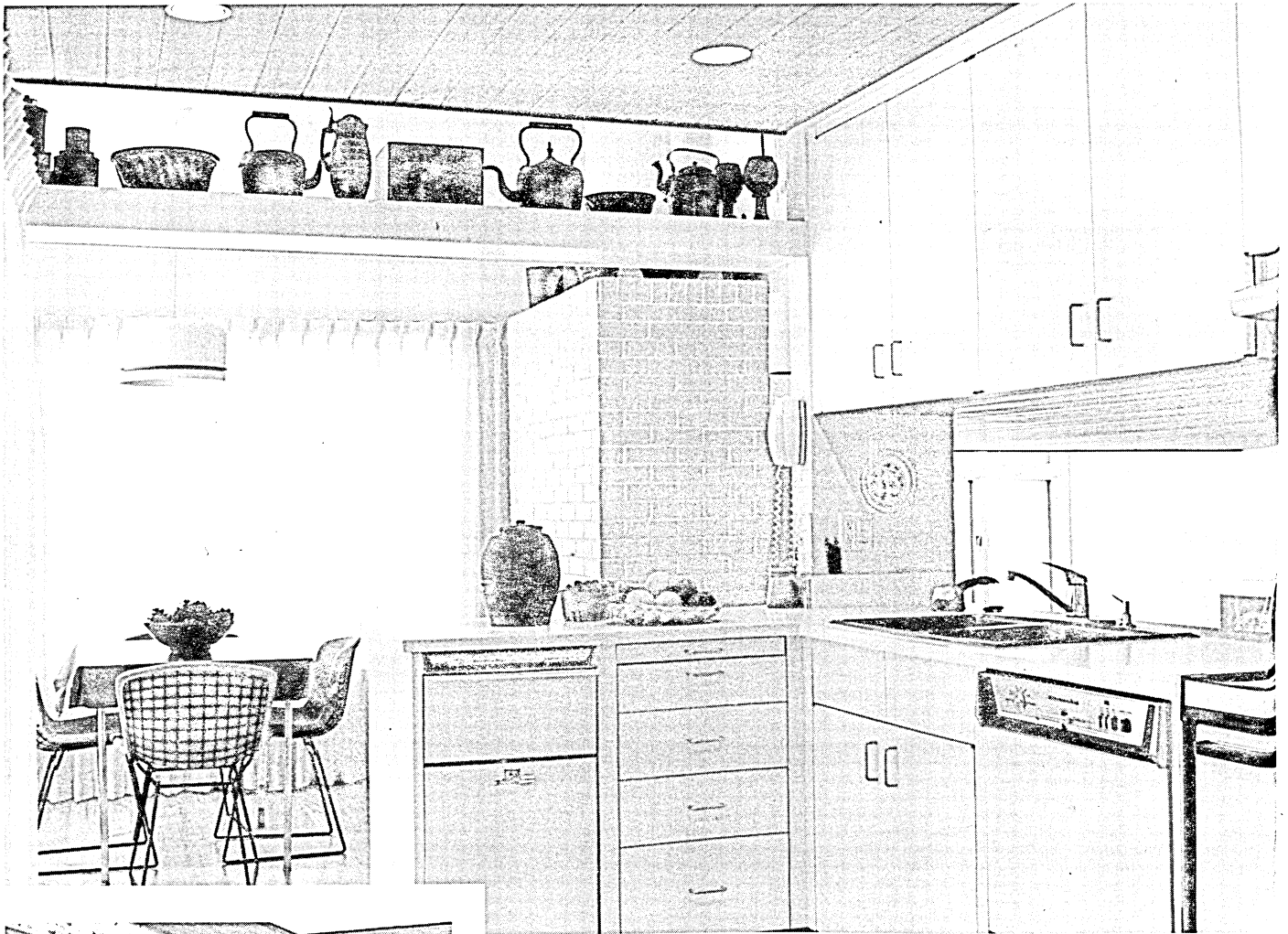
Today's kitchen is often part of a family-living area. The location and many other decisions depend upon family needs, lifestyle, and the physical limitations of the house.

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 as a family. Hobbies or special inter-

ests 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.

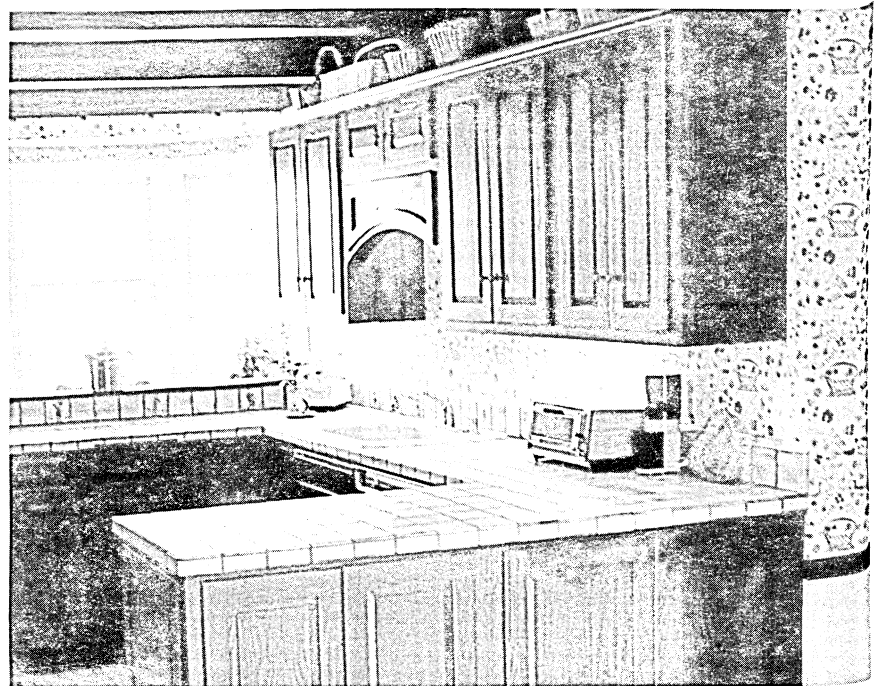
Kitchens will be completed with fewer problems and less delay if you follow the general order of work listed above. Many kitchen professionals are helpful in the early planning stages, including identification of family needs.



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.



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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 load-bearing wall, and it does not contain plumbing, gas lines, wiring, or ductwork for heating. In conventional rafter and joist construction, interior walls are normally located to serve as load bearing for ceiling joists as well as roof dividers; walls located parallel to the direction of the joists are commonly non-load bearing.

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.

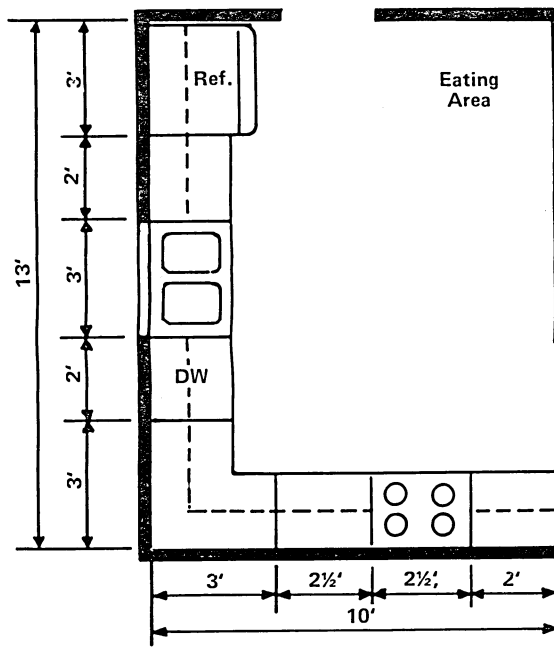
If your remodeling includes rearranging or adding cabinets and appliances, you will probably need to make changes in wiring, lighting, and plumbing. Moving the sink to a more convenient location is a major consideration; sinks need to be located near the vent stack and a drain pipe. Adding a dishwasher may require changes in both the plumbing and electric systems.

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 use 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. (1981 costs)



	Post-Formed Plastic Laminate	Self-Edged Plastic Laminate	Acrylic Corian®
Countertops (Installation)	\$125.00-\$180.00 \$95.00	\$125.00-\$180.00 \$315.00	\$550.00* \$675.00
*Does not include a molded sink			
	Vinyl Asbestos Tile	Vinyl Sheeting	Carpet
Flooring (Installation)	\$120.00-\$150.00 \$135.00	\$120.00-\$390.00 \$135.00	\$120.00-\$330.00 \$100.00
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.		
The plumbing and electrical systems would have to be brought up to code if it is a lending program requirement. Changes in plumbing, or if 30 amp service is updated, will require the system to be brought up to code.			
		Materials	Labor
Sheetrocking, Taping Walls and Ceilings (3-4 hours/two people sheetrocking, 3 days/one person taping and wall preparation)		\$190.00	\$350.00
	Low	Middle	High
Cabinets	\$1000.00-\$1700.00	\$2600.00-\$3800.00	\$4300.00-\$6400.00
Installation of cabinets ranges from \$250.00-\$1,600.00			
Appliances:			
Range (30" freestanding)	250.00- 450.00	500.00- 700.00	800.00- 1600.00
Refrigerator (19 cubic feet)	450.00- 600.00	650.00- 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	125.00- 175.00	200.00- 250.00

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.

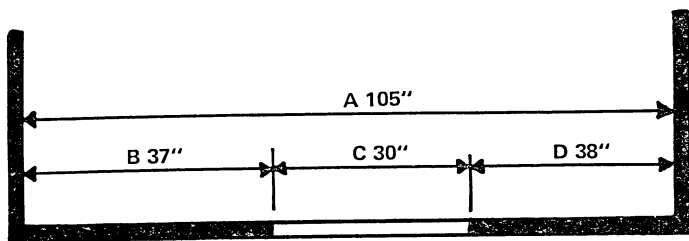
In addition the location of the kitchen depends upon:

- 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).

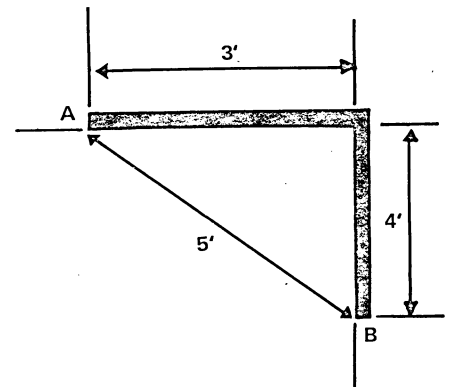
Measure the kitchen space and make a scale drawing of the room. Blueprints will give room dimensions, but more exact measurements, taken after the interior walls are in place, are needed for a good cabinet fit. Many kitchen professionals will also take these measurements.

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).

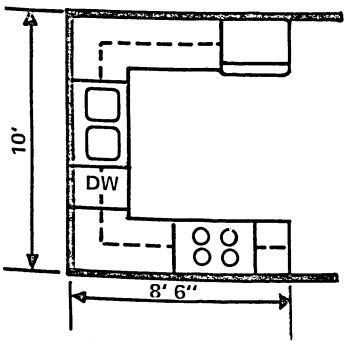


4. In addition, two other measurements should be taken:
 - the distance from the top of the window trim to the ceiling and from the bottom of the window trim to the floor, and
 - the *dimension* of the soffit, if there is one, and the distance from the soffit to the floor (measure at several locations).
5. Make a scale drawing of the room, 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, and 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.

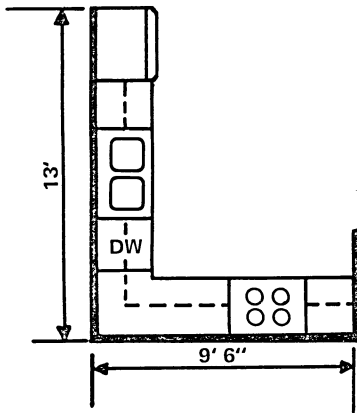
Test Possible Kitchen Shapes

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 cabinet

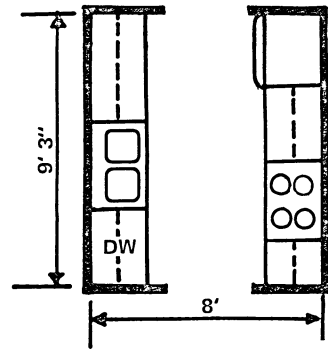
and refrigerator, range and dishwasher arranged in the "L", "U", corridor, and island shapes.



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

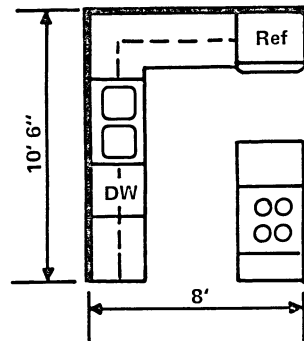
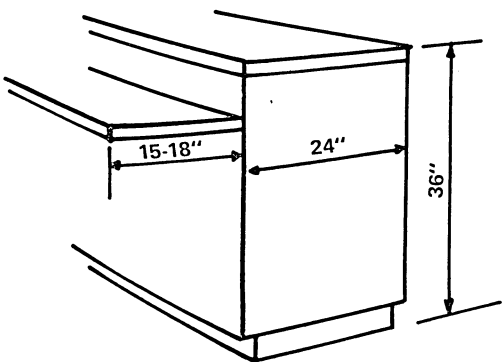


"L" Shape
Easy arrangement if more than one person uses the kitchen, one corner installation has potential difficult access for storage.



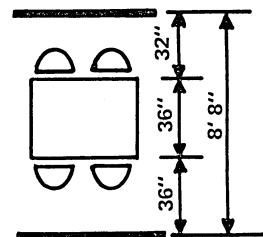
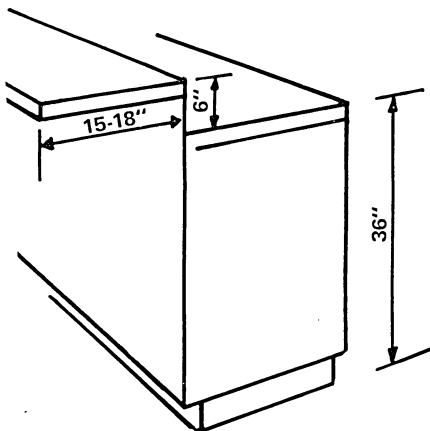
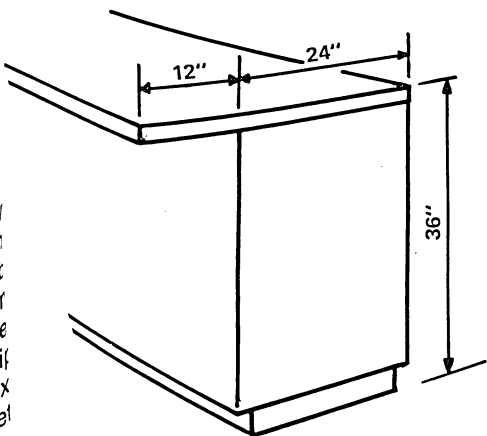
Corridor Shape
Can be used in a minimum amount of space; better if the corridor is not a traffic thoroughfare.

Eating Counters are handy, but usually they do not allow diners to face each other.



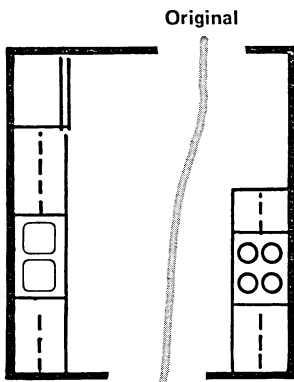
Island or Broken "U" Shape

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

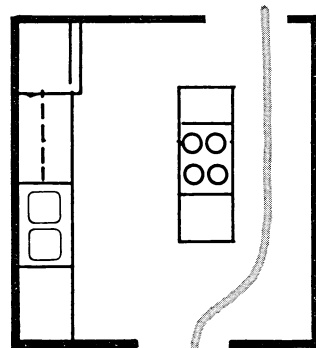


Space for Table and Chairs

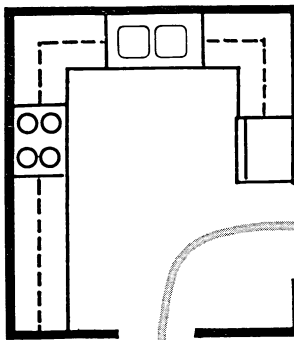
32" needed to rise from the table
36" needed to ease past a seated person



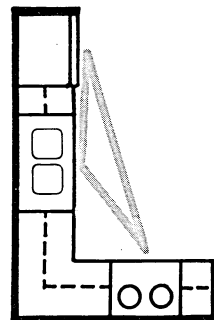
Traffic Problem



Rearrange



Change Door



Work Triangle

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 of 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 dish washers, 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 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 wall 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.

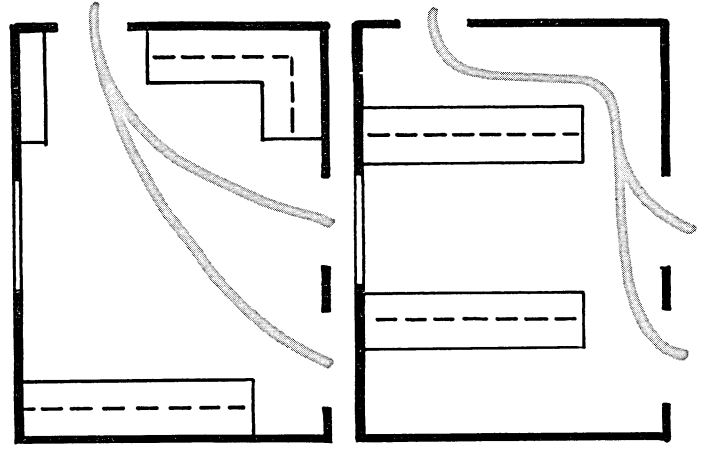
- If the room is large enough, plan the kitchen workspace within a portion of the area.
- If the windows are spaced appropriately, plan a corridor kitchen.
- If wall cabinet storage is minimum, add a full storage cabinet or pantry unit elsewhere in the kitchen.

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.

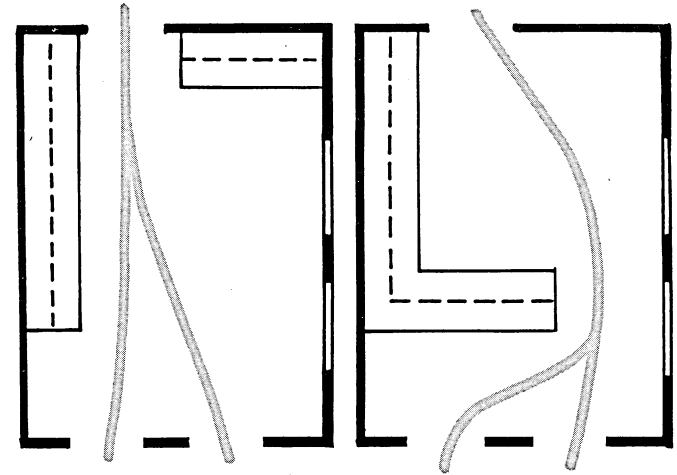
Many small appliances need storage space but only require counter space for short time periods. A portable oven, for example, requires counter space for longer periods of time than a toaster.

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



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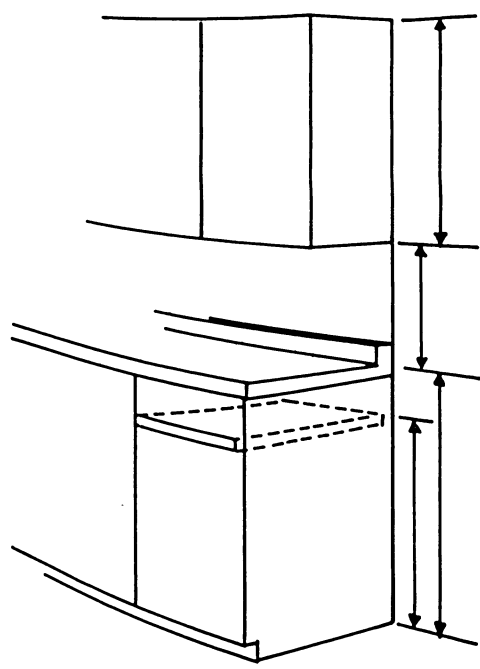
AFTER



BEFORE

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Problem Kitchens



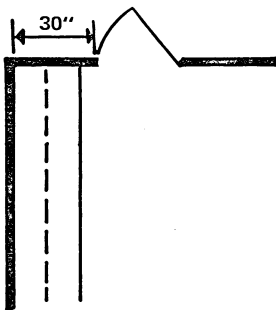
Cabinet Dimensions

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).

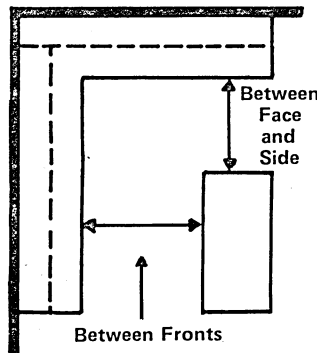
Sit down work surface 30"
 Base cabinets;
 Depth—24"
 Widths—9-60"
 (Available in 3" modules)

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.

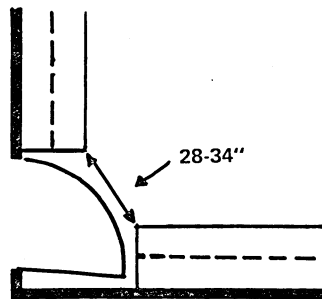
Kitchen professionals should make sure that your plan meets the following space requirements:



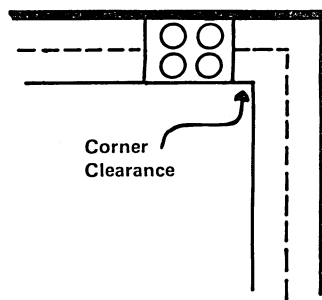
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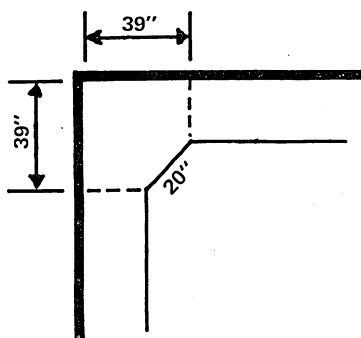
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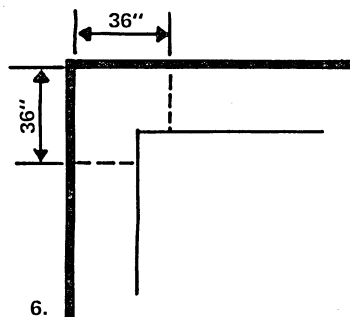
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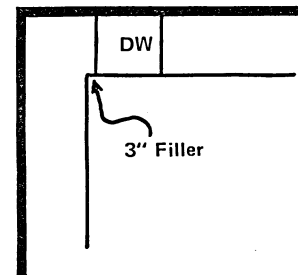
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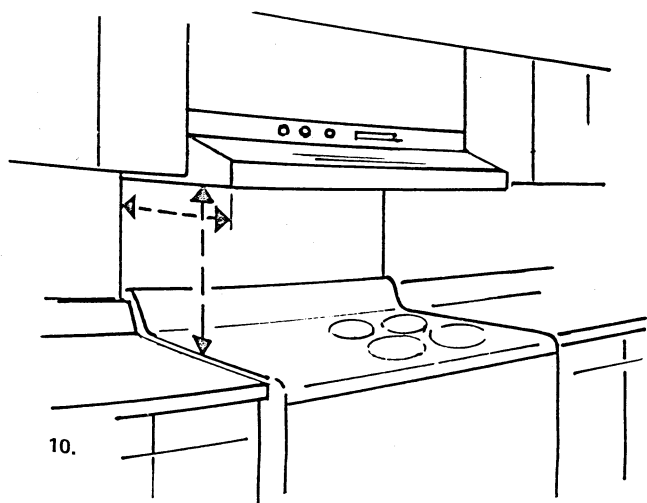


7.

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 so that the shelf or rack(s) is no higher than the user's shoulder; for most convenient use the shelf of

rack(s) should be between 2" below the elbow and 10" above the elbow. The microwave may be built into 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.

- 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 20" above the range top, hoods 18" or more in depth should be installed no less than 24" above the range top.



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 comparable 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. Surface or downdraft ventilation systems are built into or attached to range tops.

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 a 450-600 cfm rating over a 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.

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

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 outside doors, 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:

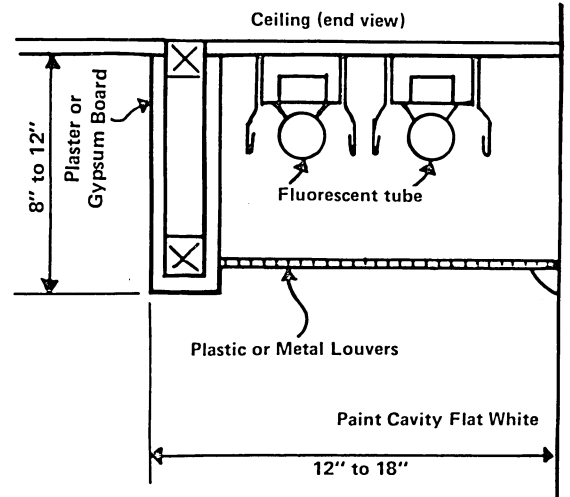
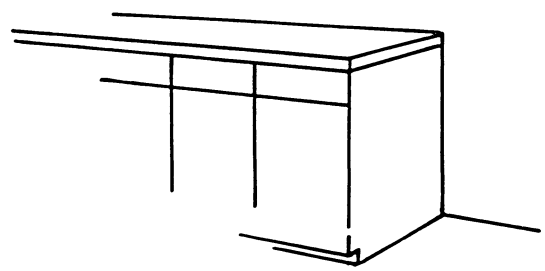
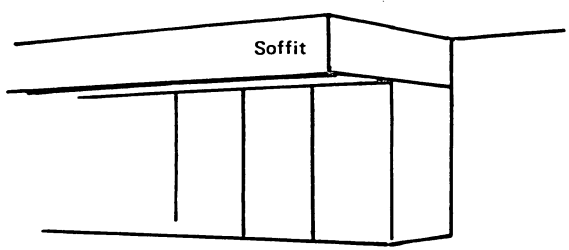
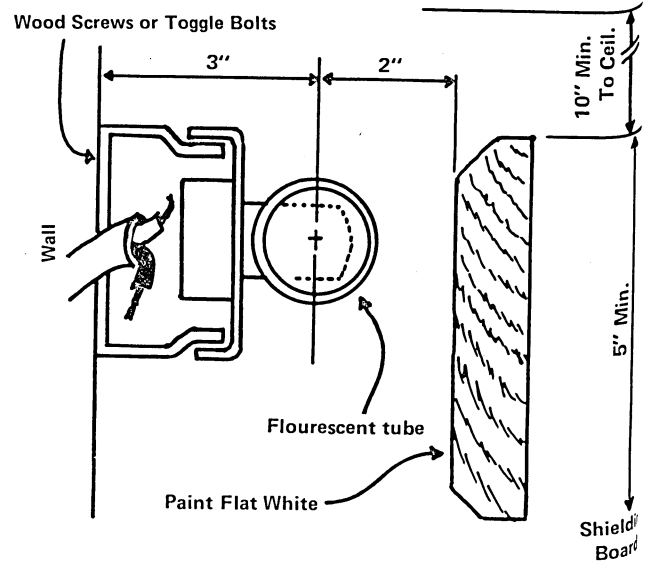
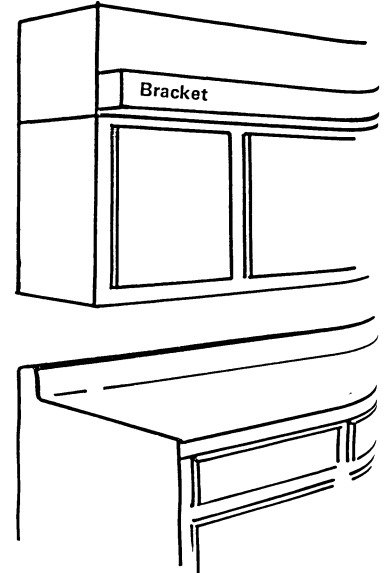
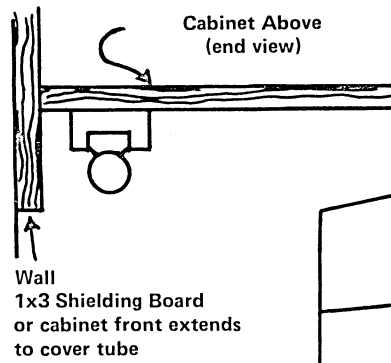
Undercabinet lighting: The fixture is placed under the cabinet at the front (preferably) or directly under the cabinet on the back wall. There are shallow fixtures (only 1"-1½" deep) with diffusers available for undercabinet lighting (e.g., Alkco, Eclipse). Undercabinet lighting is very efficient since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



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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 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:

- 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.

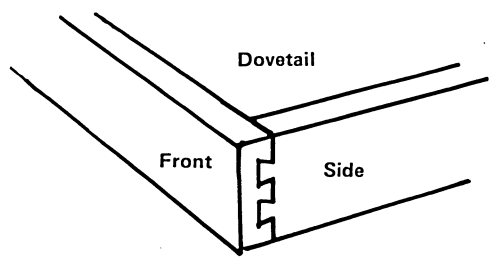
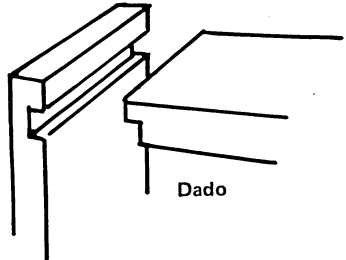
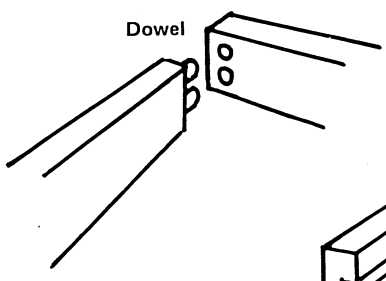
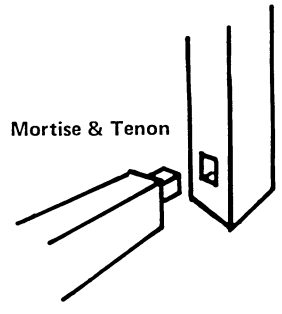
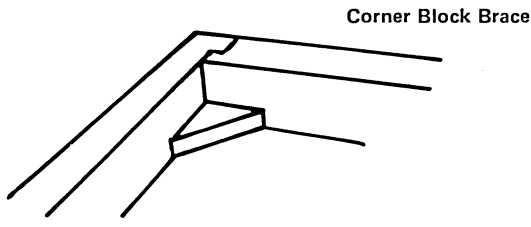
TYPE OF CABINETS AVAILABLE

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



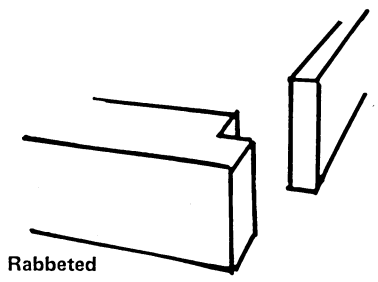
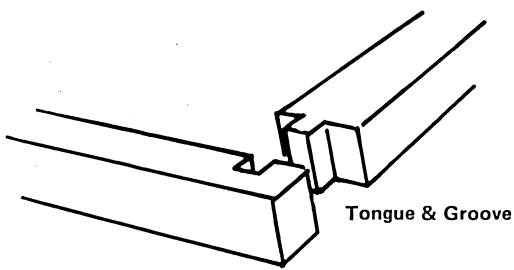
- Corner of wall and base should be braced with corner blocks.
- Where there is stress or a major joint, the stiles and rails (the vertical and horizontal framing) should be joined with mortise and tenon or dowel joints.
- Tops and bottoms should be dadoed into the sides.
- Hinges should be strong, swing 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 top figure p. 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 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.



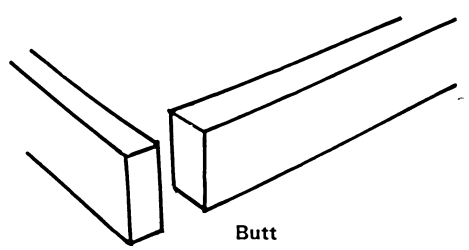
- In base cabinets, sliding shelves are more useable and convenient than stationary shelves and may be vertically adjustable.
- If there will be a corner in the kitchen cabinetry, lazy susans or pull-out shelves make that space more easily accessible.

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 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.

Cabinet refacing with plastic laminates

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

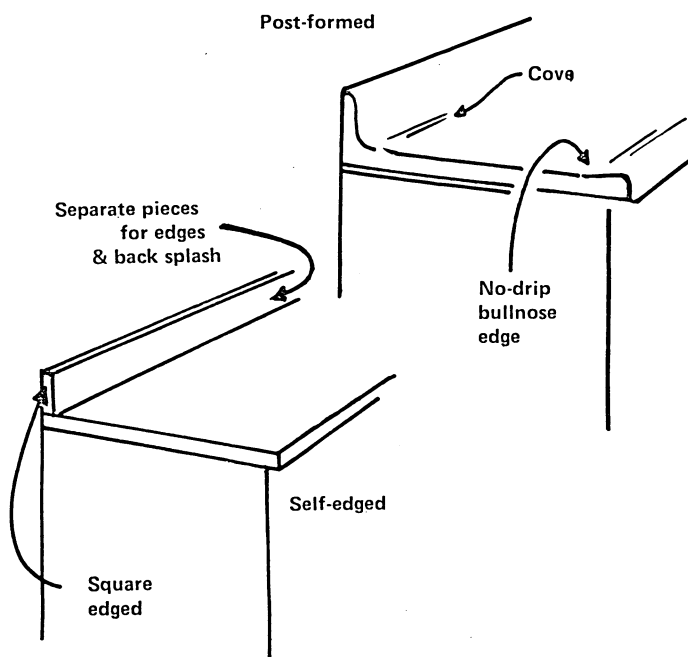
Countertops

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 1/16 inch thick (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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- 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 Appliances
- 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.
- Steidl, Rose. *Functional Kitchens*, NE Publication 241. Cornell University, Ithaca, New York 14853.
- 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 Ranges and Ovens, Extension Folder 582 (10¢).
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 (\$3.15).

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				
	Whenever work centers are combined the counter should be equal to the longer of the counter tops being combined plus 12 inches.		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 In Inches			Electrical Need	Water, Gas, Ductwork and Chimney Needs
	Width	Depth	Height		
Sink single bowl double bowl triple bowl	21-25 33-36 40-48				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.*
	Sink cabinet must be larger than the sink bowl. Thus a 33" sink requires a 36" cabinet.				
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	Sink bowl with a 3½" or 4" opening			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 must 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)	33-36	28-36	54-66, 73, 84	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.	
" (chest)	48-72	32	62 (lid open)		
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 cabinet (cut out is less)	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 barbeque grills	24-48				Ducted ventilating system required
Fuels					
Electric				110/220-120/240 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

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

Equipment	Common Space Requirements In Inches	Electrical Need	Water, Gas, Ductwork and Chimney Needs						
Wood	<p>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.</p> <p>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".</p>	<p>110-120 volt circuit to operate lights and timer on combination gas.</p> <p>110/220-120/240 volts for combination electric.</p>	<p>Stove pipe Class A chimney Gas supply lines for combination gas.</p>						
Microwave Oven	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Width</td> <td style="text-align: center;">Depth</td> <td style="text-align: center;">Height</td> </tr> <tr> <td style="text-align: center;">24-27</td> <td style="text-align: center;">12-24</td> <td style="text-align: center;">12-18</td> </tr> </table> <p>Requires space for venting of warm moist air; check specifications if installing a conventional oven.</p>	Width	Depth	Height	24-27	12-24	12-18	<p>Access to a 110-120 volt circuit; a few combination ovens require a 110/220-120/240 circuit or a 110-120 volt circuit and a gas line.</p>	
Width	Depth	Height							
24-27	12-24	12-18							
Ventilation System	<p>20-24" distance between bottom of hood and surface units or burners depending on depth of hood.</p>	<p>Wire directly to 110-120 volt circuit unless the system is part of range.</p>	<p>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.</p>						
Wall mounted hood	<p>2-6" wider than range top, hood 9" deep</p>								
Hood over peninsula or island	<p>3-6" larger than range top, hood 18-20" deep</p>								

*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	Durability	Heat	Resistance			Scratches and Cuts	Cleanability	Sound	Do-it-yourself Installation	Corners
					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 can scorch	Good	Good		Will cut with knives	Good Rough textures present a problem	Quiet	*Power tool skills for cutting. Buy stock slabs that are pre-laminated	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	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	Good if sealed		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	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	Good		*	

*Requires skill
**More difficult.

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Chart IV Flooring

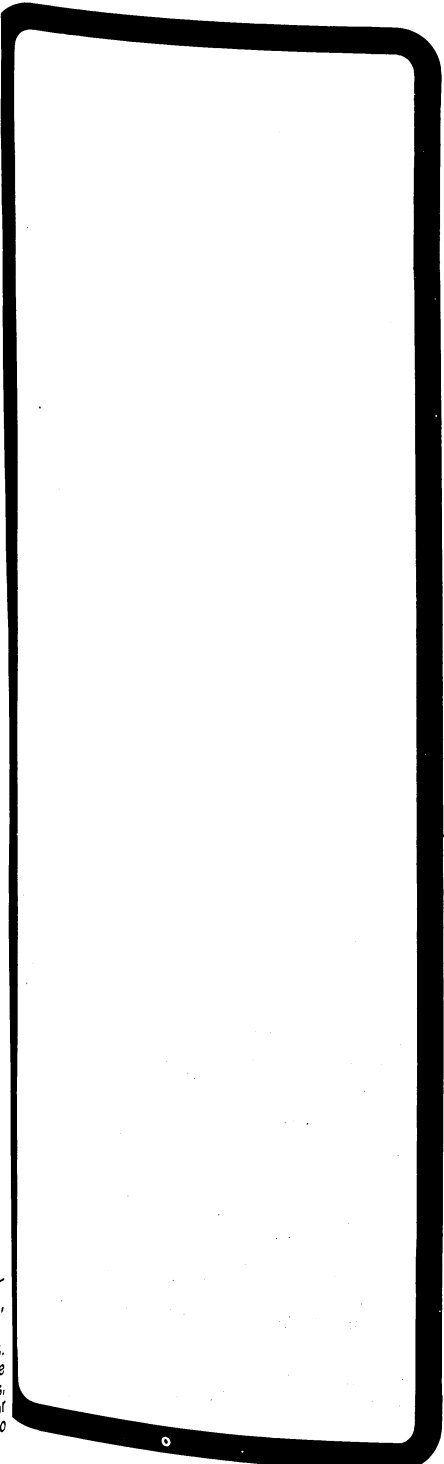
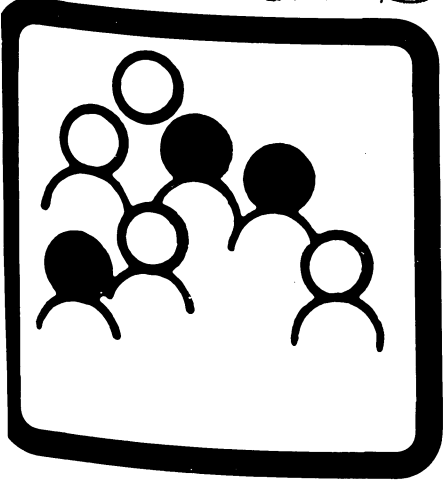
Material	Price Range	Sizes Available	Design	Durability	Maintenance	Ease on Feet and Deadenig Sound	Installation
Vinyl Asbestos Tile	Low to middle	12" square	Wide range of patterns, printed or embossed	Very good. Resists grease, and moisture. Can be dented by furniture	Easy, very good —sweep, damp mop 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	Similar to vinyl asbestos but no-wax vinyls are even easier	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. <u>Cannot take standing water</u>	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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Accounting Procedures for Rural Public Transportation Systems

JOHN M. HELMBERGER

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John M. Helmberger is a graduate research assistant in the Department of Agricultural and Applied Economics at the University of Minnesota. He is working under the supervision of Jerry E. Fruin, associate professor.

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Introduction

Section 147 of the Federal Aid Highway Act of 1973 authorized demonstration projects for providing transportation service to rural areas. Beginning in 1975, some \$25 million in federal funds were used to sponsor 102 of these projects, covering a broad spectrum of service concepts over a wide range of geographical conditions. After four years, a Section 147 Demonstration Evaluation Panel, supported by the U.S. Department of Transportation, Federal Highway Administration (FHWA), and Urban Mass Transportation Administration (UMTA), examined each of the projects and reported findings in the five-part *Section 147 Rural Public Transportation Demonstration Manual* (August 1979).¹

One of the conclusions of the Section 147 demonstration review was that the states can play an important role in management of rural public transportation by providing technical assistance and education.² Whether the states provide such assistance in-house or through individual transit projects or consultants, significant *savings* can result: individual transit projects and managers need not reinvent the wheel. Through management and technical

assistance the states can promote *consistent policies*, procedures, and information gathering techniques.³

Section 18 of the Surface Transportation Assistance Act of 1978 has had important implications for states' roles in management of rural (nonurbanized) public transportation. While Section 147 grants were awarded directly to transit projects, under Section 18 federal aid for nonurbanized transit (80 percent of net capital costs and 50 percent of operating deficits) is allocated to the states according to a formula and then distributed by the states to the local level. The result is greater state oversight (care and management) of individual transit projects.

Furthermore, the limited amount of federal support available under Section 18 has encouraged development of strategies to stretch transit funding, particularly the coordination of transit efforts of various agencies in a given area. To be successful, these strategies require consistency in data collection and reporting procedures, underscoring the importance of state involvement in project management through provision of technical assistance.⁴

Purpose

This bulletin outlines the difficulties in rural public transportation project accounting and record keeping and suggests procedures and formats to streamline these practices.*

There are four important reasons for developing streamlined project accounting and record keeping:

- **Time Saving.** An accounting system that is simple, yet provides the information crucial to sound system management, saves time for other important managerial functions.
- **Requirements of Funding Agencies.** While project managers frequently regard the reporting requirements of funding agencies as more red tape, adequate

documentation must be provided to assure reimbursement of eligible expenses.

- **Internal Monitoring.** For success, most individual transit projects must continually make adjustments to improve service. So, project managers must have access to hard, factual data about ridership, costs, and potential costs of service changes.⁵
- **Comparison and Evaluation.** Consistent accounting practices provide a basis for comparison of projects to evaluate project *efficiency* (how well a transportation system uses available labor and capital resources) and *effectiveness* (how well a transportation system meets its goals and objectives).⁶

*Although the suggested accounting procedures employ the format of the Minnesota Department of Transportation (Mn/DOT), Transit Aid Program's *Monthly Operations Report*, the basic concepts presented should be useful to rural transit systems in other states.

Problems Related to Accounting and Recordkeeping

The Section 147 Demonstration Evaluation Panel concluded that performance and cost monitoring required more attention than received in the rural transportation systems studied.⁷ This conclusion is borne out by the findings of the Iowa DOT in developing a Uniform Data Management System.⁸ While collecting information from transit operators and planners, it became evident that the following problem areas existed:

- Wide variation in accounting systems and lack of various accounting practices.
- Different definitions for the same terms.
- Lack of a central source of data about any given operation.
- Inability to establish rational policies by decision-makers due to lack of information.
- Difficulty in monitoring progress of various operations.
- Inability to compare or tabulate transit data among various systems and operations.

Many rural transportation systems have experienced severe cash flow difficulties.⁹ Often, this results from unfamiliarity with standard FHWA reimbursement procedures and can be alleviated in a number of ways, such as:

- Obtaining multiple funding sources.
- Using funding sources not tied to a reimbursement procedure, but able to put up money.
- Establishing a month's billing in advance.

- Obtaining a source of emergency borrowing.
- Insisting on monthly payments.
- Submitting vouchers on time.

Also, relief from cash flow "pinches" can be obtained by submitting eligible expenses for reimbursement when the expense is incurred, but not yet paid. For example, the expense for new vehicle acquisition can be submitted for reimbursement when the purchase contract is signed, even though payment will not be made until after delivery of the equipment.

Inadequate accounting practices can contribute to cash flow problems if late vouchers and reports are the result. Timely submission of reports can result from a streamlined accounting system that provides the necessary information while taking minimal record keeping time.

Other accounting-related problems include identification of expenses that are eligible for reimbursement under Federal Procurement Regulations (FPR) and documentation of some labor expenses. There is a gray area with regard to eligibility of some expenses, partly due to unclear FPR guidelines.

Recordkeeping difficulties also arise from third party management and other services provided to transit projects by outside agencies: for example, project management provided by a local city administrator or a professional management service or dispatching services provided by the local police dispatcher. How to document (for reimbursement) the time that third parties spend in service to the transit project has been a problem.

Suggestions for Accounting Improvements

The panel evaluating the Section 147 Demonstration Program reported that the most successful accounting systems were very simple ones, easy to understand and complete.¹⁰ They kept track of all eligible expenses with adequate documentation and minimized bookkeeping time. The main features of an effective transit project accounting system include:

- A record of income from fares and other sources.
- An itemized record of current and cumulative expenditures.
- An indication of the project's current and future funds.

A *System Management Handbook*, developed by the Michigan Department of State Highways and Transportation for its Small Bus Program, recommends streamlining the rural transit project's bookkeeping by keeping records only of funds received and paid out (credits and debits), without recognizing amounts due until such amounts are actually received or disbursed.¹¹ This eliminates records such as Purchase Journals, Accounts Receivable, and Accounts Payable.

A suggested format for a simplified transit accounting system consists of three main records:

- the Cash Disbursements Journal (figure 1)
- the Employee Payroll Ledger (figures 3a and 3b)
- the Cash Receipts Journal (figure 4)

Data in these records are supplemented by information from drivers' logs and vehicle maintenance records.

Using this suggested format, the Monthly Operations Report (figures 2a-2d) becomes an integral part of the accounting system and is invaluable in ongoing program monitoring and evaluation, as well as for satisfying state requirements for reimbursement.

The Cash Disbursements Journal

The Cash Disbursements Journal provides daily recording of cash payments by the transit program. A separate Cash Disbursements Journal should be kept for each of the major expense categories such as Administration, Maintenance, and Operations. The entry to the Disbursements Journal is a detailed explanation, including reference to supporting documents, such as bills and invoices, of each cash payment made by the project.

Figure 1.

CASH DISBURSEMENTS JOURNAL – ADMINISTRATIVE CHARGES
 Project No. Example Month June, 1981

Item – Ref.	Date	Check Number	Amount Paid	Mgmt. Fees 1085	Tariffs 1088	Adv. 1090	Legal/Audit 1100	Security 1105	Phone/Off. Suppl. 1110	Leases & Rentals 1120	Utilities 1130	Other 1135
Rent (July)	6-30-81	101	\$ 230.00							\$ 230.00		
Management Services, Inc.(June)	6-30-81	102	\$1,000.00	\$1,000.00								
Tokens (500 @ 3 cents)	6-30-81	103	\$ 15.00		\$ 15.00							
Advertising												
Hometown Herald	6-30-81	104	\$ 5.00			\$ 5.00						
KLM Radio	6-30-81	105	\$25.50			\$25.50						
NW Bell (June)	6-30-81	106	\$24.50						\$24.50			
Office Supplies & Printing	6-30-81	107	\$45.18						\$45.18			
Materials Invoice No. 1321												
Northern States Power Co.(June)	6-30-81	108	\$20.44								\$20.44	
MONTHLY EXPENSES			\$1,365.62	\$1,000.00	\$ 15.00	\$ 30.50	-0-	-0-	\$ 69.68	\$ 230.00	\$ 20.44	-0-



Figure 2a.

OFFICE OF TRANSIT ADMINISTRATION
TRANSIT AID PROGRAM
REQUEST FOR FUNDS

Grant Recipient: Agency Example
Address _____
Phone _____
Contract Number _____

Type of Request: Regular For the Month of June 1981
 Special
 Final

<u>OPERATING</u>		<u>CAPITAL</u>	
Expenses	<u>\$10,319.02</u>	Expenses	<u>-0-</u>
Revenues	<u>\$ 687.65</u>	Revenues	<u>-0-</u>
Balance (Deficit)	<u>\$ 9,631.37</u>	Balance (Deficit)	<u>-0-</u>

Signature of Authorized Recipient Official _____ Date _____

Grantee not to complete items below (For Department use only)

Mn/DOT Share:
Capital _____
Operating _____
Total _____

This request is approved
in the amount of _____

Signature of Grant Administrator _____

PROJE

OPERA

Perso

Admin

Opera

Maint

Other

Fring

Socia

Admin

Manag

Tarif

Adver

Legal

Secur

Phone

Lease

Utili

Other

Vehic

Fuel &

Maint

Tires

Other

Operat

Purcha

Deprec

Mileag

Repair

Leases

Other

Insura

Public

Worker

Other

Taxes

Vehicl

Federa

State

Other

Figure 2b. MONTHLY OPERATIONS REPORT

PROJECT Example

MONTH June 1981

OPERATING EXPENSES		CURRENT MONTH	TOTAL TO DATE FOR THIS CONTRACT
<u>Personnel Services</u>			
Administrative, Management and Supervisory Salaries	1010	1,510.65	9,730.23
Operators' Wages	1020	1,378.22	7,523.23
Maintenance and Repair Wages	1030	230.00	2,726.50
Other Wages (specify) Intra-County	1035	1,116.53	7,805.59
Fringe Benefits Rate: PERA- 4% and Health=	1040	151.65	1,012.10
Social Security Taxes Rate: 6.13%	1050	148.95	848.02
TOTAL		4,536.00	29,645.67
<u>Administrative Charges</u>			
Management Fees	1085	1,000.00	6,000.00
Tariffs and Traffic Expenses	1088	15.00	15.00
Advertising, Marketing and Promotional	1090	30.50	50.00
Legal and Auditing	1100		
Security	1105		
Phone and Office Supplies	1110	69.68	1,163.28
Leases and Rentals-Admin. Facilities (specify)	1120	230.00	2,177.50
Utilities	1130	20.44	185.27
Other Administrative Charges (specify)	1135		382.07
TOTAL		1,365.62	9,973.12
<u>Vehicle Charges</u>			
Fuel and Lubricants	1170	625.33	3,528.17
Maintenance and Repair Material	1180	29.56	2,010.14
Tires	1190		
Other Vehicle Charges (specify)	1195		
TOTAL		654.89	5,538.31
<u>Operations Charges</u>			
Purchase of Service	1230		
Depreciation	1238	309.80	1,858.80
Mileage Reimbursement (for Passenger Service Only)	1240	2,253.63	6,766.46
Repair and Maintenance of Other Property	1243		
Leases and Rentals-Garages, Vehicles, etc. (specify)	1246		97.50
Other Operations Charges (specify)	1248		
TOTAL		2,563.43	8,722.76
<u>Insurance Charges</u>			
Public Liability and Property Damage Insurance	1280	1,199.08	1,297.74
Worker's Compensation	1300		777.94
Other Insurance Charges (specify)	1310		63.12
TOTAL		1,199.08	2,138.80
<u>Taxes and Fees</u>			
Vehicle Registration and Permit Fees	1350		
Federal Fuel and Lubricant Taxes	1360		
State Fuel and Lubricant Taxes	1370		
Other Taxes and Fees (specify)	1380		
TOTAL		--	--
TOTAL OPERATING EXPENSES		10,319.02	56,018.66

Figure 2c.

<u>REVENUES</u>		CURRENT MONTH	TOTAL TO DATE FOR THIS CONTRACT
Passenger Fares	1440	269.15	1,873.12
Contract Revenues	1472	100.00	600.00
School Bus Revenues	1474	250.00	1,500.00
Charter Revenues	1476		
Auxiliary Revenues	1478	68.50	302.75
Other Financial Assistance (specify)	1490		
Federal Operating Grants (specify)	1492		
TOTAL REVENUES	1505	687.65	4,275.87

<u>CAPITAL EXPENSES</u>			
Vehicle	1600		
Lift, Ramp, etc.	1602		
Radio Equipment	1604		
Fare Box	1606		
Other Capital Expenses (specify)	1610		
TOTAL CAPITAL EXPENSES	1585		
Revenue for Capital Equipment			
Federal Capital Grants (specify)	1617		
Other Financial Assistance (specify)	1619		

<u>OPERATING STATISTICS</u>			
Total Number of Passengers	1830	2,182	
Of This Total, How Many Passengers Were:			
Elderly	1850	1,990	
Handicapped	1860	162	
Children	1870	30	
Free Rides	1880		
Dial-A-Ride	1890		
Total Vehicle Hours	1955	703	
Revenue Vehicle Hours	1960		
Total Vehicle Miles	1995	10,842	
Revenue Vehicle Miles	2000		
Number of Dial-A-Ride Vehicle Trips	1930		
Number of Times Lift or Ramp Was Used	1940		

<u>Maintenance Summary</u>	Vehicle Number									
	1	2	3	4	5	6	7	8	9	10
Miles Driven	3,160	1,887	3,110							
Fuel Used (gal.)	316	269	--							
Oil Used (qt.)										
Parts Cost		30								
Labor Cost		230								

Figure 2d.

COMMENTS

June, 1981

#1035	Dispatches	638.00
	Intra-City	453.28
	Janitorial	25.25

#1120 Office Rent (% figured on Human Services staff in building)

NOTE: All source materials used to prepare this report, including but not limited to, bills, invoices and timesheets, must be retained on file for Mn/DOT Audit.

OFFICE OF TRANSIT ADMINISTRATION
MINNESOTA DEPARTMENT OF TRANSPORTATION
407 TRANSPORTATION BUILDING
ST. PAUL, MINNESOTA 55155

The Cash Disbursements Journal should be a book with adequate columns to provide for headings and account numbers. Each check (payment) should be entered in numerical sequence in the Cash Disbursements Journal, showing the date written, the check number, the amount, and recipient. All entries should indicate the nature of the expense, such as rent, telephone, electricity, printing, insurance, office supplies, and the amount in the appropriate column. Also included should be notations such as the date, number of the invoice or bill for which payment is made and the period covered by the payment (to avoid errors of double payment). In each budget category, use as many lines daily and as many pages monthly as necessary. At the end of the month, the columns in the Cash Disbursements Journal are totaled to obtain the monthly expense for each subcategory. Then the totals can be posted (transferred) to the required monthly reporting form.

Figure 1 shows a procedure for recording disbursements under the administrative category of expenses. The account title, Administrative Charges, and the column headings and account numbers correspond to line items on the monthly reporting form used by the Minnesota Department of Transportation (Mn/DOT) Transit Aid Program, Request for Funds/Monthly Operations Report, Form TP-70210-02 (figure 2). Basing recordkeeping procedures on the format of the state reporting form facilitates the transfer of information at the end of the month from the books to the report. In addition, the use of common terms with standard definitions, such as those in the Mn/DOT Monthly Operations Report, promotes uniform data collection and reporting practices, which are essential for information exchange and for transit system comparisons.¹²

The column headings in figure 1 are nearly self-explanatory. The column headed, Management Fees, with account number 1085, is for recording payments to a management service company engaged to provide operating management to the transit system. The next column, Tariffs and Traffic Expenses, number 1088, is for nonlabor costs associated with timetables, tariffs, tariff association fees, tickets, tokens, and transfers. Security, number 1105, refers to services provided by an outside security agency rather than by transit system employees. Leases and Rentals, number 1120, includes rents paid for transit system office equipment, furnishings, and land and buildings. Other Administrative Charges, number 1135, includes such charges as mileage reimbursement for transit support vehicles, conference fees, employees' travel expenses (including mileage reimbursement), drivers' training, membership fees for associations, and subscriptions to publications.

If the format of the Mn/DOT Monthly Operations Report is followed (figures 2b and 2c), separate Cash Disbursements Journals would be kept for Administrative Charges, Vehicle Charges, Operations Charges, and Capital Expenses. The two remaining categories of expense, Insurance Charges and Taxes and Fees, could be kept as separate journals, or for convenience, combined into one journal with seven distribution columns.

The Employee Payroll Ledger

Figure 3a is an example of an individual employee's payroll distribution ledger account.¹³ Totals can be obtained directly from this ledger for the monthly report. This format also gives each employee's individual total earnings, withholding tax, etc., needed for W-2 forms at the end of the year. Tax deductions are to be calculated on the amounts in the column entitled, total earnings and using federal and state tax tables. *Payroll and distribution of time must be supported by time and attendance or equivalent records for individual employees including management.* Salaries and wages of employees chargeable to other programs; for example, CETA, must be supported by appropriate time distribution records. It is imperative that the manager or person charged with the responsibility of managing the system, document precisely the time spent doing this. Similarly, employees "shared" with other employers (such as a police dispatcher who provides dispatching services to the transit system) must keep an accurate record of time spent in service to the transit system.

Standard employee time cards or sheets should be adequate for documenting most employees' time. However, for shared employees, it may be necessary to devise alternative methods to keep track of time spent in service to the transit system. For example, a city administrator responsible for managing a system, may find that his or her transit management duties are coupled with other responsibilities making it impractical to maintain a time card for the transit system. A solution may be to estimate the proportion of the administrator's work load that is devoted to management of the transit system and bill the system accordingly. In another instance, a police dispatcher, dispatching for the transit system, could document time by tallying incoming and outgoing transit-related calls and then multiply the total number of calls by an estimated average length of call. Note that while time records and documentation for other expenses do not need to be submitted with the monthly report, it is important that they be kept on file for audit.

Figure 3b illustrates a convenient method for summarizing the monthly payroll data from each of the individual payroll accounts. The columns titled Regular Earnings, Overtime Earnings, and Total Earnings are for recording the monthly totals from the corresponding columns on each employee's payroll account, as shown. The amount of total earnings is extended to the appropriate wage or salary subcategory, using the account numbers and column headings from the Personnel Services section of the Operations Report. Employer expenses for fringe benefits and Social Security Taxes, if any, are recorded in the appropriate columns. When each employee's monthly payroll information is recorded, the numbered columns can be totaled and the totals posted to the corresponding lines on the Monthly Operations Report.

The Cash Receipts Journal

The Cash Receipts Journal is a daily record of revenues from operations, grants, and other sources, such as donations. In it, daily receipts are recorded in coded

Figure 3a.

INDIVIDUAL EMPLOYEE

NAME Example S.S.# _____ DATE EMPLOYED _____

COUNTY OF _____ PAYROLL DISTRIBUTION 1020 ADDRESS _____ NO. OF EXEMPTIONS _____

Week Ending	Ck. #	Hrs. Worked		Rate/Hr.	Regular Earnings	Overtime Earnings	Total Earnings	Deduct. from Employee's Earnings				Total Deduct.	NET PAY
		Reg.	O.T.					State	City	Fed.	FICA		
Jan. 2													
Feb. 6													
Mar. 6													
TOTAL 1st QUARTER													
Apr. 3	60	40		\$3.60	\$144.00		\$144.00	\$1.44	\$3.60	\$17.00		\$22.04	\$121.96
	10	83	40		144.00		144.00	1.44	3.60	17.00	\$10.00	32.04	111.96
	17	116	32		115.20		115.20	1.16	2.88	11.40		15.44	99.76
	24	149	40		144.00		144.00	1.44	3.60	17.00		22.04	121.96
May 1	194	40	4		144.00	\$21.60	165.60	1.66	4.14	20.60		26.40	139.20
	8	227	36		129.60		129.60	1.30	3.24	14.50	20.00	38.74	90.86
	15	260	40		144.00		144.00	1.44	3.60	17.00		22.04	121.96
	22	293	40	2	144.00	10.80	154.80	1.55	3.88	18.40		23.82	130.98
	29	326	40		144.00		144.00	1.44	3.60	17.00		22.04	121.96
June 5	359	39			140.40		140.40	1.40	3.52	16.40	10.00	31.32	109.08
	12	392	40		144.00		144.00	1.44	3.60	17.00		22.04	121.96
	19	425	40		144.00		144.00	1.44	3.60	17.00		22.04	121.96
	26	458	40	5	144.00	27.00	171.00	1.72	4.28	21.40		27.40	143.60
TOTAL 2nd QUARTER					\$1,825.20	\$59.40	\$1,884.60	\$18.86	\$47.14	\$221.40	\$40.00	\$327.40	\$1,557.20

11

Figure 3b.

MONTHLY PAYROLL SUMMARY
 Project No. Example Month June 1981

Employee	Regular Earnings	Overtime Earnings	Total Earnings	Admin. Salaries 1010	Operator's Wages 1020	Maint. Wages 1030	Other Wages 1035	Fringe Benefits 1040	Social Security Taxes 1050			
Employee No. 1 (from fig. 3a.)	\$572.40	\$ 27.00	\$599.40		\$599.40			---	---			
Employee No. 2	etc.									
Employee No. 3	etc.									
MONTHLY PERSONNEL EXPENSES			\$4,235.40	\$1,510.65	\$1,378.22	\$230.00	\$1,116.53	\$151.65	\$148.95			
<p>Note: Not all wages and salaries reported are necessarily included in calculations of fringe benefits and/or Social Security Taxes, e.g., labor charges associated with repair and maintenance that are invoiced by others, part-time labor, etc.</p>												

Figure 4.

CASH RECEIPTS JOURNAL
 Project No. Example Month June 1981

Item - Ref.	Date	Amount Received	Passenger Fares 1440	Contract Revenue 1472	School Bus Revenue 1474	Charter Revenue 1476	Auxiliary Revenue 1478	Other Assistance 1490	Federal Oper. Grants 1492	Federal Capital Grants 1617	Other Capital Grants 1619		
Contract Pmt. (June)													
County Social Services	6-2-81	\$100.00		\$100.00									
Contract Pmt. (May)													
School Dist. No. 001	6-2-81	\$250.00			\$250.00								
Auxiliary Revenue													
Lease of Adv. Space (30 days)	6-2-81	\$ 20.00					\$ 20.00						
Deliveries	6-2-81	\$ 12.25					\$ 12.25						
Passenger Fares													
Cash Fares	6-2-81	\$ 11.50	\$ 11.50										
Tokens, Passes	6-2-81	\$ 15.00	\$ 15.00										

Passenger Fares													
Cash Fares	6-30-81	\$ 13.75	\$ 13.75										
MONTHLY RECEIPTS		\$687.65	\$269.15	\$100.00	\$250.00	-0-	\$ 68.50	-0-	-0-	-0-	-0-		

subcategories, such as Passenger Fares, Contract Revenues, Auxiliary Revenues, Federal Grants, and accumulated throughout the month. The Cash Receipts Journal distinguishes between operating revenues and revenues for capital equipment. This is because many grant programs, such as Section 18, fund operations and capital expenditures at different levels. (As noted earlier, Section 18 provides payment of 50 percent of operating deficits and 80 percent of net capital expenditures.)

The Cash Receipts Journal is similar in format to the Cash Disbursements Journal. Figure 4 illustrates a suggested form for the Cash Receipts Journal, with example entries identifying the source of revenue and, where needed, the service performed. The date and amount of revenue received are recorded, and the amount is extended to the appropriate column.

Note that, as in figure 1, column headings and account numbers correspond to line items in the Mn/DOT Monthly Operations Report. At the end of the month when columns are totaled to obtain the monthly revenues in each category, the totals can be posted directly to the monthly report.

The Monthly Operations Report

If the transit system's accounting procedures are based on the format just suggested, the Monthly Operations Report becomes a convenient summary of the cost and performance data accumulated monthly. Completion of the Operations Report amounts to little more than transferring collected data to the report form. Note in figure 2b, that the entries in the Administrative Charges section are identical to the column totals in figure 1, and the expenses reported under Personnel Services correspond to the column totals in figure 3b. In figure 2c, the Revenues entries correspond to the column totals in figure 4.

The "Amount Paid" column in the Disbursements Journal, and the "Amount Received" column in the Receipts Journal serve as checks for verifying that the totals posted to the Monthly Report are consistent with the data in the Journals. For instance, check that the total "Amount Paid" in figure 1 is equal to the total of Administrative Charges in figure 2b. The Cash Receipts Journal illustrated in figure 4 has been set up so that the total "Amount Received" includes both revenues from operations and revenues for capital expenditures. Thus, the total "Amount Received" should be equal to the total of the Revenues section in figure 2c plus the sum of lines 1617 and 1619. Since the example shows no revenues for capital expenditure, the total "Amount Received" is equal to the total of Revenues.

Notice that some of the expense and revenue subcategories in the report require specification, for example,

lines 1035, 1120, 1135, and 1195. Kinds of appropriate comments are in figure 2d. In the example, the expense for Other Wages, reported on line 1035, is itemized, and the expense for Leases and Rentals, line 1120, is identified as office rental paid to the county, determined by the specified formula.

The Mn/DOT Monthly Operations Report includes, in addition to the expense and revenue categories which have been discussed, a section for reporting Operating Statistics (figure 2c). The information reported in this section is important for determining the effectiveness and efficiency of the transit system's performance. Standard measurements of the system's effectiveness and efficiency include:

- operating costs per mile, per hour, and per passenger
- operating deficits per mile, per hour, and per passenger
- passenger-revenues per mile, per hour, and per passenger
- the passenger-revenue/cost ratio
- system-revenues per mile, per hour, and per passenger
- the system-revenue/cost ratio
- passengers per revenue-mile
- passengers per revenue-hour

Important passenger and vehicle data can be obtained from drivers' logs and vehicle maintenance records (figures 5 and 6).¹⁴

Figure 2a, the Request for Funds, is completed simply by carrying over Total Operating Expenses (line 1426) from figure 2b; and Total Revenues (line 1505), Total Capital Expenses (line 1585), and Revenue for Capital Equipment (line 1617 plus line 1619) from figure 2c. Revenues are then deducted from expenses to determine reimbursable amounts from operations and capital expenses, separately, as shown in figure 2a.

Some confusion can exist regarding what expenses are eligible for reimbursement. For example, when is depreciation of equipment an eligible expense? The problem, according to some state officials, is due to ambiguity in the FPR guidelines. Currently, the Federal Government is in the process of compiling a detailed description of the expenses that are eligible for reimbursement. In the meantime, the Mn/DOT Office of Transit Administration is developing general guidelines for identifying eligible expenses. It is important to note that when there is uncertainty about the eligibility of an expense, inquiry should be made to the appropriate authorities *before* the expense is incurred, if possible, to assure allowance of the expense.

Closing the Books

Some of the grant programs that provide funding for rural transportation systems require that the books be cleared at the end of the year, or grant period, so that all

expenses and revenues associated with operations in the current and following grant-years are kept separated. This amounts to a changeover in the last month of the

Trip
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50

Figure 5. VEHICLE CHECKLIST
Date _____
Vehicle No. _____

Figure 5. VEHICLE CHECKLIST

Date _____ Vehicle No. _____ Fuel added _____ gals.

Mileage : end _____ Oil added _____ qts.

start _____ Mileage at fueling _____

total _____

Inspect and check (✓) items below if okay.

I. EXTERIOR

- 1. Tires _____
- 2. Turn signals _____
- 3. Head lights _____
- 4. Tail lights _____
- 5. Outside mirrors _____
- 6. Windshield wipers _____
- 7. Fresh body damage _____
- 8. Cleanliness _____

II. INTERIOR

- 1. Brakes _____
- 2. Steering _____
- 3. Transmission _____
- 4. Safety equipment:
 - a) Fire extinguisher _____
 - b) Flares _____
 - c) First aid kit _____
- 5. Dash gauges _____
- 6. Radio _____
- 7. Window glass _____
- 8. Fresh damage _____
- 9. Cleanliness _____

III. UNDER HOOD

- 1. Oil level _____
- 2. Radiator level _____
- 3. W/W fluid level _____
- 4. Battery level _____
- 5. Belts _____
- 6. Engine _____

Driver's Signature: _____

VEHICLE DEFECTS

Note any defects below:

I. EXTERIOR

II. INTERIOR

III. UNDER HOOD

Maintenance performed _____

Mechanic's Initials _____

Tip	Pick-Up	Time	Destination	Time	.50	.25	.75	.35	S.C.	Hand-cap.
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										
46										
47										
48										
49										
50										
TOTAL THIS SHEET										

Figure 6.

SYSTEM _____

MONTH _____

Vehicle I.D. # _____

License Plate # _____

Odometer _____

Maintenance Performed

Date	Odometer Reading	

gra
ing
paid
exp
inc
han
kee
last
exp
mon
colle
line
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dur
mat
V
outli
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simp
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grant-year from cash basis accounting (that is, recognizing expenses and revenues only when they are actually paid or collected) to accrual basis accounting, in which expenses and revenues are recognized when they are incurred or earned, regardless of when cash changes hands.

The changeover to accrual basis does not require keeping a separate set of books to be used only during the last month of the grant-year. All that is needed is to list expenses incurred and revenues earned during the final month of the period, but which will not be paid or collected until later, and include these on the appropriate lines in the monthly report.

Similarly, a list should be kept of expenses paid during the final month of the grant-year which are matched with operations in the following period (for

example, prepaid rent), and the appropriate lines in the monthly report should be adjusted downward by these amounts. The same procedure should be followed for revenues received during the final month of the grant-year, in advance of services performed.

However, it is important to remember that revenues and expenses in the following month, the first month of the new grant-year, will need to be corrected to account for the adjustments made in the final month of the previous period. These reversing adjustments are necessary to avoid double counting or unintentional omission of revenues and expenses.

The application of accrual techniques for closing the rural transit system's books at the end of the grant-year is further discussed, with illustrations of suggested procedures, in the Appendix.

Conclusion

While the format of the accounting procedures just outlined is derived from the Mn/DOT Transit Aid Program's Monthly Operations Report, the principles for simplifying rural transportation system accounting can be used for other formats and reporting requirements. The information that is crucial for managing a successful rural public transit system can be provided by effectively

streamlined accounting procedures that are easily understood and that conserve time for other important managerial duties. With properly designed procedures, accounting and record keeping need not be regarded as the "dirty paperwork of an operation that would be more fun without them."¹⁵

Appendix: Closing the Books

The changeover from Cash Basis to Accrual Basis Accounting in the last month of the grant-year can be accomplished by following the procedures outlined in figures 7 through 9.

An Accrual Adjustments Worksheet should be set up for each major expense category and for revenues. Distribution columns should correspond to the columns in the Disbursements Journals and the Receipts Journals. Figures 7a and 7b illustrate the Accrual Adjustments Worksheet for one expense category, Administrative Charges, and for Revenues, respectively.

The adjustments to Administrative Charges recorded in figure 7a are, with one exception, for expenses incurred in December, the last month of the grant-year, but which are not payable until January, so not included in the December Disbursements Journal for Administrative Charges. The exception is the adjustment for January office rent payment, dated December 29, 1980. Although this expense is paid in December, it is properly assigned under the accrual basis to operations in January, the first month of the next grant-year. So, the entry postpones recognition of the rent expense until January. The parentheses () about the amount of the rent expense indicate a negative adjustment, that is, while the other adjustments increase total monthly expenses for December, the January rent expense will be *deducted* from the December totals since it does not apply to the current year under accrual accounting methods.

Similarly, figure 7b gives examples of accrual adjustments to December Revenues, indicating revenues that have been earned but not yet collected in December and,

in parentheses (), revenues that have been received in advance of services rendered. Revenues due will increase total December Revenues (upward adjustments) while revenues received in advance will reduce the total (downward adjustments).

At the end of the month when the columns in the Accrual Adjustments Worksheet are totaled, (figures 7a and 7b) the Net Adjustments obtained should be added to (or deducted from) the corresponding column totals in the Disbursements and Receipts Journals. Figures 8a and 8b illustrate the procedure for making accrual adjustments to the Disbursements Journal for Administrative Charges and to the Receipts Journal, respectively. The Monthly Expenses entered in the Disbursements Journal and Monthly Receipts entered in the Receipts Journal are assumed to be the column totals for the month. These amounts represent actual cash payments and receipts in December. The next line in figures 8a and 8b, Accrual Adjustments, shows the column totals from figures 7a and 7b, respectively. Finally, Adjusted Monthly Expenses and Adjusted Monthly Receipts are total monthly expenses and receipts plus (or minus) the Accrual Adjustments. In other words, Adjusted Monthly Expenses (figure 8a) shows the amount of actual cash expense in each subcategory *plus* expenses incurred but not yet paid in December and *less* expenses paid in advance. In the same way, Adjusted Monthly Receipts (figure 8b) shows actual December cash receipts *plus* revenues earned but not collected in December and *less* revenues received for services not yet performed.

Figure 7a.

ACCRUAL ADJUSTMENTS – ADMINISTRATIVE CHARGES
 Project No. Example Grant-Year Ending December 1980

Item – Ref.	Date	Amount	Mgmt. Fees 1085	Tariffs 1088	Adv. 1090	Legal/ Audit 1100	Security 1105	Phone/ Off. Suppl. 1110	Leases & Rentals 1120	Utilities 1130	Other 1135		
Hometown Herald	12-1-80	\$ 10.00			\$ 10.00								
Ad – one week run													
Office Supplies	12-11-80	\$ 37.88						\$ 37.88					
Invoice no. 11054													
Rent (Jan. ck. no. 734)	12-29-80	(\$230.00)							(\$230.00)				
Northwestern Bell	12-30-80	\$ 24.50						\$ 24.50					
(Est. charges: Dec.)													
Northern States Power	12-30-80	\$ 72.00								\$ 72.00			
(Est. charges: Dec.)													
NET ADJUSTMENTS		(\$85.62)	-0-	-0-	\$ 10.00	-0-	-0-	\$ 62.38	(\$230.00)	\$ 72.00	-0-		

Figure 7b.

ACCRUAL ADJUSTMENTS – REVENUES
 Project No. Example Grant-Year Ending December 1980

Item – Ref.	Date	Amount	Passenger Fares 1440	Contract Revenue 1472	School Bus Revenue 1474	Charter Revenue 1476	Auxiliary Revenue 1478	Other Assistance 1490	Federal Operations 1492	Federal Capital Grants 1617	Other Capital Grants 1619		
Contract Payment Rec'd. (Jan.)													
School District No. 001	12-30-80	(\$250.00)			(\$250.00)								
Contract Revenue Due (Dec.)													
County Social Services	12-31-80	\$100.00		\$100.00									
Auxiliary Revenue Rec'd.													
Lease of Adv. Space (Jan.)	12-31-80	(\$25.00)					(\$25.00)						
Other Assistance Due													
CETA share of Dec.	12-31-80	\$356.00						\$356.00					
Operator's Wages													
NET ADJUSTMENTS		\$181.00	-0-	\$100.00	(\$250.00)	-0-	(\$25.00)	\$356.00	-0-	-0-	-0-		

The adjusted totals can be transferred directly to the December Operations Report, as illustrated for Administrative Charges and Revenues:

Administrative Charges	(December 1980)	
Management Fees	1085	\$ 950.00
Tariffs and Traffic Expenses	1088	0
Advertising, Marketing and Promotional	1090	25.80
Legal and Auditing	1100	0
Security	1105	0
Phone and Office Supplies	1110	105.70
Leases and Rentals-Admin. Facilities (specify)	1120	0
Utilities	1130	133.00
Other Administrative Charges (specify)	1135	76.75
	TOTAL	\$1,291.35

REVENUES	(December 1980)		CURRENT MONTH
Passenger Fares	1440	\$ 272.35	
Contract Revenues	1472	175.00	
School Bus Revenues	1474	0	
Charter Revenues	1476	0	
Auxiliary Revenues	1478	32.60	
Other Financial Assistance (specify)	1490	705.00	
Federal Operating Grants (specify)	1492	0	
	TOTAL REVENUES	1505	\$1,184.95

In January, when that month's operations report is prepared, it will be necessary to reverse the adjustments made to December expenses and revenues. Otherwise, expenses recognized but not paid in December will be recognized again when they are paid in January. Yet, expenses paid in advance in December and eliminated from the December monthly totals through an adjusting entry, will also be omitted in January when they ought to be recognized. Similarly, without reversing entries, revenues due but not collected in December will be double counted when they are received in January. Revenues received in advance but not recognized in December, having been eliminated in the adjustment process, will go unrecognized in January.

Figures 9a and 9b illustrate a procedure for reversing the accrual adjustments made to December's Administrative Charges and Revenues. In figure 9a, expenses added to the December totals are deducted from the January totals, while expenses deducted in December are added back in January. Thus, Adjusted Monthly Expenses in figure 9a does not include any amounts recognized in December, nor does it omit any amounts postponed in December for recognition in January. Figure 9b follows the same procedure for reversing the accrual adjustments made to December Revenues. The adjusted totals can then be entered in the January Operations Report.

The discussion of procedures for closing the transit

system's books at the end of the grant-year has, for convenience, focused on the last month of one period and the first month of the next. In reality, closing the books can be complicated when more than one month elapses between the time an expense is incurred or revenue is earned, and the time that the expense is actually paid or the revenue collected. Suppose a transit system places an order for a new van in October, with payment to be made at February delivery. The expense is incurred in October but won't be recognized under the system's cash basis accounting until February, assuming that the grant-year ends on December 31, is in the next period.

Or, a transit system may submit a capital expenditure in October or November for reimbursement with federal funds, but not receive the funds until well into the next grant-year. The revenue becomes due when the expenditure is submitted, but will not be recognized by the cash basis until it is received.

In both of these situations, adjustments should be made to recognize the amounts in question in the grant-year during which they were incurred or earned. However, it is not entirely appropriate to recognize the amounts in the last month of the grant-year when they were incurred or earned in an earlier month. Neither is it correct to make reversing adjustments for these amounts in the first month of the next period if payment or collection occurs in a later month.

A solution for those transit systems with sufficient resources, is to use accrual basis accounting throughout the year. In this way, all expenses and revenues will be recognized when they are incurred or earned, and necessary reversing adjustments will be made when appropriate. An additional benefit of using the accrual basis consistently is that cash flow problems, mentioned earlier, would be diminished: instead of having to wait until expenses are paid to submit them for reimbursement, the transit system using accrual accounting submits all expenses when they are incurred and very likely receives reimbursement before many of the expenses are due for payment. Unfortunately, the benefits of accrual basis accounting cost more in terms of human and financial resources than many rural public transit systems can afford.

An alternative solution is to adapt the procedures just outlined. Specifically, an expense incurred before the last month of the grant-year, but not paid by the end of the year, could be recognized in the final month by means of an accrual adjustment. If the expense is not paid in the following month, the first month of the next period, no reversing adjustment would be made for that amount; rather, the reversing adjustment would be made in the month when the expense is paid. In the same way, uncollected revenues earned any time during the grant-year could be recognized in the final month of the year, and the corresponding reversing adjustments could be made in the month of the following year when the revenues are collected. However, care must be taken not to overlook the need for reversing entries as they become necessary in the course of the year.

A possible variation on this alternative would be for the transit system to recognize all unpaid expenses and uncollected revenues at the end of the grant-year, as suggested, but not make the corresponding reversing adjustments until the end of the following year. At that time, the necessary corrections would be made for ac-

crual adjustments from the end of the previous year, and new accrual adjustments would be prepared for the year just ending.

An advantage of this procedure is that the system management would only be bothered with accrual adjustments once a year. They would not be making reversing adjustments month by month as old expenses or revenues are paid or collected. A disadvantage is that the transit system's income and expenses will be misstated throughout the grant-year, until corrections are made in the final month, by the amounts of the accrual adjustments from the end of the previous year.

Footnotes

- ¹Available through the U.S. Department of Transportation, Technology Sharing Program, DOT-1-79-4 through 8.
- ²*Proceedings of the Fourth National Conference on Rural Public Transportation, "State of the Art in Rural Public Transportation,"* September 1979, pp. 3-5.
- ³*Ibid.*, "Public Transit Management/Technical Assistance in Iowa," pp. 57-60.
- ⁴*Ibid.*, "Foreword," p. V, and "The Transition from Specialized to Public Transportation," pp. 66 and 67.
- ⁵*Planning Rural Public Transportation Systems, A Section 147 Rural Public Transportation Demonstration Manual, Number 2 of 5, U.S. Department of Transportation, DOT-1-79-5; August 1979, p. 53.*
- ⁶*Ibid.*, pp. 1 and 2.
- ⁷*Rural Public Transportation Services and Performance, A Section 147 Demonstration Manual, Number 1 of 5, U.S. Department of Transportation, DOT-1-79-4; August 1979, p. 1.*
- ⁸*Proceedings of the Fourth National Conference, op. cit.*, "Public Transit Management/Technical Assistance in Iowa," p. 57.
- ⁹*Ibid.*, "Results of the Section 147 Demonstration Program," pp. 9 and 10.
- ¹⁰*Planning Rural Public Transportation Systems, op. cit.*, p. 35.
- ¹¹*Michigan Small Bus Program System Management Handbook, Michigan Department of State Highways and Transportation; June 1978, pp. 75-83.*
- ¹²Definitions for all of the expense subcategories in the *Monthly Operations Report* are given in *Instructions for Completing the Operations Report*; available from Minnesota Department of Transportation, Office of Transit Administration, Transit Aid Program.
- ¹³*Michigan SBP Handbook, op. cit.*, pp. 81-83.
- ¹⁴*Ibid.*, pp. 96 and 101.
- ¹⁵*Planning Rural Public Transportation Systems, op. cit.*, p. 34.

