RESTAURANTS AND EATING PLACES

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SPACE REQUIREMENTS

Adequacy of space will influence building and operating costs and efficiency. When space is too small, labor time and effort are likely to increase and the volume and quality of output decrease. When it is too large, building and maintenance costs are excessive.

Decisions pertaining to space allowance may be strongly affected by the limitations of investment funds and available space. Ample space is sometimes provided by means of low-cost materials and equipment of such inferior quality that they have short and unsatisfactory service life. In other instances, space is restricted to a point where it prohibits profitable volume or the best utilization of labor. Space allowances in relation to investment should be balanced in terms of (1) proposed permanence of the facility, (2) acuteness of need for the specific operation, (3) essentials for operating efficiency, (4) desirable standards in terms of appearance, sanitation, and good quality of production and service, and (5) immediate and future costs, depreciation, upkeep, and maintenance.

Facts peculiar to the particular establishment should be used as the basis for determining space needs. Requirements will vary for facilities of a given type and volume. Location; type of operation; clientele; frequency of deliveries of supplies; kind of food used, such as fresh, frozen, or canned; and the completeness of processing to be done will cause variation in production and storage requirements. The policies of those in charge will have an influence. Certain general information, such as numbers to be served, turnover, arrival rate, and type of service, will be helpful in deciding dining area needs.

Study is required to clarify immediate and future needs in food production. Choices should be made between meat cutting or portion-ready meats, a baking section or use of commercially baked products, and the use of unprocessed versus processed foods. If enlargement is probable, studies made before the building is planned as to how space may be added and how the initial plan should be designed to minimize ultimate cost, will be helpful.

It is well to block out space allowances according to functions that the facility is to perform. Calculate area requirements in terms of: (1) volume and type of service, (2) amount and size of equipment to be used, (3) number of workers required, (4) space for needed supplies, and (5) suitable traffic area. The dining area location and space allowance are usually determined first, the production areas next in terms of specific relationship to the dining area, and the other sections as required to these. Planners should be careful in accepting general space recommendations. There are many variations.

Food Service Planning, John Wiley & Sons, New York, 1967.

Dining Area

Space for dining areas is usually based on the number of square feet per person seated times the number of persons seated at one time.

Space Requirements The patron's size and the type and quality of service should be considered. Small children may require only 8 sq ft for a type of service in which an adult would need 12 sq ft for comfort. A banquet seating allowance might be as little as 10 sq ft per seat and that for a deluxe restaurant as much as 20 sq ft. The amount of serving equipment in the dining area and lineup space will influence needs. Lost space must be considered.

The diner's comfort should govern allowance. Crowding is distasteful to many people. It is likely to be tolerated more readily by youngsters than by adults. It is more acceptable in low-cost, quick-service units than in those featuring leisurely dining. Both young and old enjoy having sufficient elbow room and enough space so that dishes of food and beverage are not crowded. Place settings for adults usually allow 24 in. and for children 18 to 20 in. (Table 1).

TABLE 1 Square Feet per Seat Used for Various Types of Food Operations

Type of operation	*Square feet per seat*
Cafeteria, commercial	16-18
Cafeteria, college and industrial	12-15
Cafeteria, school lunchroom	9-12
College residence, table service	12-15
Counter service	18-20
Table service, hotel, club restaurant	15-18
Table service, minimum eating	11-14
Banquet, minimum	10-11

All of the areas in a dining room used for purposes other than seating are a part of the square footage allowed for seating. This does not include waiting areas, guest facilities, cloakrooms, and other similar areas. Excessive loss or use of space for other than seating in the dining area will, however, increase needs. Structural features of the room should be considered. Width and length of the room, table and chair sizes, and seating arrangements affect capacity.

Service stations may be estimated in the proportion of one small one for every 20 seats or a large central one for every 50 to 60 places. The advisability of having a central serving station will be influenced by the distance of the dining area from the serving area. It is of special value when production and dining are on different floors. Plumbing and wiring and whether supplies are delivered mechanically will influence location of the stations. Small substations for silver, dishes, napery, beverages, ice, butter, and condiments may measure 20 to 24 in. square and 36 to 38 in. high. The size of central stations varies from that for a small enclosed room to that of a screened section measuring approximately 8 to 10 ft long by 27 to 30 in. wide by 6 to 7 ft high.

Table size will influence patron comfort and efficient utilization of space. In a cafeteria, for example, where patrons may dine on their trays, it is important that the table be of adequate size to accommodate the number of trays likely to be there. Four trays 14 by 18 in. fit better on a table 48 in. square than on a table 36 or 42 in. square. Small tables, such as 24 or 30 in. square, are economical for seating but are uncomfortable for large people. They are only suitable in crowded areas for fast turnover and light meals. Tables having common width and height allowing them to be fitted together will give flexibility in seating arrangements. These are particularly good for banquette or cocktail-type bench seating along a wall. Tables for booths are difficult for waitresses to serve if they are longer than 4 ft. The width of booths including seats and table is commonly 5½ ft. A lunch counter will have a minimum width of 16 in. and a maximum width of 24 to 30 in. The linear feet are calculated on the basis of 20 to 24 in. per seat. The maximum area best served by one waitress is generally 16 ft of counter. This will give eight to ten seats. U-shaped counters make maximum use of space and reduce travel. Space in depth of 8½ to 11 ft will be required for every linear foot of counter. This will provide 3 to 4 ft of public aisle, 2½ ft for aisle space for employees. A width of 4½ ft is desirable where employees must pass.

Calculate aisle space between tables and chairs to include passage area and that occupied by the person seated at the table. A minimum passage area is 18 in. between chairs and, including chair area, tables should be spaced 4 to 5 ft apart. Aisles on which bus carts or other mobile equipment is to be moved should be sized according to the width of such equipment.

The best utilization of space can often be arrived at through the use of templates or scaled models. Diagonal arrangement of square tables utilizes space better than square arrangement and yields a more trouble-free traffic lane. Lanes that pass between backs of chairs are likely to be blocked when guests arise or are being seated.

Table heights in schools should be chosen for the comfort of children. In units patronized by many grades a compromise height will be needed between the 30 in. normally used for adults and the 24 in. suitable for children, or two sizes may be used in different sections of the room. A table length to seat four, six, or eight is preferable to longer ones.

Number of Persons Allowance The number of persons to be seated at one time is the second point of information needed for calculation of the dining room size. The total number of seats required at one time, multiplied by the space required for each seat, will give the total number of square feet needed in the

dining area. The number of times a seat is occupied during a given period is commonly referred to as "turnover." The turnover per hour, times the number of seats available, gives the total number of patrons who can be served in an hour. If peak loads, or number to be served at one time, are known, the number of seats required can be estimated.

Turnover rates tend to vary, for they are influenced by such factors as the amount of food eaten, the elaborateness of the service, and the diner's time allowance. A breakfast meal of few foods may be eaten more quickly than dinner, and a simple fare faster than a many-course meal. Turnover is quickest in dining rooms where food has been prepared in advance for fast service and where patrons serve themselves and bus their soiled dishes. The turnover time is speeded up 10 percent by patrons removing their soiled dishes so that tables are quickly available for other guests. Deluxe service for leisure dining, involving removal and placement of several courses, takes the longest time. Although specific turnover may vary from 10 minutes to 2 hours, actual eating time is normally 10 to 15 minutes for breakfast, 15 to 20 minutes for lunch, and 30 to 40 minutes for dinner.

The calculation of occupancy of seats in a dining room must take into consideration a certain percentage of vacancy, except where a given number are seated at one time according to assignment. In table-service dining rooms this has been estimated as 20 percent of total capacity, in cafeterias from 12 to 18 percent, and for counter operations 10 to 12 percent. Many factors influence this percentage, such as patrons arriving at different times, irregular rate of turnover, and reluctance to share a table with strangers.

The table sizes used in the dining room will affect occupancy. It is often desirable to provide for groups varying from two to eight, with a predominance in most dining rooms of those for two people. The "deuces" may be of a size and shape that can be put together to form tables for larger groups. In metropolitan areas where many tend to dine alone, wall bench-type seating and tables for two with a center ridge or line denoting space for one have been used successfully. Chairs with a "tablet-arm" that will hold a tray have been used for fast turnover in crowded areas.

The utilization of seating capacity tends to be greater for cafeterias than for table service. The patron may spend 25 to 50 percent of the time while seated at the table waiting for service. The cafeteria diner may begin eating as soon as he is seated. One cafeteria line can serve four to eight patrons per minute depending on (1) the speed of the servers, (2) the elaborateness of food selection, (3) convenience of the layout, and (4) the type of patrons. At these rates, 240 to 480 patrons will need to be seated within an hour. If the turnover rate is two per hour, then from 120 to 240 seats will be used. However, if 15 percent of the total capacity at the peak period remains unfilled, then between 140 and 280 seats will be required. An additional 14 to 28 seats or 10 percent would be needed if the patrons do not bus their soiled dishes.

Patronage estimates for facilities of different types may be guided by the number of persons in residence, enrollments in a school, an industry's payroll, the membership of a club, or the amount of traffic in an office or shopping area. In each case a certain percentage may normally be expected to dine in the facility provided. The percentage will be influenced by such factors as its location in relation to other facilities, the patron's buying power, the price plan (on the basis of subsidy or profit), patron's mealtime allowance, and convenience of the location.

The patronage estimate for a college cafeteria should take into consideration the number of students who live at home, are members of a live-in group, such as an organized house, and the number of other dining facilities available on or near the campus. A college residence providing table service may have to allow a seating capacity that is 110 percent of occupancy if a policy exists for having "special guest" occasions and seating all at one time.

An industrial lunchroom may serve as few as 25 percent and as many as 90 percent of the payroll. Clues to probable patronage may be drawn from such factors as nearness to other eating facilities, wage rates, type of work, prices to be charged, convenience, quality, and attractiveness. The attitude of management toward the lunchroom may affect patronage also. Pride in providing a good service for the industrial family as opposed to a take-it-or-leave-it attitude tends to win favorable response.

The size of a dining room in a hospital should be determined as to whether it is to be used for employees, patients, or guests, or any combination of these. The type of hospital and the number of ambulatory patients should also be considered. The type of hospital will also influence the number of personnel employed. The ratio of personnel to patients will vary from 1 to 3, depending on how much special care is required or how much teaching and research are done. Good food and reasonable prices will attract a high percentage of those eligible to eat in the facility.

School lunch participation varies 25 to 75 percent and a good percentage for planning is 60 to 75 percent of enrollment. Where prices are low, the food good, meal selections appealing, and the food service carefully integrated with the educational program, the percentage will be high.

Banquet seating requires planning because maximum seating potential means maximum profits. Folding tables 30 in. wide are popular. These are obtained in varying lengths, but 72 and 96 in. are commonly used. The spacing for the legs should be such as to allow for comfortable seating when the tables are joined end to end and place settings are laid on 24-in. centers.

Restaurant operators should consider space in relation to patronage volume essential for a profitable business. Labor, food, and operating costs must be met and a profit realized that covers risk-bearing effort expended and return on investment. Essential income is weighed in the light of probable patronage and probable average check. The number of seats provided in planning must cover this need.

Flexibility in seating capacity is often desirable. People do not like to be crowded nor do they enjoy the lonely experience of being seated in a huge area occupied by only a few. Sparse patronage creates an impression of poor popularity. Separate rooms, folding doors, screens, or other attractive devices can be used to reduce size of an area during slack periods. Sections left open should be those easiest to serve. Balconies, back rooms, or other less desirable space can often be used for overflow numbers that occasionally require service.

A common experience in many dining room operations is the need for more seating at one meal than at others. This may be due either to increased numbers or different turnover rates. A residence cafeteria serving 600 men has an overflow room seating 100, which it uses only at dinner. The night meal is not only larger but the men dine in a more leisurely fashion. The room is available for serving other groups at breakfast and lunch.

Commercial restaurants located in shopping or office areas often have a heavier demand at noon than at the dinner hour. Rooms used for general patronage at noon may be closed at night or provide space for private dinner parties. Entrances to these rooms should not require passage through the main dining room. Convenience for special service is important.

Production Areas

A frequently used rule for allotting space for the kitchen is that it should be one-third to one-half the area of the dining room. It has been found unsatisfactory, however, to go by a set space allowance for this area. Detailed study of space allocations leads to the conclusion that percentages in relation to the dining area are "completely unrealistic and unreliable." An analysis of specific needs is required. Many factors influence space requirements, such as:

1. Type of preparation and service
2. Amount of the total production done in the unit
3. Volume in terms of the number of meals served
4. Variety of foods offered in the menu
5. Elaborateness of preparation and service
6. Amount of individual service given, as in a hospital tray service
7. Seating and service plan, whether on one floor or many

The cost of providing space, equipment, and labor is sufficient to merit careful calculation of the best type of operation before planning. New products on the market, new cooking methods, and new equipment available should be evaluated. The use of preprocessed products in many metropolitan areas has made a pronounced change in the amount of space allotted for bake shop, meat cutting, and vegetable preparation areas. Where portion-cut meats are readily available, it is questionable whether even a large establishment can afford to equip and provide skilled labor for a butcher shop. The use of large quantities of frozen foods affects storage needs. The cost and quality of market products, their availability, and the frequency of deliveries are all to be considered.

Variety in menu selection and elaboration of foods tend to increase space needs in work areas and storage. Small amounts of numerous items do not permit stacking and bulk packaging. Elaboration of food often involves individual portion treatment, with individual casseroles, for example, as compared to bulk steam table pans. A hospital food service requiring many special diets serves as a common example of menu variety and individual portion treatment imposing special space requirements.

The equipment provided will affect the space needs. Garbage and refuse, for example, may require a sizable area for storage awaiting pickup. Disposal units for food garbage, incinerator for burnable refuse, and a crusher for tin cans will greatly reduce the amount to be held. Frequency of garbage collection will minimize the space needs.

Structural features of the building may influence the utilization of space. The shape of the kitchen, location of ventilation and elevator shafts, support columns and partitions should be considered in relation to an efficient layout for work. The location of entrances and

exits for a good flow of traffic, window placement, suitable space, and relationship of sections need consideration. Eliminate partitions whenever possible; this will reduce space needs and also permit easier supervision of production areas.

Kitchens serving a smaller number require a larger square footage per meal than those serving a larger number. The following data used for industrial cafeterias show the rate at which space needs per meal tend to decrease as the number served increases (Table 2).

TABLE 2 Variation in Space Needs in Relation to Numbers Served

Meal load	Square feet per meal	Variation in square feet
100-200	5.00	500-1,000
200-400	4.00	800-1,600
400-800	3.50	1,400-2,800
800-1,300	3.00	2,400-3,900
1,300-2,000	2.50	3,250-5,000
2,000-3,000	2.00	4,000-6,000
3,000-5,000	1.85	5,500-9,250

Planners are often asked to make estimates of space needs before having an opportunity to make policies or detailed plans for operations. Figures that will be found useful in making such estimates are given in Table 3. These figures pertain to average kitchen areas found in different types of food facilities. Their use is to be regarded as *tentative and to be measured carefully in terms of specific needs.* The square footage given is to be multiplied by the maximum number of meals estimated per hour of service, in order to find the total space requirement.

After production policies have been established, work areas may be blocked out in terms of the equipment needs and the number of workers required to do the work in a section. Linear space, depths, and heights for work centers should be controlled in terms of average human measurements. This will include the reach to and grasp of material or equipment used in working. The length and width of the work table is adjusted in terms of the amount and size of equipment that will rest on it during the progress of work. The linear measurement will vary in terms of the number of workers using it at one time.

The width of the table may be 24 to 30 in. unless dishes or food containers are to rest at the back of the table. Tables 36 in. wide are preferable when the back of the area is used for such storage. Where two workers work opposite each other, a table 42 in. wide may be used. A work area of 4 to 6 lin ft will be within convenient reach of the average person. Tables 8 to 10 ft long are used if two people are working side by side. A height of 34 in., commonly used as a working height, should be evaluated in terms of specific work done and equipment used.

Aisle space should permit free, easy movement of essential traffic. The minimum width for a lane between equipment where one person works alone is 36 and 42 in. where more than one is employed and where workers must pass each other in the progress of work. Where mobile equipment is used, 48 to 54 in. are recommended. At least 60 in. are needed for main traffic lanes where workers regularly pass each other with mobile equipment. If workers or equipment must stand in the lane while working, appropriate space should be allowed for this. Thought should be given to space for doors opening into an aisle and for handling large pieces of equipment, such as roasting pans, baking sheets, and stock pots.

Main thoroughfares should not pass through work centers. Compactness is essential for step-saving. It is well for the work centers to be in close proximity to main traffic lanes, with easy access to them. It is important both to avoid distraction from outsiders passing through work centers and to conserve space. Work centers at right angles to traffic lanes are efficient (Fig. 1).

The percentage of floor area covered by equipment varies according to production needs and the type of equipment used. A satisfactory layout may claim less than 30 percent of total space for equipment while work areas, traffic lanes, and space around equipment for easy operation and cleaning may require 70 percent or more.

For hospital production and service areas, 20 to 30 sq ft per bed is suggested. The need is reduced as the number of beds increases—approximately 30 sq ft per bed for a 50-bed, and 20 sq ft per bed for a 200-bed hospital. This allowance does not include major storage areas, dining rooms, employee facilities, or floor serving pantries.

Serving Areas

Space allowance of serving areas should be adapted to the needs of the specific facility. The menu, organization of work, and number served will influence size. The type of service will also be influential in dictating space needed.

In cafeterias the counter length should be regulated by the variety and volume. Excess space partially filled is unattractive, but crowding is also undesirable. An estimate that may be used for allotting width is 14 ft. This allows for 4 ft as patron lane space, 1 ft tray slide, 2 ft counter width, 4½ ft for workers, and 2½ ft for back bar. The size of the tray should dictate the width of the tray slide. The average length of counters in college residence halls and hospitals is found to be 30 to 32 ft, while those in school lunchrooms average around 15 to 20 ft. Some commercial cafeteria counters may be 70 to 80 ft long, but counters over 50 ft long are frequently considered inefficient. Twenty feet is usually thought of as a minimum but, under special conditions and where a limited menu is served, 6 to 8 ft may be sufficient. The trend is toward shorter counters with mobile serving units or dish holders set at right angles to the counter. Smoother service and greater speed are achieved. Counter height may be set at comfortable levels for workers and patrons. Schools may have lower counters so that children may see the food and push their trays along a slide as they are served. For little folk, 28 to 30 in. is desirable, with counters narrow so that servers may reach over to assist a child. A solid tray slide tends to result in fewer accidents than those made of bars or tubing. Plastic trays measuring 9 by 12 in., compartmented, and of pastel colors are popular. Slides for these may be on the servers' side of the counter for ease of service and to eliminate spillage or accidents. The child picks up the completed service at the end of the line.

Some planners use, as a rough guide, one counter or line for every 250 to 300 patrons served, but arrival rate, speed of service, and turnover are more reliable factors to consider in establishing the number of lines required.

Hospital service space will depend upon whether central or floor service is used, trays are set up in serving pantries, and modified diets are set up in line or in a diet kitchen. Space must be allowed for bulk food trucks, tray trucks, small tray carts, or special dispensing units used.

Short-order units where food moves directly from production to the consumer require the least service space. The need for an intermediate station is eliminated. Step-saving compactness saves space. The units requiring the most space are those furnishing elaborate or highly individualized service.

Receiving and Storage Areas

Space allocation for receiving and storage must be based on specific needs. The volume and type of items received and stored should be considered. Although the average operation may find a dock 8 ft deep and 12 ft long sufficient for receiving items, this would not be sufficient for a large one. The space requirement in square feet for food storage for 30 days has been calculated by some as approximately one half the total served or, if 1,000 are served, 500 sq ft may be used as a tentative figure for total food storage needs. Cases of 6/10's stacked 6 cases high on flat trucks will have a bearing weight of approximately 250 to 300 lb per sq ft. Skid sizes should be 3 by 2½ ft by 8 to 12 in. high. Where heavy items, such as 10-gal cans of milk, are stored, bearing weights may be increased. One case of 6/10's, 24/2½'s, or 24/2's weighs approximately 50 lb and occupies 1 cu ft.

Common Storage The volume of canned food needed to serve 100 persons three meals daily for one month is estimated at approximately 45 cases of 6/10's or equivalent. The maximum stack height will be 8 or 9 cases or approximately 72 in. Accessibility of items that differ, as well as volume, will govern the number of stacks needed. A total of 3 cu. ft per stack is estimated to include floor space covered by a case of canned food, plus a share of aisle space. One thousand cases piled eight high in 125 stacks will require 375 sq ft or a storage area approximately 20 by 20 ft. Storeroom aisles may be as narrow as 36 in., but 42 or 48

TABLE 3 Square Feet of Kitchen Space per Meal for Food Facilities of Different Type and Size

Type of facility	Estimated maximum meals per hour				
	200 or less	200-400	400-800	800-1,300	1,300-7,500
Cafeterias	7.5-5.0	5.0-4.0	4.0-3.5	3.5-3.0	3.0-1.8
Hospitals	18.0-4.5	12.0-4.5	11.0-4.5	10.0-4.0	8.0-4.0
Hotels	18.0-4.0	7.5-3.0	6.0-3.0	4.0-3.0	4.0-3.0
Industrial lunchrooms	7.5-5.0	4.0-3.2	3.5-2.0	3.0-2.0	2.5-1.7
Lunch counters	7.5-2.0	2.0-1.5			
Railroad dining car	1.6				
Restaurants (service)	7.0-4.0	5.0-3.6	5.0-3.6	5.0-3.0	5.0-3.0
School lunchrooms	4.0-3.3	3.3-2.2	3.0-2.0	2.5-1.6	2.0-1.6

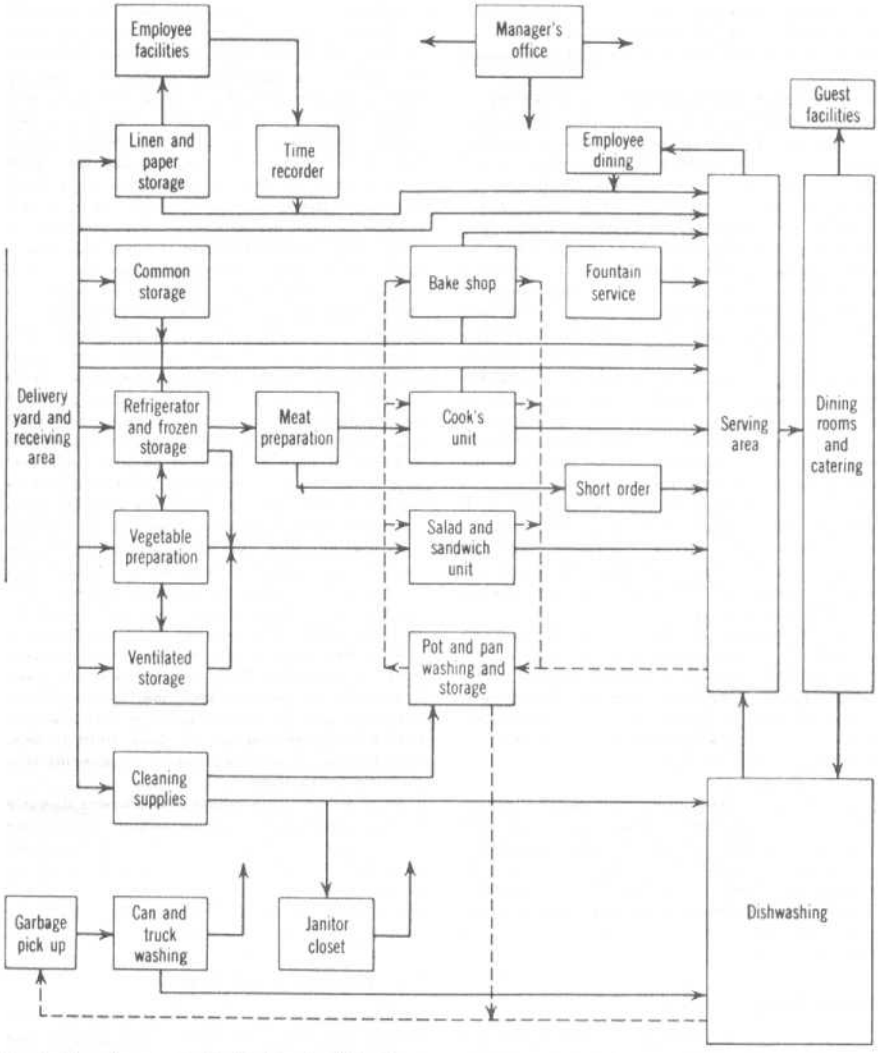


Fig. 1 Flow diagram showing functional relationships.

in. are preferred. Wider aisles may be required if trucks are used. A 3-ft skid on a hydraulic jack needs maneuvering room. If rolling bins or garbage cans on dollies are used for storage, plan location for these. If cans or bins are under shelves, adjust height of bottom shelf to clear and allow for work space for removing food from these containers. Fixed shelving will be best when planned to suit the sizes of items stored. Consider both interspace and depth suitable. Condiment bottles, cereal packages, and canned goods differ in package sizes and in stacking quality. The depth of a shelf should accommodate either the width or length of the case, and the interspace should be adequate for the number to be stacked one on top of another. Allow 1½ to 2 in. as free space for ease of positioning. Add thickness of shelving to interspace when stating measurements between centers.

Position heavy items to reduce lifting and facilitate dispensing. Drums of oil and vinegar should have spigots and be equipped with pumps or located on cradles. Table surface and scales should be located for convenient issuing of dry stores. Plan to have all products at least 6 in. above the floor or movable to facilitate cleaning of storage area. Limit height of top shelf for easy reach without aid of stool or stepladder. The average vertical reach of men is 84½ in. and of women 81 in. Use of the top shelf for light, bulky packages, such as cereal, is recommended.

Refrigerated and Low-Temperature Storage There are many factors affecting space needs for refrigerated and low-temperature foods. Across-the-board figures generally should be used only in preliminary estimates. The quantity stored at one time will dictate the storage needs. Variation in the type of storage also will be indicated by the types of items to be stored. Allocation in preliminary planning may be as follows: 20 to 35 percent for meat (portion-ready meats require ⅛ to ⅓ less space than carcass or wholesale cuts); 30 to 35 percent for fruits and vegetables; 20 to 25 percent for dairy products, including those in serving areas; 10 to 25 percent for frozen foods; and 5 to 10 percent for carry-over foods, salads, sandwich material, and bakery products. A requirement of 15 to 20 cu ft of refrigeration per 100 complete meals has also been used by some planners. Others state 1 to 1½ cu ft of usable refrigerator space should be provided for every three meals served. Analysis of a number of award-winning installations indicated that approximately 0.25 to 0.50 cu ft of refrigerated walk-in space was provided per meal served, and frozen walk-in space approximated 0.1 to 0.3 cu ft per meal served. Additional low-temperature or refrigerated space in terms of reach-ins was not calculated. In some climates, refrigerated space must be provided for dried fruits, nuts, cereals, and other foods to prevent weevil and insect infestation.

A walk-in becomes feasible for an operation serving 300 to 400 meals per day, and refrigerated pass-throughs can be added when from 400 to 500 meals are served per day. A walk-in 5 to 6 ft wide does not permit storage on both sides with adequate aisle space. Storage space of 1½ to 2 ft should be allowed on either side of the aisle. If crates or cases are stored, this may have to be increased. Aisles of 30 in. are usually too narrow; 42 in. are desirable. If mobile equipment is moved in and out, aisles may have to be wider. Walk-ins that are 8 to 9 ft wide and about 10 ft long are minimum size. This allows for two storage areas 30 in. wide with a 3 to 4 ft aisle. If added width is desired for storage space in the center, allowance for storage areas of about 3 ft wide and 42 in. minimum aisles should be provided. Large walk-ins may be designed for lift truck operation, with doors opening from the receiving dock on one side and into the kitchen opposite. If this is done and lift trucks are used, space must be provided in storage aisles for their working and turning around. Doors should be a minimum of 42 in. wide to admit large crates and containers or be sized to suit mobile equipment. Doors to low-temperature areas are most often planned to open into a refrigerated area. If this is not done a heating device may have to be installed on a door opening into a warm area to prevent its freezing tight from condensation. About 12 to 15 sq ft must be kept free for every door opening. About 45 lb of frozen food, if stacked in cases, can be stored per cubic foot. About 30 to 35 lb of refrigerated food can be stored per cubic foot.

Sanitation Areas

Dishwashing Area The space required for the dishwashing operation depends on the methods and equipment used. In all instances there must be adequate room to receive the volume of soiled dishes likely to arrive at any one time, plus space for scraping, stacking, and placing in baskets on a conveyor of a machine or into a prerinsing operation. The dimensions may be only 30 to 36 in. for a single tank machine, 60 to 72 in. for sinks, or 7 to over 30 ft for a conveyor-type machine. The requirements in the clean dish area will vary. It is important that there be enough space for dishes to be exposed to air for sufficient time to air-dry before stacking. For a basket-type machine, it is well to allow space equal to that required for three baskets, a stack of trays, and three or four stacks of dishes. For basket machines, it is usually recommended that the clean dish area occupy 66 percent of the total table space and the soiled dish area, 40 percent.

Methods used for transporting and storing dishes will influence space needs. Where mobile storage equipment is used, more space is needed for the several units than where one cart is used for transporting and is repeatedly loaded and unloaded. A table surface is desirable for sorting, treating, or inspecting silver and other tableware. The installation of a domestic washer and drier in the dishroom may require space.

Pot and Pan Section Provide a soiled utensil collection area adequate for the largest volume that normally arrives in the section at one time. The busiest periods are likely to occur when preparation containers are emptied for service

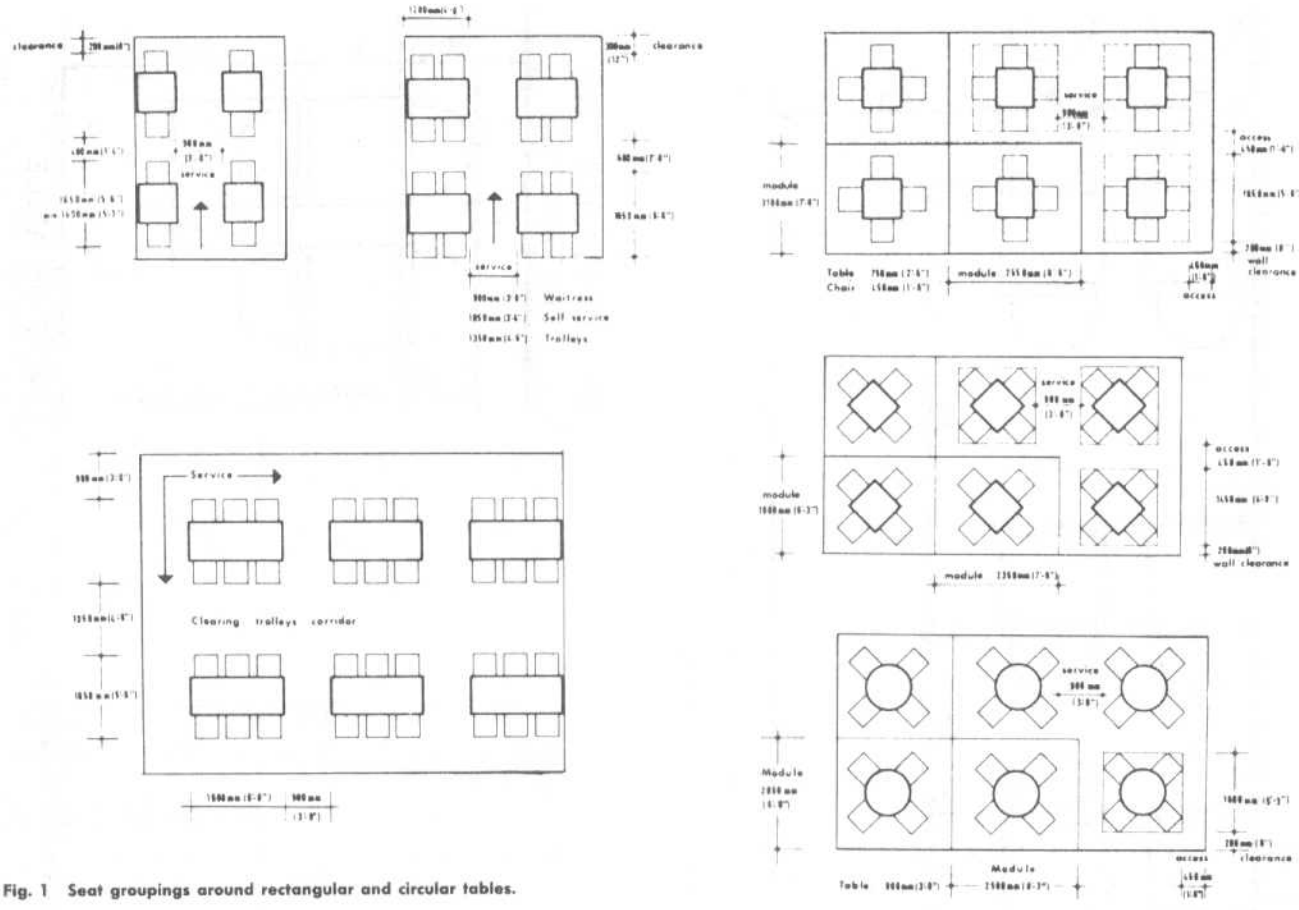


Fig. 1 Seat groupings around rectangular and circular tables.

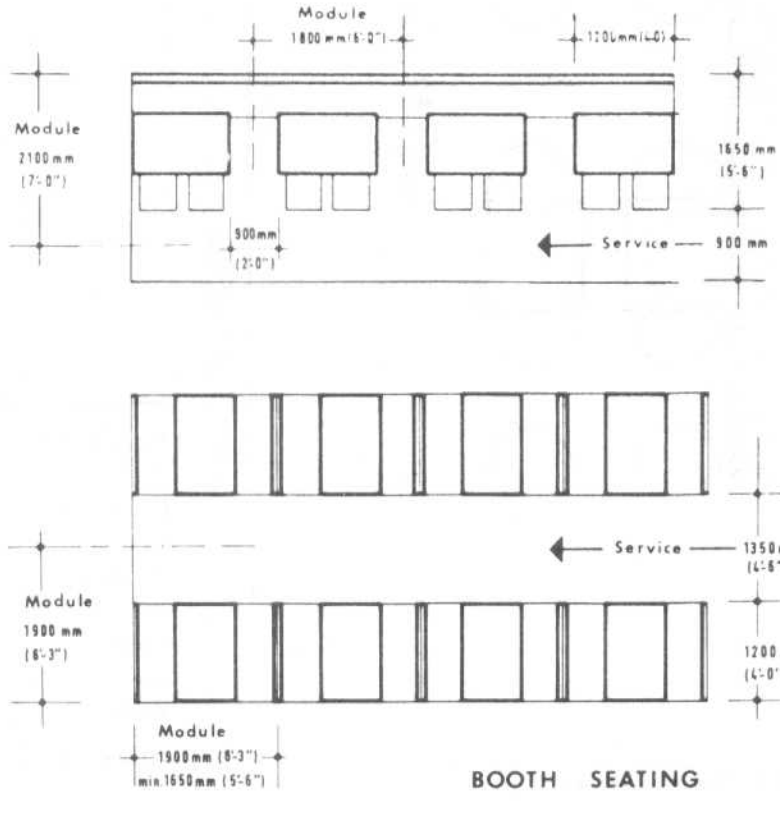
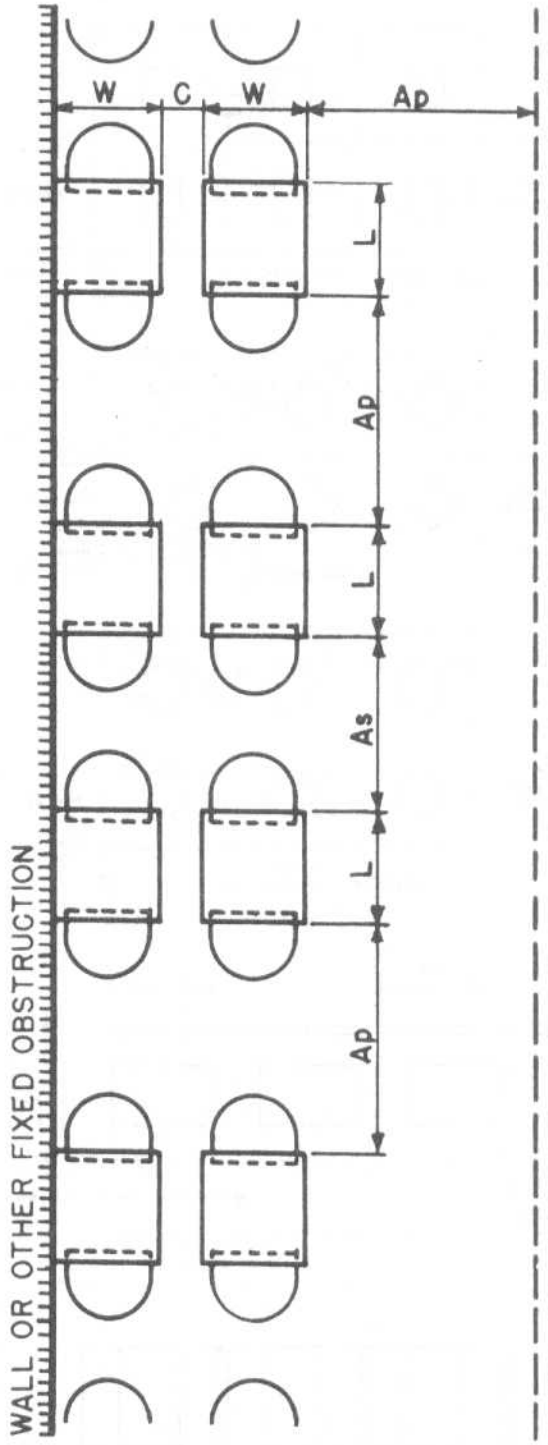


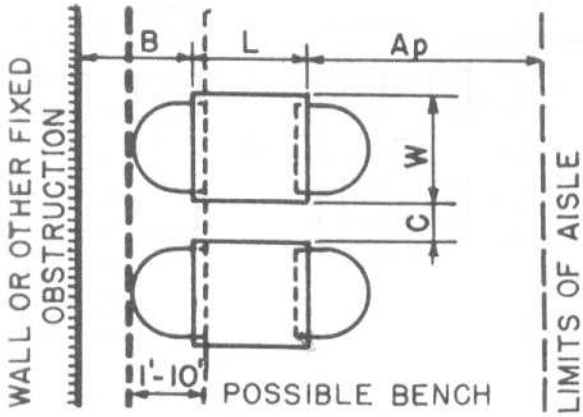
Fig. 2 Banquette seating arrangements and limiting dimensions including space for access and service.

Fred Lawson, *Restaurant Planning and Design,* The Architectural Press, Ltd., London, 1973.

RESTAURANTS AND EATING PLACES

Restaurant Seating





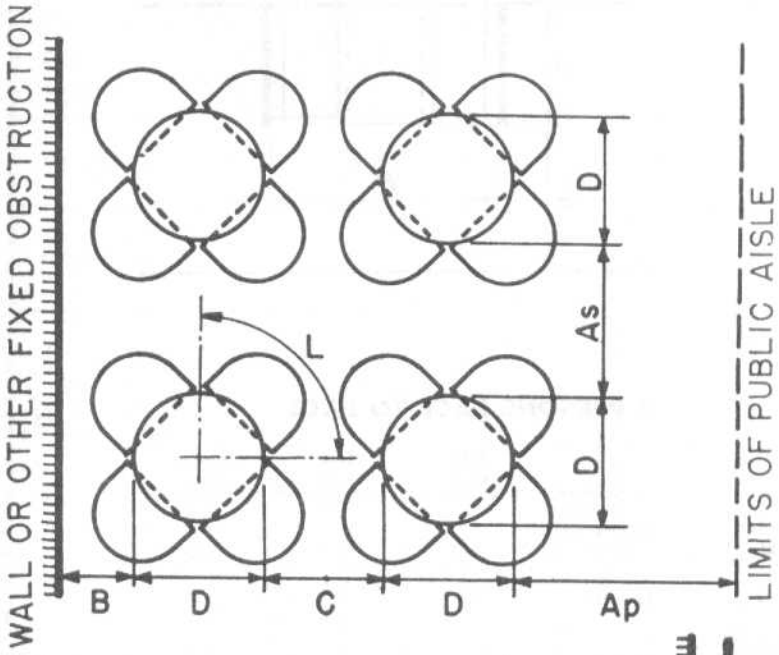
	Abs. Min.	Des. Min.	Comfort-able
Ap Public circ'n	3–0 to 4–6	3–6 to 5–0	3–9 to 5–0
As Service aisle	3–6 to 4–6	4–0 to 5–0	4–0 to 5–6
B To wall	1–8 to 2–0	2–0 to 2–6	2–0 to 3–0
C Between units	0 to 8	6 to 1–0	1–0
Length	1–8 to 2–0	2–3 to 2–4	2–4 to 2–6
Width	1–8 to 2–0	2–2 to 2–3	2–4 to 2–6

all dimensions in feet and inches

	Abs. Min.	Des. Min.	Comfort-able
Ap Public circ'n	*1–10 to 4–6	2–3 to 5–0	3–0 to 5–0
As Service aisle	3–0 to 3–6	3–6 to 4–0	3–9 to 4–0
C Between units	0 to 3	4 to 6	6
Length	1–8 to 2–0	2–3 to 2–4	2–4 to 2–6
Width	1–8 to 2–0	2–2 to 2–3	2–4 to 2–6

*Lower range only if chairs, etc., do not project into aisle

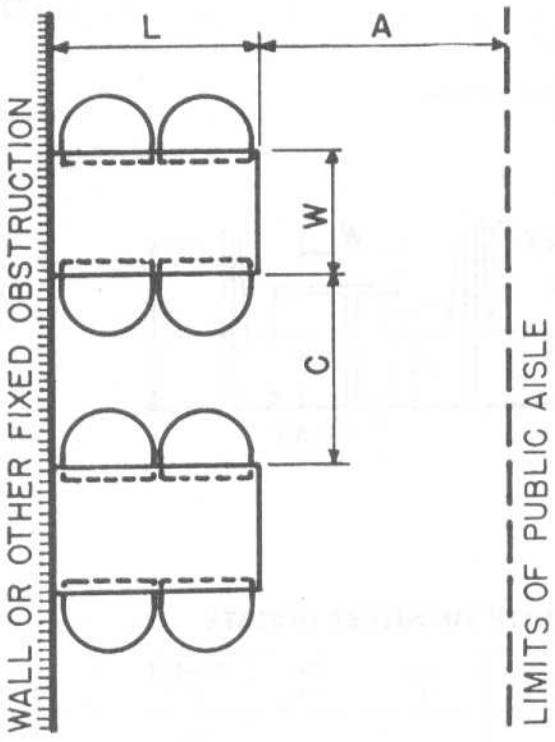
Fig. 4 Table and chair units.



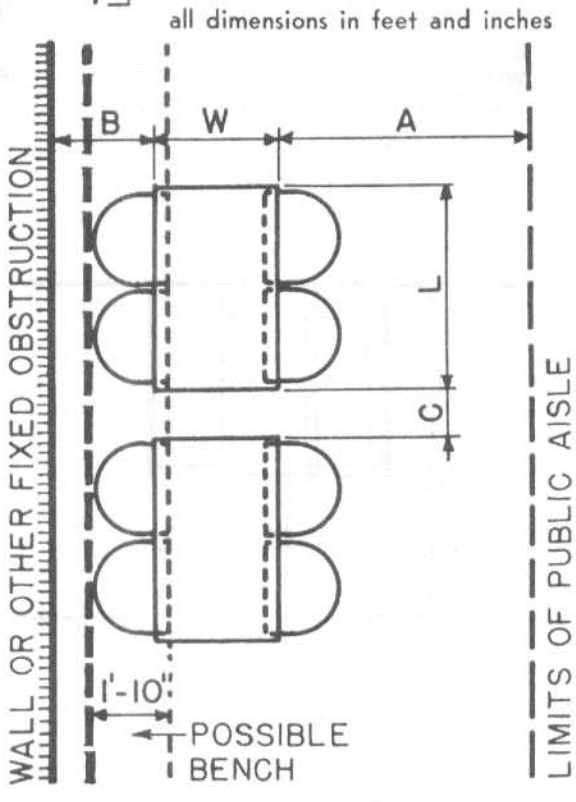
		Abs. Min.	Des. Min.	Comfortable
Ap	Public circ'n	3-0 to 3-6	3-6 to 4-6	3-6 to 4-6
As	Service only	2-0	2-6	3-0
B	To wall	6 to 1-0	10 to 1-0	1-0 to 1-3
C	Between units	1-6	1-10	2-0
Diameter		2-8	2-10	2-10
*L	Perimeter per seat	1-10	2-0	2-2

*For seating units for more than 4 persons, round tables are usually recommended; diameter depending on perimeter necessary to seat required number.

all dimensions in feet and inches



		Abs. Min.	Des. Min.	Comfortable
A	Service or pub. circ'n	2-0 to 3-6	2-6 to 4-6	3-0 to 5-0
C	Between units	3-0 to 3-6	3-6 to 4-0	3-9 to 4-0
Length		3–6	3-10 to 4-0	4–0
Width		1-8 to 2-0	2-0 to 2-3	2-4 to 2-6

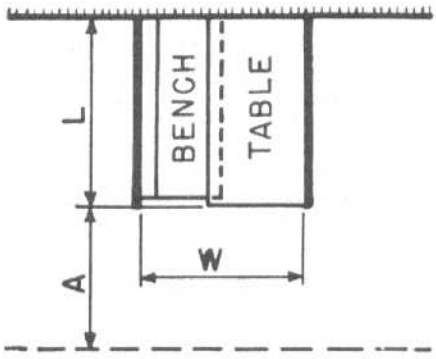


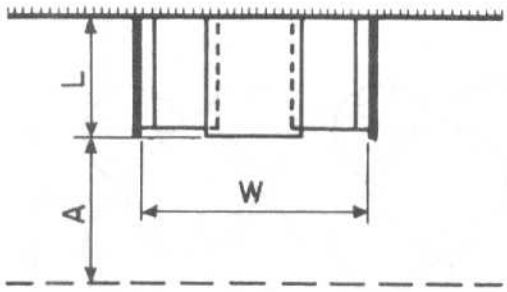
		Abs. Min.	Des. Min.	Comfortable
A	Service or pub. circ'n	3-6 to 4-6	4-6 to 5-0	5-0 to 5-6
B	To Wall	2–0	2-0 to 2-6	2-0 to 3-0
C	Between units	0 to 1-0	1–0	1–6
Length		3–6	3-10 to 4-0	4–0
Width		1-8 to 2-0	2-0 to 2-3	2-4 to 2-6

Fig. 4 (continued) Table and chair units.

RESTAURANTS AND EATING PLACES

Restaurant Seating





2 PERSONS SIDE BY SIDE

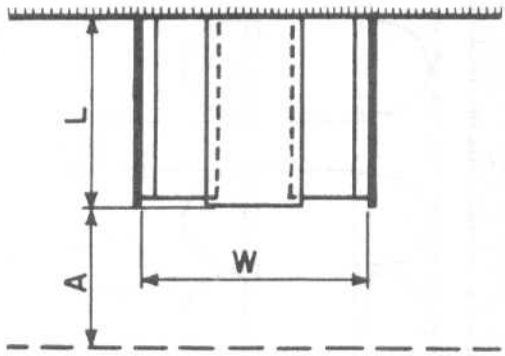
	Abs. Min.	Des. Min.	Comfort-able
Service A and pub. circ'n	2–6	3–0	3–6
Length	3–6	3–9	4–0
Width	3–0	3–3	3–6

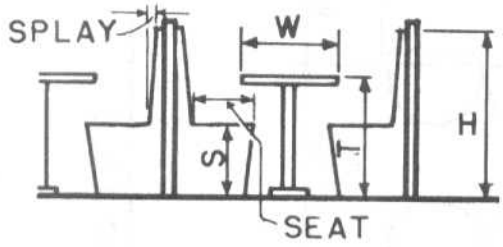
Note: This type not ordinarily recommended.

2 PERSONS FACE TO FACE

	Abs. Min.	Des. Min.	Comfort-able
Service A and pub. circ'n	2–6 to 3–0	3–0 to 4–0	3–6 to 5–0
Length	2–0	2–2 to 2–6	2–6
Width	4–10 to 5–6	5–2 to 5–6	5–8 to 5–10

dimensions in feet and inches





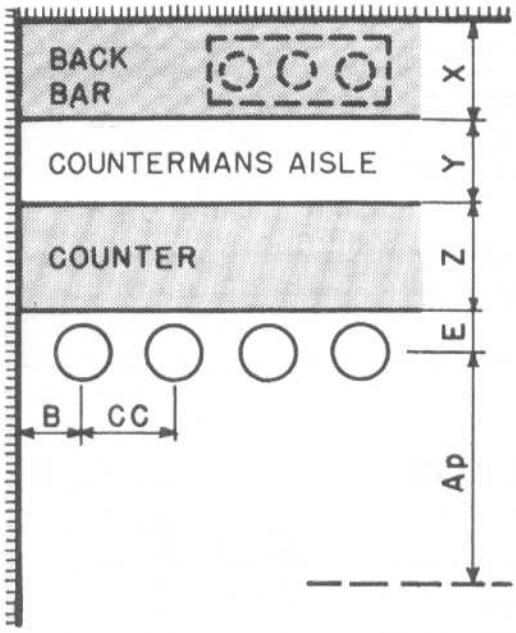
4 PERSONS

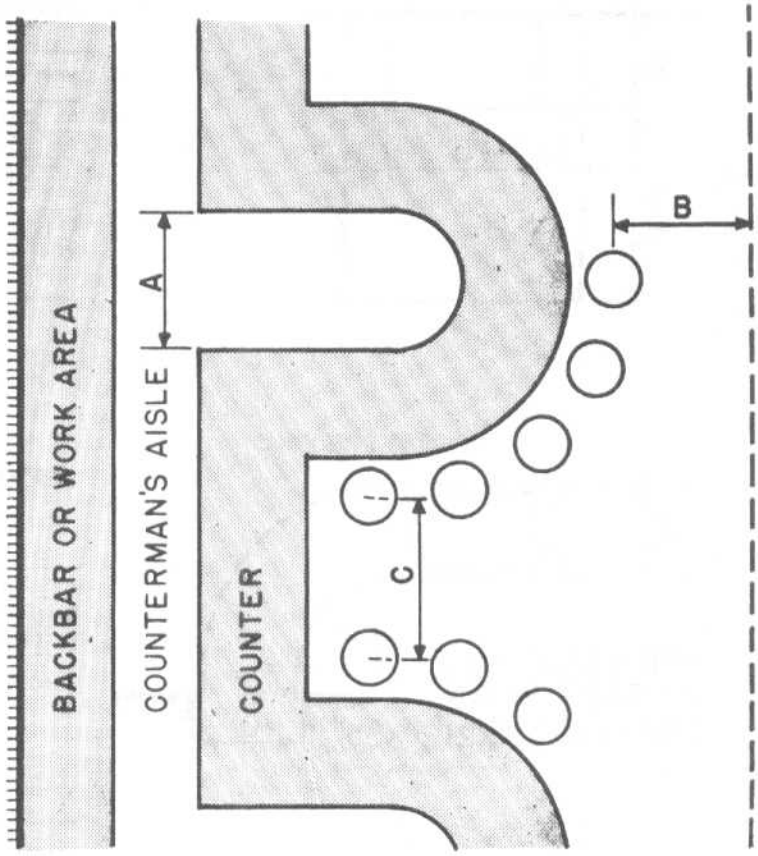
	Abs. Min.	Des. Min.	Comfort-able
Service A and pub. circ'n	2–6 to 3–0	3–0 to 4–0	3–6 to 5–0
Length	3–6	3–9 to 4–0	4–0 to 4–2
Width	4–10 to 5–6	5–2 to 5–6	5–8 to 5–10

BOOTH FURNITURE HEIGHTS

	Abs. Min.	Des. Min.	Comfort-able
H	3–0 to 3–6	3–6	4–0
S	1–5 to 1–6	1–5 to 1–6	1–6
T	2–5	2–5 to 2–6	2–6
W	1–8 to 2–0	2–0 to 2–2	2–4 to 2–6
Seat	1–4 to 1–5	1–5 to 1–6	1–6 to 1–8
Splay	0 to 0–3	0–2 to 0–3	0–3½ to 0–4

Fig. 5 Booths.





STANDARD (straight) TYPE

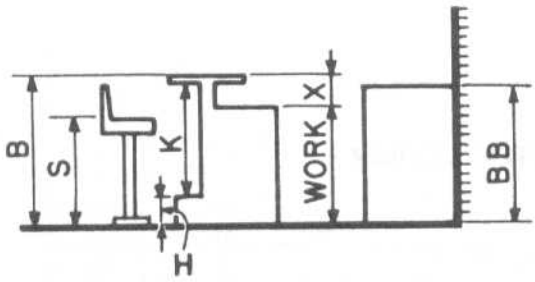
		Abs. Min.	Desirable Min.
X	No cooking equipment	1- 6	2-0
X	With cooking equipt.	2- 0	2-6
Y	1 person	2- 0	2-3
Y	2 or more persons	2- 6	2-9
Z		1-10	2-0
E		9	1-2
Ap		3- 6	4-6
B		1- 0	1-2
CC		1-10	2-0

Variations in Shape

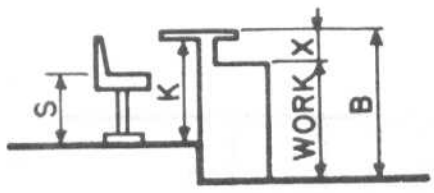
	Usual Minimum
A	2-6 to 3-6
B	2-6 to 4-6
C	2-9 to 5-6

dimensions in feet and inches

HEIGHTS



LEVEL FLOOR



DROPPED FLOOR

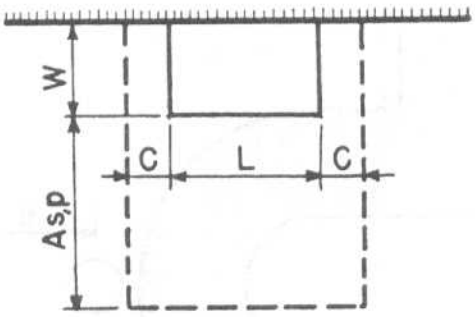
	Range of Dimensions		Range of Dimensions
B	2-6 to 3- 6	X	1-2 to 1- 3
BB	3-0 to 3- 6	Work	2-4 to 2- 7
H	7 to 10	S	1-6 to 2- 6
K	2-4 to 2- 8		

	Range of Dimensions
B	3-0 to 3- 6
K	2-4 to 2-10
S	1-6 to 2- 1
X	1-2 to 1- 3
Work	2-4 to 2- 8

Fig. 6 Food bars.

RESTAURANTS AND EATING PLACES

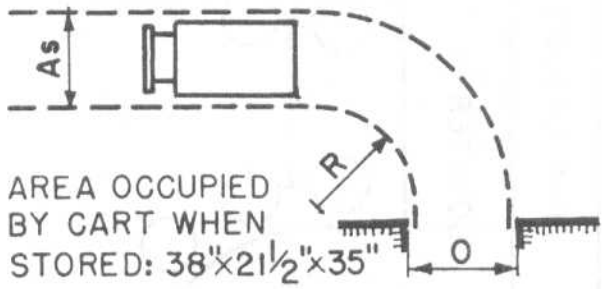
Serving Units



SERVING TABLE (& sideboard)

		Abs. Min.	Des. Min.	Comfortable
As	Service only	2-6	3-0	3-6
Ap	Public circ'n	2-0	2-6	3-0
C	Clearance to adjacent units	2-0	2-3	2-6
Length / Width	30" x 20" x 42" is average.			

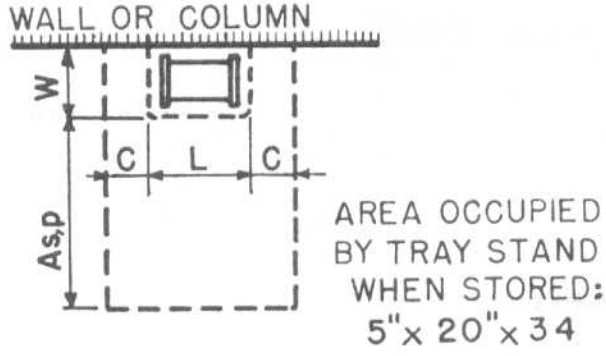
Display tables (hors d'oeuvres, etc.) usually 5' 0" x 2' 0"; (wines), 3' 0" round



SERVING CART

		Abs. Min.	Des. Min.
As	Service only	2-0	2-6
R	Turn radius	3-0	3-6
O	Door, opening width	2-0	2-6

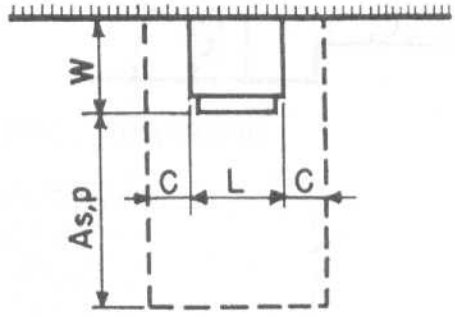
Approx. area when stored: 38" x 21½" x 35"



TRAY STAND

		Abs. Min.	Des. Min.	Comfortable
As	Service only	2-6	3-0	3-6
Ap	Public circ'n	2-0	2-6	3-0
C	Clearance to adjacent units	2-0	2-3	2-6
Length (tray) / Width (tray)	Depends on type of restaurant.			

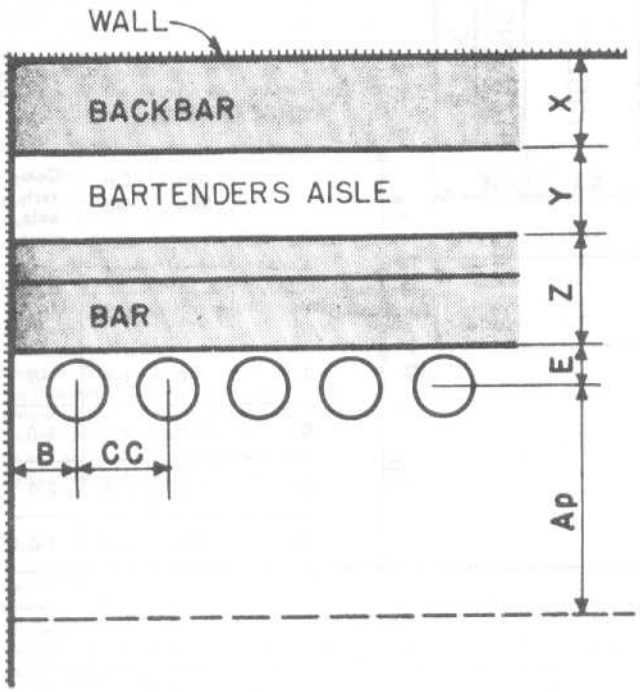
Approx. area of stand, stored: 5" x 20" x 34"



WATER COOLER

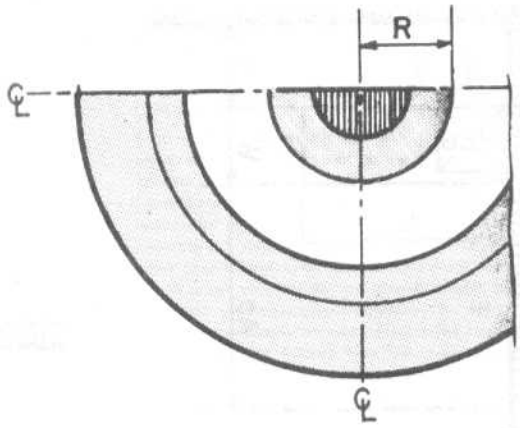
		Abs. Min.	Des. Min.	Comfortable
As	Service only	2-6	3-0	3-6
Ap	Public circ'n	2-0	2-6	3-0
C	Clearance to adjacent units	Can arrange on top or front		
Length / Width	Depends on capacity and if glass storage included.			

Fig. 7 Serving units.



STRAIGHT TYPE—with or without stools

		Abs. Min.	Des. Min.	Comfortable
Ap	Public aisle	3-6 to 4-6	4-0 to 5-0	4-6 to 6-0
B	Stool to wall	1-0 to 1-6	1-2 to 1-6	1-4 to 1-6
CC	Stool, cent. to cent.	1-9 to 2-0	2-0	2-2 to 2-6
E	Stool to bar	9 to 1-0	1-0	1-1 to 1-2
X	Back bar	1-6 to 1-8	1-8 to 2-0	2-0 to 2-3
Y	Bartender's aisle	2-0 to 2-2	2-6	3-0
Z	Bar	2-3 to 2-6	2-5 to 2-6	2-8 to 2-9

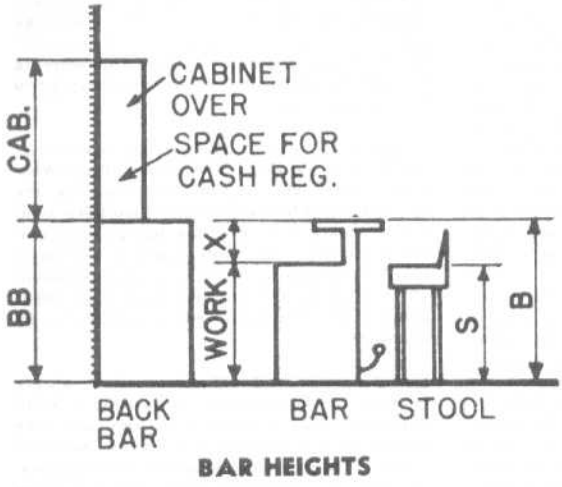


CURVED TYPES: Radius R should be at least 2 ft.; other dimensions as for straight types.

Bar length: Allow from 1 ft. 8 in. to 1 ft. 10 in. per person for standup bars; 2 ft. for each stool.

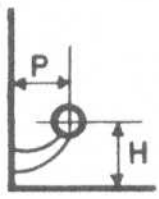
Bar depth: No increase in depth is needed for more than 1 bartender, as each man should be provided with his own "set-up" space in the work counter and back-bar.

Service bars: These are usually from 6 to 8 ft. long for 1-man service; from 10 to 12 ft. long if 2 bartenders are needed for peak service periods. No footrail, counter overhang, or stools are required. Location is often adjacent to kitchen and concealed from patrons; however, advertising values sometimes cause it to be set in public view. In the latter case, a rope rail or similar device, to discourage patrons from standing at the bar, is often advisable.



BAR HEIGHTS

dimensions in feet and inches



RAIL OR STEP

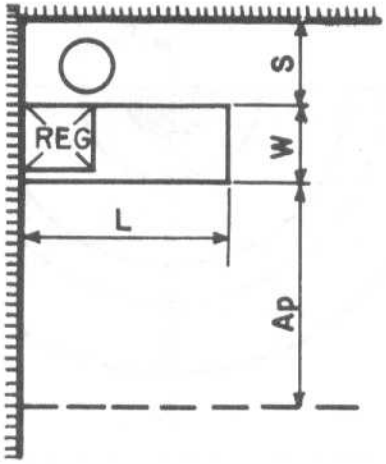
P = 7 to 10
H = 7 to 10

	Usual Min.	Usual Max.
B	3-6	3-9
BB	3-6	3-9
Cab	3-0 to 3-10	5-0 to 5-7
S	2-4 to 2-6	2-7
Work	2-4	2-6
X	1-0 to 1-2	1-2 to 1-3

Fig. 8 Liquor bars.

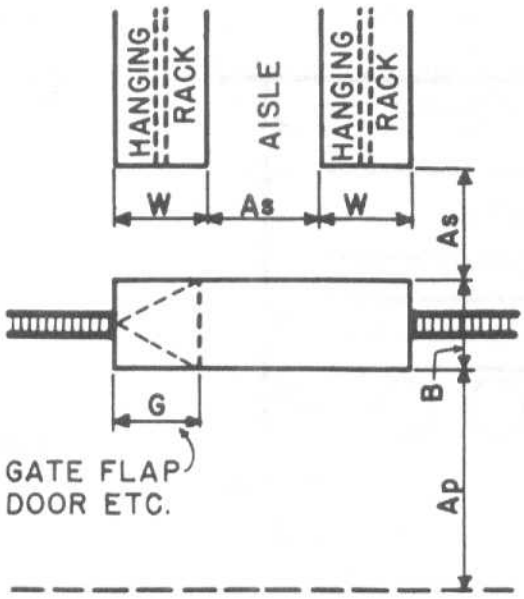
RESTAURANTS AND EATING PLACES

Nondining Spaces



CASHIER'S DESK and COUNTER

		Usual Minimum
S	Cashier's Aisle	2–0 to 2–6
Ap	Public Aisle	3–6 to 5–0
Length		4–0 to 8–0
Width		2–0 to 2–4



CHECK ROOM

	Abs. Min.	Des. Min.	Comfortable
Ap	3–0	4–0	6–0
As	2–6	2–9	3–3
B	1–0	1–6	1–9
C	2–0	3–0	5–0
G	1–6	1–9	2–0
W	1–10	2–0	2–0

dimensions in feet and inches

Fig. 9 Nondining spaces.

and immediately following service when service equipment is brought from the serving areas. A disposal or a removable strainer above a drain is desirable for waste removal.

When allowing space for the pot and pan section, 40 sq ft is generally regarded as a minimum for the smallest unit. The free work aisle between the sinks and other equipment should be 4 ft wide. The space allowance above the minimum will vary widely depending upon the type equipment used and the volume of pots and pans handled. Less space in relation to the maximum load may be required where a mechanical washer is used and fewer labor hours will be spent in handling a large volume per unit handled.

Miscellaneous Sanitation Areas For washing mobile equipment, space is needed where splashing can be confined and that has satisfactory drainage. This area may be adjacent to the dishwashing section or to the place where can washing is done. The size and type of equipment to be handled will govern the space needs.

A storage area for emergency cleanup equipment is needed in convenient relationship to dining rooms and work sections. Spillage and breakage create unsightliness and are accident hazards. Immediate care usually does not require heavy or large equipment but may be handled by a small broom, dustpan, small mop, and bucket not used for major cleaning. A mobile unit may be designed to carry these things, or a small closet may be provided.

Major cleaning equipment required will depend on the floors, finishes, and furniture to be cleaned. Determine whether a power sweeper, scrubber, and waxer are to be used. Space may be required for storage of janitor supply carts and for miscellaneous replacement items, such as light bulbs. Provision will be needed for storing, emptying, cleaning, and filling mop trucks and for cleaning and air-drying wet mops.

Employee Facilities

Facilities for employees may include locker and lounge area, toilets, showers, time-recording equipment, hand basins near work areas, and dining rooms. An employee entrance should be so located that the employees may go directly to the dressing rooms without passing through the dining room or production area.

Locker and Lounge Area Employee possessions should be protected in a suitably safe and sanitary condition while the employees are at work. Whether individual lockers or common cupboard, sufficient space should be allowed for personal clothing to hang without crowding or wrinkling. If cupboards are used for clothing, a separate space should be afforded for street clothing and for uniforms, and individual parcel lockers should be provided for storage of purses and other valuables. The height of the space for clothing should permit the longest garment to hang straight without wrinkling. The depth from front to back should be a minimum of 20 in.

Suitable size for an employee lounge depends largely on scheduling of workers and the policies of individual establishments. Many operators discourage lounging in the dressing room and recommend the employees' dining area for this. Others having broken shifts on their schedules favor an extra room for lounging. In all cases benches or chairs are to be provided upon which workers may sit while changing clothes and shoes. A cot or daybed, 36 in. by 6 ft, should be provided in the women's room.

Toilets and Showers The location of toilet facilities near work areas is preferred over a remote location in promoting good health habits, lessening loss of labor time, and permitting closer employee supervision. Separate facilities should be provided for men and women. They should be separated from food areas by a hallway or double entrance. Supply one wash bowl for every 8 to 10 workers, one toilet stool for every 12 to 15 women, and one urinal and one toilet stool for every 15 men. Toilet compartments measure approximately 3 by 4½ to 5 ft.

The type of employees, the climate, kind of work, and conditions of work will influence the need for shower facilities. Showers will be appreciated and used by employees working in hot, humid kitchens. Experience has demonstrated that they are little used in localities where the weather is cool most of the year, the work areas well ventilated, and workers drawn from an income group who have good facilities at home.

Time-recording Equipment Provide space for a recorder near and within view of the office. Wall-hung card racks of sufficient capacity are recommended for the number of workers, both full and part time, who are likely to be employed during an accounting period. Estimated space for a clock recorder is approximately 18 in. wide by 12½ in. deep and 18 in. high, and a rack of 50 cards approximately 1½ by 2½ by 34½ in.

General Considerations The size of employee facilities has been found to vary widely. Small operations may not supply lockers and may have only a toilet and lavatory for workers. Some do not provide separate dining areas. Expediency in allowing ample space may be tempered by cost of space, available room, and the acuteness of need. Total space used

may be increased where main toilet and locker areas are remotely located and additional facilities are provided near work areas. It may be decreased where the food facility is a part of a larger organization providing facilities for other workers as in a hospital or in a hotel.

Guest Facilities

Comfort and cordiality should characterize the entrance and waiting area for guests. The size of the area should be based on probable need for waiting, type of service, and number of persons likely to congregate at one time. If there is a lounge or hallway adjacent to the dining room, this may provide some waiting space.

Locate the public telephone, coat rack, and toilet facilities in convenient relationship to the waiting area. In college dining rooms provide ample space for books as well as coats. In residences, a hallway approaching the dining room will lessen the wear on the lounge. Attractive benches or seats are recommended.

TABLE AND CHAIR UNITS

Data on space allocations and clearance contained in Figs. 2 to 8 is presented as an aid in determining capacities, desirable seating layouts, and necessary clearances. Information was furnished by the John Van Range Co. and Albert Pick Co., restaurant equipment specialists; Louis A. Brown, architect; and the Brunswick-Balke-Collender Co.

Tabulations are divided into three groups. The most luxurious establishments ordinarily use as minima the largest figures given, and vice-versa.

BOOTHS

There are, in some localities, code and other restrictions on booth furniture dimensions. Authorities having local jurisdiction should be consulted. One designer consulted regarded the 2-person booth (side-by side) as a waste of space; others recognize that conditions may arise when no other type of furniture will suffice. Booths for more than four persons are not commonly encountered.

NONDINING SPACES

Diagrams, tables and other data given in Fig. 9 and below illustrate only a few of the many types of nondining spaces and clearances required. Data included here may, however, suggest methods of solving most problems.

Cashier

Preferred location for the cashier's desk or counter, according to the Albert Pick Co., is on the right hand side of the door when leaving, in order to avoid cross-traffic and resulting congestion. Dimensions vary from those given in the table according to what merchandise is sold by the cashier and can best be determined in conjunction with each job. If quantities of tobacco, etc., are sold, a back wall case may be necessary.

Coat Checking

Figure 9 illustrates only one type of check room layout; selection of type and size depends on the job under consideration. It is generally considered uneconomical, except in the most luxurious restaurants, to provide check rooms capable of accommodating garments for the peak load of patrons, for the following reasons: (1) Women usually do not check coats; (2) not all male patrons check coats; (3) space required can usually be used otherwise to greater advantage. The Albert Pick Co. estimates that approximately 5 garments can be hung per linear foot on each side of the type of racks diagrammed.

Use of coat trees in dining areas is termed "necessary but never desirable." These occupy approximately 20 by 20 in., are 72 in. high, and can accommodate 8 garments per costumer. Overshoe racks are considered undesirable; umbrella racks, desirable in check rooms.

Telephone Facilities

Booths are usually preferred to telephone jacks, probably because of costs of installation and of relocating wiring when redecorating or replanning. Booths should be out of direct vision yet convenient to dining and lounge areas. One booth per 50 seats is the usual ratio or one phone jack per dining booth.

KITCHENS

The greatest areas for efficiency in manufacturing have been in the areas of reduced work flow. Industrial engineers learned a long time ago that the movement of a product from one spot to another does not of itself improve the product. The process of moving takes time, costs money, is dehumanizing and may, in fact, cause product damage. Industry has evolved all types of imaginative methods for reducing travel and, where it was essential, cause it to happen with the least amount of human assistance and at the lowest possible cost.

The food service industry, until recently, has generally felt that these techniques were not appropriate, primarily because of the past availability of low-cost help and the acceptance of what were considered traditional work methods. With sharply rising labor costs and with the need for gaining the full productivity of technically trained people, the industry is rapidly adopting improved material handling concepts.

The evolution of a food service scheme which requires the smallest number of steps or distances to be traveled is developed using 80 percent common sense and 20 percent technical know-how. In planning a new or modernized facility, the designer must continually ask two questions: "Why?" and "How?" And the classic answer, "It's always been done this way," is no longer acceptable.

Since the architectural relationship, both horizontally and vertically, of the various elements in the project is the first consideration, the "why" question must be asked first at every step in the process. Many designers establish a work-flow plan before endeavoring to effect the interrelationship of the various areas. Each operation has its own unique features and only by continually asking at each step the question, "why," will the most effective plan evolve.

Usually foodstuffs are received and immediately stored. Generally there are refrigerated, frozen, and dry storage areas and these logically should be adjacent to receiving areas and should also be readily accessible to the preparation facilities. It is often appropriate to have not only major storage areas but also interim, smaller storage facilities. As the cost of labor increases, many designers are rethinking the old concept of having a single walk-in refrigerator, for example, and locating smaller process refrigerators strategically throughout the layout.

Certain of the preparation processes may be located in separate floors. A bakery, for example, may be tucked out of the way, but thought must be given to the flow of materials to and away from this area. Generally the plan is a continuous process, always moving forward from one step to the next, with backtracking or cross-overs limited as far as possible.

In most feeding operations, all of the production ultimately ends in the serving area, and care must be taken to establish the flow of the finished food to the customer, whether it be in a sit-down dining room on the same floor or to patients in a multi-story hospital. This, in essence, comprises the heart of the primary work flow and if any steps can be eliminated in the process, this will be of benefit to those who will operate the facility.

In addition to this basic flow, we find peripheral flow patterns which may be cyclical in nature; for example, the preparation utensils have to be scraped, washed, stored, and then returned to the work areas; dining room serviceware undergoes a similar but more complex process. And during all the processes there is a generation of waste, sometimes from the receiving area; certainly from the preparation and serving areas, as well as from the washing facilities. All this waste material must travel to some point of disposal which in many cases is adjacent to the receiving area. The work flow in each of these supplementary processes likewise must be considered and minimized (Fig. 1).

There are other architectural features that must be considered in addition to the interrelation of the spaces: the proper height of loading trucks, the elimination of door saddles, walk-in refrigerators and freezers at floor level, the design of elevators and dumbwaiters which are the proper size and which stop floor flush and for loading.

The means or equipment necessary for the transport of food in process is the next consideration, and the question "how" must be answered. All things considered, the wheel is the basic "how." Wherever possible, dollies, trucks, carts, wagons and rolling racks should be employed.

The source of supply and method of delivery are the first considerations. There are many suppliers who offer their products palletized for quick, easy transfer to the receiving area. Others strap quantities of boxes together. The designer must concern himself not only with what is currently in practice but what might be done, and adapt his equipment to meet the nature of incoming products. Once in the building, various methods are used. Some facilities have been designed around a single tier rack which is used for everything from the initial receiving to final service. Other designs involve the use of a variety of special purpose vehicles: often the heavy duty platform truck, rolling shelves or movable pallets for the receiving and storing process; then going to special purpose pan racks for moving food in process to the serving area, with still other special purpose carts for soiled and clean dish handling. There are as many variations of these combinations as there are food service operations and there are trucks and carts for every conceivable use. It behooves the designer to make the selection of the proper carts in evolving the food service scheme.

Dumbwaiters, elevators, dish tables, serving counters, work tables, doorways and refrigerators all must be designed keeping in mind the specific vehicles to be used. In major installations, there are some exciting new concepts using carts which are transported by overhead monorails. Another new technique utilizes buried cables in the floor along which carts move from place to place without assistance, following electric impulses in the cable.

There are special considerations to which the designer must address himself, such as security, supervision, safety and employee morale. Next to the banking business, the food service industry involves itself in a product which has great universal appeal. Security, therefore, must be an overriding consideration. On paper, the walk-in refrigerator that opens directly onto the loading area may seem great, but unfortunately, human nature being what it is, employees working where they would be out of view are often tempted to conspire to accept short deliveries or slip merchandise out for their own use. Receiving areas, therefore, should be open and visible to management.

Supervisors should be located in strategic areas where they have a commanding view of the important operations. Some schemes include elevated offices where supervisors can scan a major portion of the entire operation, seeing not only the preparation areas but also serving areas.

Safety considerations include providing adequate width of aisles, limiting weights on carts, protecting passageways adjacent to dangerous machinery, etc.

Employee morale is increasingly important. Minimizing the isolation of employees in dull storerooms by themselves can improve productivity.

It would be impossible for the designer to create all the work areas in such a fashion that transport was eliminated. It would also be impossible to make use of every special purpose cart available. It is the designer's job to weigh all of the factors involved and to consider frequency, quantities to be moved, the weights involved and then compromise these various relationships to come up with a workable scheme.

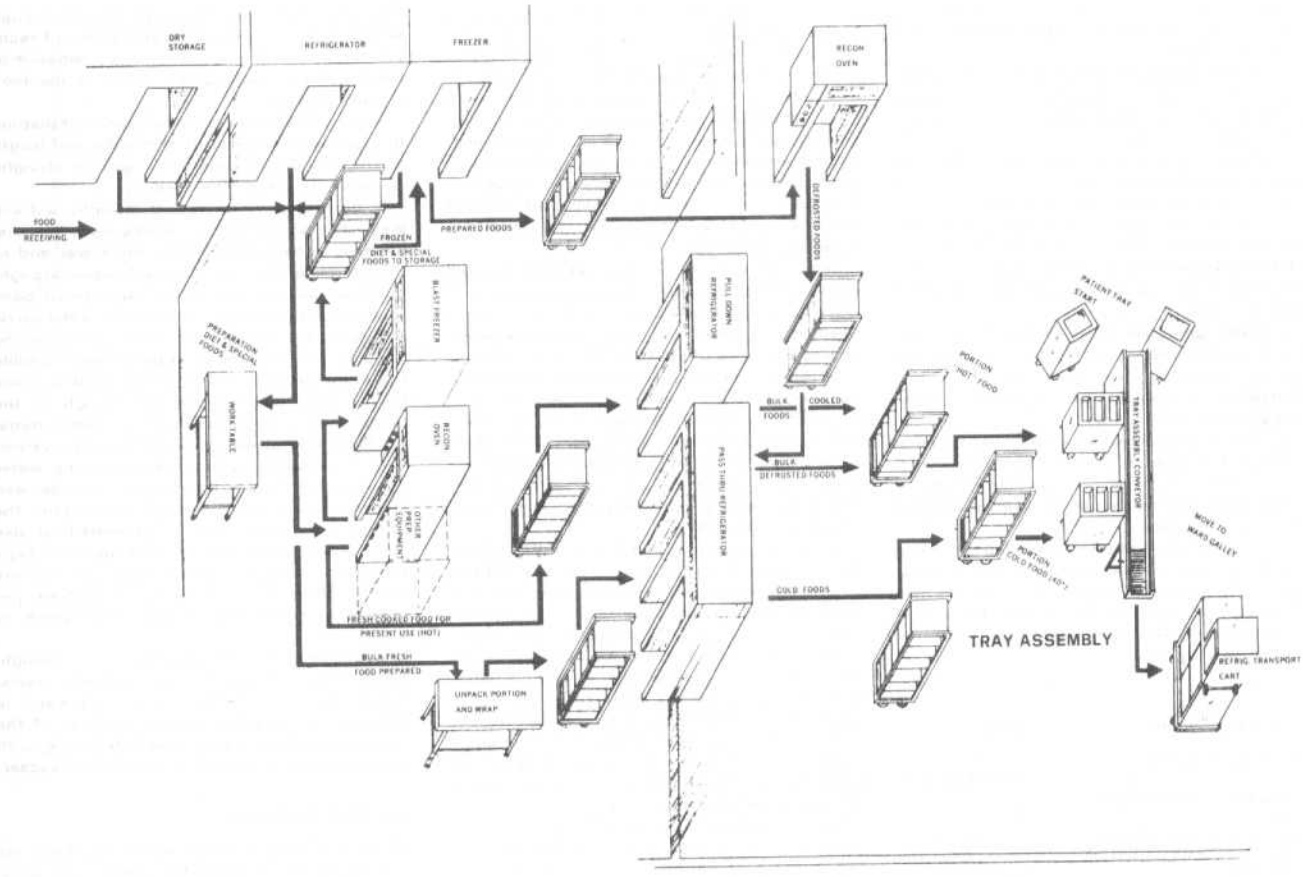
After the size of each area has been determined, many designers create a scheme of space relationships to the proper scale irrespective of the architectural configuration to which they must conform. And only after they have evolved the best theoretical scheme do they try to fit it into the space available. Unfortunately, in the past the work areas of the food service facility frequently have been left to the end and fitted in as best they could. With the tremendous cost of building, equipment and the mechanical services required plus the increasing cost of labor, this is one of the major planning considerations that should be given priority not only in the allocation of space but its relationships to food service and other building functions.

AISLE SPACE

Many of the problems which exist in kitchens are due to inadequate thought of the flow sequences of food through the kitchen. The matter of aisle spaces is of great importance in the food facility. There are some general rules, comments and recommendations which can be made for typical establishments.

1. Separate work and traffic aisles as much

Kitchen Planning Magazine, vol. 7, no. 4, fourth quarter, 1970. *Harbrace Encyclopedia of Professional Kitchen Planning.*



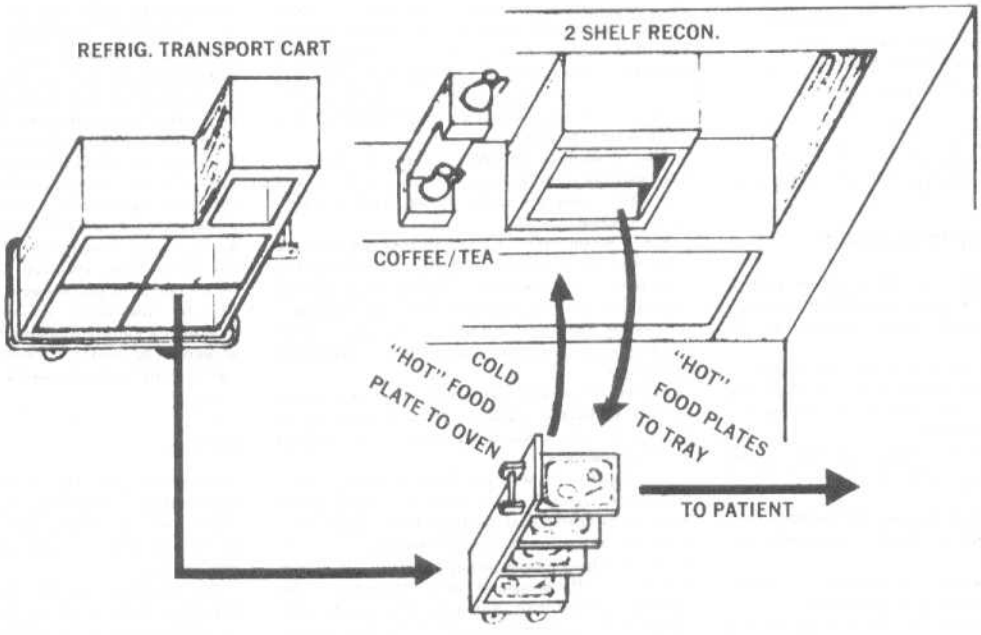


Fig. 1 Ward galley. Work-flow rendering for a hospital food service program. (Cold distribution and ward heating method.)

as possible. This may be done by locating traffic aisles parallel or perpendicular to the working aisles.

2. Traffic aisles should be made to serve two departments where possible. Traffic aisles against walls can serve only the one department adjacent to the aisle.

3. Aisles around the perimeter of kitchen have several disadvantages:

a. They serve only one department.

b. They utilize a large area when compared to the remaining area. For example: a 5-ft-wide aisle running around the entire perimeter of a 40-sq-ft area uses almost 25 percent of the total area available.

c. Paths along the perimeter of a room are the longest paths available between departments, requiring increased moving time. Remember, movement per se adds nothing to a product except cost.

4. Traffic aisles and especially work aisles that are too wide require many extra steps, often while personnel are carrying relatively heavy loads. Aisles should be sized according to the guides above.

It is definitely not recommended to move traffic through aisles where workers must constantly cross between two stations on either side of the aisle. The width of the aisle becomes excessive and this could become dangerous (Fig. 2).

Work aisle guide	*Width, in.*
For 1 person working	24 to 36 (Keep to minimum)
For 2 persons working back to back	42
For personnel who must pass equipment which projects into the aisle	30 + the distance of projection into the aisle
Traffic aisle guide	
For 2 persons to pass	30
For 1 truck to pass one person – one-way traffic	24 + maximum truck width
For 2 trucks to pass – one-way traffic	20 + maximum truck width
For 2 trucks to pass – two-way traffic	30 + the sum of truck widths
Multi-usage aisle guide (these are not recommended but must sometimes be employed)	
For personnel passing 1 worker at his station	42
For personnel passing 2 workers, back-to-back at their stations	48
For trucks passing 2 workers, back-to-back at their stations	60 + truck width

LOCATING FOOD WASTE DISPOSERS

Food waste disposers can be supplied with a number of different type assemblies making them suitable for practically any position where food waste occurs.

When trying to decide upon the disposer and assembly most suitable for use at the soiled dish table, a number of questions should first be answered:

1. Is there sufficient room on the soiled dish table for a cone bowl or sink—or must space be conserved?

2. Will the disposer be used to handle preparation waste in addition to the waste returned to the dish table?

3. Will there be a quantity of milk containers and other paper waste to dispose of?

4. Will more than one operator be using the same machine?

5. Does the dishwashing machine have built-in prewash, or will the prerinsing operation be done over the disposer, or made a part of a machine incorporating both features?

6. Will compartment-type trays be used?

In installations where the unloading area for soiled dishes is very limited and the designer cannot afford the space that a cone bowl or sink requires, there is a disposer assembly that takes no more space than that allowed for a scrap-block. This would be strictly a disposer operation.

When the food waste disposer is to be used for disposing of both preparation waste and table scraps, the assembly should have built-in flexibility. A cone bowl with removable stainless steel sleeve offers this. With the stainless steel perforated sleeve removed, the cone bowl becomes a large receiving hopper—one that accepts leafy waste with ease. With the stainless steel perforated sleeve and scrap-block in position, the assembly is then suitable for scraping of waste and control of silverware that might accidentally be pulled or dropped into the cone bowl.

Overhead prerinse can be installed above the disposer if desired. However, it is difficult to prevent the stream from traveling over the table. Recessing the cone bowl in a shallow sink will assist in confining the rinse water.

When one disposer is to be used by two or more operators, placement of the machine and the design of the table takes on added importance. Where two operators are to use one machine, an island type of installation satisfies the requirement. If more than two operators are to be served by one disposer, a trough is most suitable.

Knowing that the scraping of waste is but the first step toward preparing tableware for the washing operation and that size and type of dishwashing machine governs the amount of preparatory work needed, you may be interested in two machines that incorporate disposers which have been specifically designed for work ahead of the dishwasher machine.

When working ahead of a dishwashing machine that does not incorporate prewash, the preparatory operation must be performed as a separate operation in the prewash sink or as a scraping, preflushing, and disposing and this makes for an excellent preparatory operation. Basically this machine consists of a wash tank, a recirculation pump, a separator conveyor, silver-salvage basin and a food waste disposer.

The machine should occupy a position between the point where the soiled dishes land and where they are to be sorted while waiting to be racked.

Since water may be used to transport waste from the food waste disposer, this machine first uses the water for scraping, then reuses it as a transporting medium. For most efficient operation, the machine should be used while sorting, as a combined, rather than a separate operation.

Sorted tableware that is waiting to be racked carries sufficient water to actually soak small pieces of food waste that may still be clinging to the tableware.

On the dish table installations where there will be two or more operators preparing tableware at the soiled dish table and where the dishwashing machine incorporates built-in prewash, a trough type scraping and disposing operation offers speed and flexibility. The operators then can move to the work load rather than moving the load to some one position. An installation of this type can be one that uses fresh water flowing within the trough or one where there is a large volume of recirculated water mixed with a small amount of fresh water conveying the waste to the food waste disposer.

In planning for the most suitable installation, thought must be given to the width and length of the trough and whether it will be straight, L shape, or some other design.

If the trough is short and straight, a fresh water trough installation works well. The disposer is usually attached to the lower end of the trough section and the fresh water brought in at the opposite end and at intermediate positions along the trough. Since water is the carrying agent for the ground food waste leaving the disposer, a trough installation offers double usage for the water as it is first used to move the scraped waste along the trough to the disposer. The same water is then used to transport the ground waste to the sewage system.

In installations where a recirculating water conveyor and food waste disposer is to be used in conjunction with a trough application, the designer or consultant is permitted to use imagination in his planning. L-shape or U-shape troughs serving an entire area can become reality where there is 65 to 70 gallons per minute of recirculated water with which to work.

With quantities of water moving in a trough, waste moves freely without operator assistance. On some installations tableware is actually presoaked in certain sections of the prefabricated trough without interfering with the forward flow of food waste to the disposer.

Vegetable Preparation

When choosing a food waste disposer for installation for a vegetable preparation area, the designer should keep in mind that he will be wanting to dispose of large, leafy waste, and the opening into the disposer should be able to handle this waste. He should choose an assembly along with the disposer that offers this convenience.

Where there is to be a fairly heavy work load in the vegetable preparation area, some consultants have found a two-compartment sink desirable. The first compartment measures 24 by 36 by 6 in. It is here the trimming and disposing of food waste takes place. The vegetables are then rinsed in the second compartment that measures 18 by 24 by 12 in.

Should a designer choose to install the disposer in the work table adjoining a sink, there are a number of assemblies that are designed for this application. Generally, the assembly consists of a cone bowl fitted with a rubber scrap block. Water can either be directed into the cone bowl through a water inlet elbow or an elevated gooseneck. With the latter type of inlet, the water serves a double purpose in that the vegetables can be washed under the stream. The water entering the disposer then carries the ground waste through the waste line.

Pot Sink

The pot and pan area is another location where consideration should be given to the installation of a food waste disposer because there is considerable amount of waste returned on the utensils.

The disposer can be fitted with a sink drain fitting and installed at the base of the sink or included with a suitable assembly and made a part of the work table adjoining the sinks.

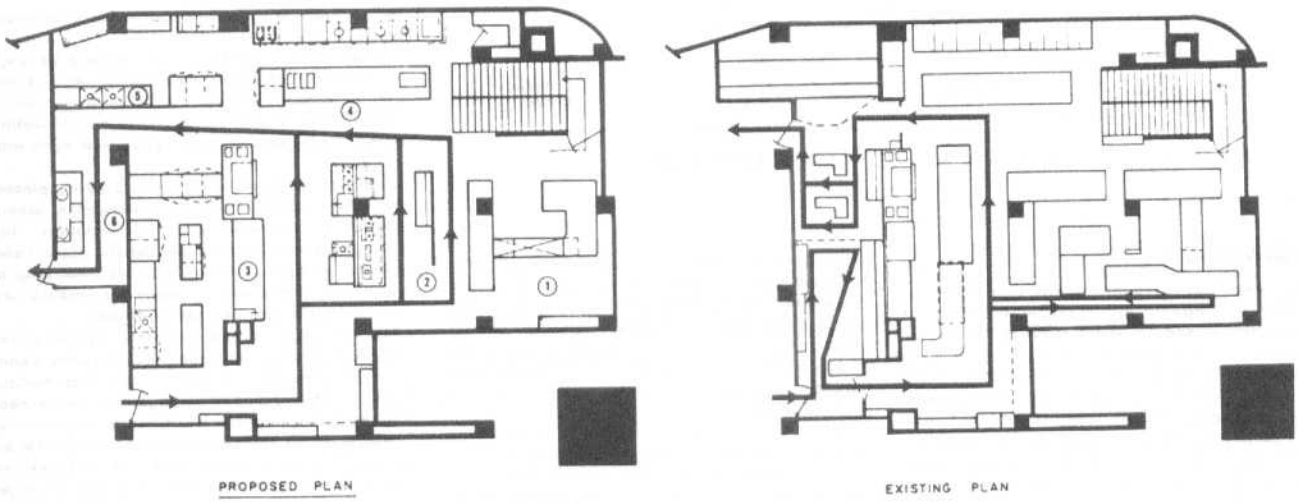


Fig. 2 Movement through traffic aisle at the cafe/bar kitchen facilities, Hotel Commodore.

Although there is no hard and fast rule when choosing the proper size disposer, there is a relationship between horsepower, size of opening to the disposer and the size of the grinding chamber.

THE MAIN COOKING AREA

The main cooking department is the heart of the kitchen and deserves special care in designing. Both meat and vegetables are usually cooked in this area. Serving in table service restaurants may take place from or near this area. In other installations, the cooked food is transported a considerable distance to the serving area. In general, it has been found advisable to cook such items as vegetables in small batches as close as possible to the serving time. This consideration requires that at least the vegetable cooking should be done as near to the serving area as possible. In fact, some installations utilizing cafeteria counters have provided small, high speed vegetable steamers directly on the cafeteria counter.

Meats may be prepared in large batches but the trend is towards staggering of the start and completion of meat cooking even though no equipment may be saved because of the long processing time as compared to the serving period.

The trend in the design of the main cooking area has been towards the provision of roast ovens separate from the ranges. This reduces friction between those using range top and the oven.

The flow chart below indicates the relation of the main cooking area to the other kitchen departments. (Fig. 3.)

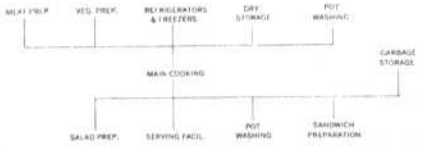


Fig. 3

The layout of the main cooking department varies greatly from installation to installation. In general, the table service restaurant will serve from this area, and this requires consideration. In many cases where food is cooked to order, insufficient refrigerated or frozen food storage space has been provided in the main cooking area.

Several considerations are necessary before typical departmental layouts are presented.

1. The broiler should be at the end of the line—away from the traffic in front of the cooking equipment. Adequate refrigeration and work space should be provided for the broiler operator.

Traditional French kitchen arrangements assign the broiling, carving and roasting duties to the broiler operator. It is not always necessary to follow this practice in today's kitchens.

2. Fryers may be located near the broiler if the same person will operate them or they may be located at the far end of the range battery. Sufficient work table space and an area to drain fried foods must be provided in addition to refrigeration and in some cases freezer storage space.

3. The steam table or serving area, if it is to be from the same area as cooking, should be near the broilers and fryers.

4. The space between cook's table and cooking equipment should be at a minimum but should provide for opening of range ovens, steamers, etc. If traffic or trucks are anticipated, greater space than normal is required.

5. All heat-producing equipment should be vented to an effective exhaust hood. Local laws should also be checked on this point.

6. Equipment which is placed against a wall should have sufficient space for cleaning behind the equipment. One to two feet are recommended.

7. It is preferable to provide breaks in extended cook's or serving tables for access by cooks. Extended parallel, back-to-back arrangements may require breaks in the equipment for similar reasons.

8. Plate warming facilities have traditionally been placed in front of the cook's table in waiter service restaurants. The trend, however, has been toward provision of plate warming facilities which are directly accessible to the servers.

PREPARATION AREAS

Meat Preparation

The meat preparation departments take meats as delivered and convert them into products suitable for further processing in the main cooking area. The specific duties of this department have changed significantly in recent years. There was a time when cooks did most of the preparation at the main cooking area. This gave way to a meat preparation department where butchers prepared the meats for the cooks. The meat was then issued to the cooking department in such a ready-to-cook quantity that portion control was readily obtainable. The trend now, in all but the very large installation, has been towards the increasing purchase of meat in a ready-to-cook state. The theory, which often is valid, is that the various packing houses with their skilled mass-production workers can perform this operation more economically. A further benefit is that meat storage space is decreased—often up to 40 percent—by the purchase of ready-to-cook meats.

The flow chart for a typical meat preparation area with its relationships to the other kitchen departments is shown in Fig. 4.

Holding in a refrigerated area may precede cooking. In some instances, meats are prepared a day or more prior to cooking.

Fig. 4

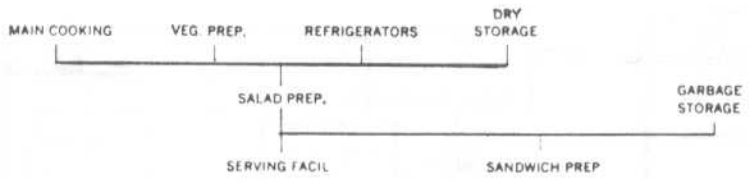


Fig. 5

Salad Preparation

The salad preparation section utilizes ingredients prepared in the vegetable preparation section and/or items from the fruit and vegetable refrigerator. Some minor amount of meat and dairy products may also be used in various salads. In table service restaurants, the salad departments may be included with the pantry or *garde manger*. Such typical departments are shown with the serving departments. Some installations, however, combine the salad and vegetable preparation departments. In those installations using cafeteria counters, the salads pass directly from the salad preparation area to the counter. Pass through refrigerators are quite useful in minimizing the steps required to service the cafeteria counter especially if salads will be prepared during the serving period.

The flow chart (Fig. 5) for a typical preparation area shows the relationship of this department to the other kitchen departments. The number of trips, method of transportation and amounts which are to be transported between the departments should determine the relative location of the salad preparation area. For example, if salads are to be made with a constant flow of materials from the vegetable preparation department and a storing of completed salads in mobile refrigerated trucks until ready for moving to the service area, then the location of this department should be as close to the vegetable preparation department and refrigerator as possible. With such a production system, it is not necessary to locate this department near the service facilities. On the other hand, supplies may be batch delivered and a constant flow of salads to the serving areas will be maintained. For such an operation the location of the salad preparation area should favor the serving facilities.

The work methods to be followed in the preparation of salads determine the precise layout of this department. As with the other kitchen departments, food should flow as much as possible in a continuous direction from the start of the department through processing and on to the next department. Some installations, especially those processing large numbers of the same or similar salads, are able to apply the principles of mass production and mass assembly to the design of the salad preparation department.

Vegetable Preparation

The vegetable preparation department prepares fresh vegetables for cooking and salads. In some installations, as previously noted, vegetables used in salads are prepared in the salad preparation department. Prior to the layout of this department, the precise functions and operations which will be performed should be determined.

The flow chart for the vegetable preparation area (Fig. 6) shows its relationship to the other departments in the kitchen.

In many instances vegetables are prepared the day before their usage by the salad and main cooking units. In such cases the prepared vegetables must be stored in holding refrigerators. The vegetable refrigerator is usually used for this purpose, but very large installations and those installations which do not have the walk-in refrigerators on the same floor as preparation and cooking will provide holding refrigerators.

The layout of the vegetable preparation should follow as closely as possible the processing steps. Typical layouts vary depending on the state of the raw materials and the operations to be performed.

Sandwich Stations

Efficient food production requires planned arrangement of equipment. The size of the operations to be handled will determine dimensions. It must provide ample space for ingredients, tools and a logical work flow. The height must permit the worker to maintain good posture, use the least amount of energy, and stand in a relaxed position. Where short handled tools are used, the average recommended height is 36 in. Allow adequate toe space at the bottom edge of counter. The width of the work counter must provide comfortable reaching areas, without the necessity of the worker stretching. Sixteen inches from each elbow in all working directions is the average comfortable reaching areas, without the necessity of the worker stretching.

A counter top of hard maple or synthetic rubber-plastic composition is preferred. If the installation has a metal or other top, a large cutting block with a hard surface can be placed on it. Have counter top project at least 1½ inches beyond the front of unit to prevent crumbs from collecting on shelf or door gasket below.

Provide a food-waste container recessed in the right hand side of the counter for "as you go" cleaning of the working surface. It should be easily accessible for removal, emptying and cleaning.

Both the placement angle of the filling containers and their sequence arrangement for left to right working of the sandwich maker will streamline operations. The fillings are more accessible if the containers tilt slightly forward toward the worker. Spreading of sandwiches is an automatic reach-and-touch procedure if each filling container is put in its customary place.

The "in-use" bread supply should be kept at the left of the sandwich board. Many food-service establishments use a container which holds 3 to 4 varieties of bread or a self-leveling bread dispenser which moves each slice into position.

For the efficient handling of serving plates, there is a self-leveling dish dispenser, which allows the dishes to "pop" into position. This equipment can be recessed at the right hand corner of the counter top for the final step in sandwich preparation. These dispensers are available with hot or cold controls.

Select toasters and grills for performance, capacity, thermostatic controls, and easy cleaning. Production volume is the determining factor in their size and arrangement, but accessibility to the worker is of prime importance.

Adjacent to the sandwich center should be a double compartment sink. In installations where the salad and sandwich centers are adjacent, this sink can, of course, serve both units.

Provide an accessible storage area for small working tools, such as knives, spatulas, scoops, spoons, cutters, and other related equipment.

The layout of a sandwich center must often fit different shaped spaces. The equipment listed above can be arranged in a straight line, a U-shape, a circle, a corner, or as an aisle. In each available space, the equipment should be arranged as efficiently as possible.

WORK FLOW IN OTHER AREAS

Serving Facilities

The type and arrangement of serving facilities varies greatly from installation to installation. Restaurants use pantries and range batteries. Employee feeding facilities use cafeterias, snack bars, etc. Hospitals use tray makeup conveyors, cafeterias for employees and staff, and sometimes decentralized tray makeup facilities as floor pantries.

The major service departments in a table service restaurant are the range battery and pantry. The departmental layouts for the main cooking department illustrate typical arrangements of this area with provisions for service. The pantry and cold service are often united in one area of the kitchen. In other installations, salads and cold meats are prepared in one area and desserts, beverages, and some other items in the pantry.

The trend seems toward the combination of these two areas and toward the movement of many of the pantry items as rolls, butter and beverages to waitress stations located at strategic points in the dining room. Self-service of salad, cold meat and pantry items by the waiters and waitresses is ever increasing in

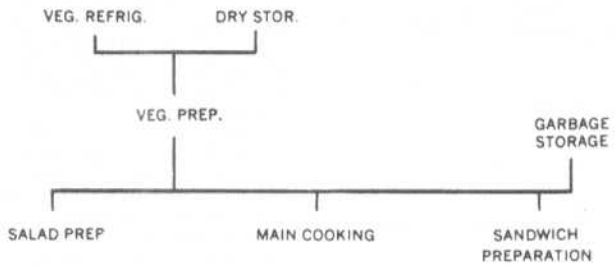


Fig. 6

table service restaurants, especially if speed of service and minimization of kitchen workers is of importance.

Bake Shop

Of all the preparation departments which might be located away from the main kitchen, the bake shop is usually least affected by such a location. The major differences of a remote bake shop are the requirements of additional pot washing and refrigeration facilities. Ovens should then be located in the bake shop, and this usually prevents their dual usage by the main cooking department.

Though some food service installations still prepare their own yeast breads, it is generally advisable to have this service rendered by a commercial bakery. Some bakeries will prepare yeast breads to special order if demand is sufficient. The completely self-contained installations and some of those featuring specialties do—and will continue to—prepare their own yeast breads.

Many installations do prepare pastries on the premises.

Successful freezing of prepared items for baking has enabled the typical shop to become much more efficient in recent years. Studies have shown that freezing of some items may even be helpful with respect to the quality of the finished product. This has made it possible to prepare relatively large quantities of an item using mass production techniques of preparation and baking them as needed. For such as operation, a freezer capable of freezing as well as storing prepared items is necessary. Such a freezer is called a sharp freezer.

In general, the bake shop should be near the storage area, both dry and refrigerated, and near the pot washing area. Location near serving facilities is of relatively minor importance if mobile racks are used to transfer sufficient quantities of baked goods to minimize the number of trips required. The flow chart (Fig. 7)

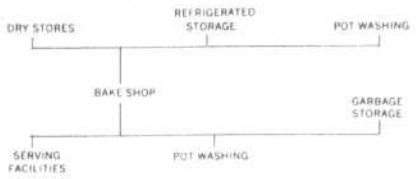


Fig. 7

shows the relationship of the typical bake shop to the other kitchen departments.

The layout within the bake shop should follow the typical processing steps as much as possible. The oven should be near the landing table with sufficient space in front of the oven to remove baked goods with a peel which reaches to the innermost corners of the oven. In general, as much clear space should be provided in front of a bake oven as the bake oven is deep, front to back. The proof box should be near the oven as should the baker's table. The mixer, pastry stove or hot plate and steam-jacketed kettle, if used, should be near the baker's table.

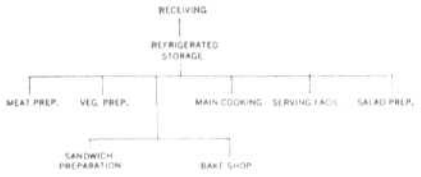


Fig. 8

Refrigerated Storage

The production processes in a kitchen are characterized by relatively few receipts of refrigerated supplies compared to movements between the refrigerated storage area and the preparation departments. For this reason, it is suggested that location of the refrigerated storage be close to the preparation departments (see Fig. 8).

In some instances the flow chart will be modified by preparation procedures which are to be followed. For example, some installations will partially prepare vegetables prior to storage.

Too often when the refrigerated storage areas and preparation departments are located on different floors, the time required to wait for elevators is excessive.

Another arrangement is to have the refrigerated storage and preparation departments near receiving, then move to the final preparation and production departments. This arrangement is better than that above but is still limited by vertical transportation. An advantage of such a location is that the part of the meat and vegetables which is scrap is closer to the garbage storage area.

In general it is recommended that the freezer storage open into a refrigerator rather than directly into the warmer kitchen. With such an arrangement, the refrigerator might be made for dual purpose usage, as a refrigerator or freezer. This will probably be quite useful in the future with the trend toward increasing usage of frozen foods. An alternate location of the storage freezer is near the main cooking area. This minimizes the distance traveled on the part of the cooks in obtaining food which is purchased in a ready to cook state.

Dishwashing

In the past, extreme emphasis was placed on locating this department either adjacent to a cafeteria service dining room or as the first "port-of-call" in a kitchen serving a table service dining room. With the increasing usage of vertical and horizontal conveyors, this becomes of lesser importance, and increasing attention can be placed on locating the dishwashing area near the location of dish usage—the serving and/or preparation areas as the mode of operation dictates. It is not unusual, nor impractical, to locate the dishwashing on a floor other than the dining room floor.

A separate dishwashing room which is well ventilated, lighted and has noise-absorbing surfaces will be found a great aid in lowering the high—often objectionably high—noise level commonly found in kitchens.

The large operation utilizing horizontal conveyors can apply industrial engineering principles to the breakdown of patron or patient trays.

Glass washing, long a major problem in food service, is now being better handled largely through the control of washing, rinsing and water additions. In most instances, it is not at all impractical to wash glasses in the same machine as dishes, if they are washed shortly after the water has been changed. Other installations utilize a glass washer with a separate soiled glass table or use the same tables as for soiled dishes.

Some installations, especially larger hotels, find it necessary to provide a separate silver room where hollowware may be correctly cleaned, burnished and maintained. Such an area usually can provide a better means for control of expensive silver.

The flow chart (Fig. 9) shows the typical relationship of this department to others within the food service installation.

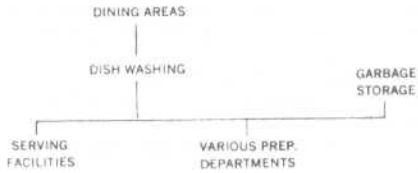


Fig. 9

Pot Washing

Many smaller installations try to utilize the same sinks for pot washing and vegetable or salad preparation. This practice is not recommended. A minimum of two compartments—preferably three compartments with a grease or skimmer compartment between the first two compartments—is recommended. The main cooking, baking and serving departments are the major source of pots, pans and other utensils. In many installations, a relatively large storage area for soiled pots is required as they are not washed at the same time as received in the pot washing department. This is especially true if the same personnel operate the dishwashing machines and the pot washing department.

Fig. 10

The flow chart for a typical pot washing department is shown in Fig. 10. Note that pot, pan and utensil storage, while not shown on the flow chart, must be considered. This is apt to occur in each department from which pots arrive and in two places in the pot washing area: prior to cleaning and subsequent to cleaning.

KITCHENS

By Max Fengler

KITCHEN PERSONNEL AND THEIR FUNCTIONS

- Chef de cuisine (kitchen chef) is responsible for purchase of goods, cost control, setting up the menu, and supervision of personnel and hygiene in the kitchen area.
- Sous-chef (kitchen chef's assistant) represents the kitchen chef in his absence; in a large organization, he takes over some of the chef's duties.
- Saucier (sauce cook) prepares all sauces and the meals that go with them, as well as all fish dishes (although in large organizations there is a poissonier); he is responsible for the work at the kitchen range, and in medium-sized establishments he assumes the functions of the chef's assisant.
- Rotisseur (roast, fry, and grill cook)

In large restaurants, there is, in addition, a grilladin.

- Entremetier (soup, vegetable, and side-dish cook)

In large restaurants a potagier prepares soups and broths.

- Garde-manger supplies the ready-to-cut meat and fish preparation, the cold appetizers, hors d'oeuvres, and salads. In large restaurants, this work is divided between the hors d'oeuvrier (appetizer cook) and the boucher (butcher).
- Pâtissier makes cookies, cakes, ice cream, and other desserts; in large restaurants, the work is divided among the glacier (ice cream maker), confiseur (fine pastry cook), and boulanger (baker of bread, rolls, and other baked goods).
- Commis (junior cook) is available to chefs of sections.
- Salad man or girl produces and serves various kinds of salads and in some restaurants is responsible for the smorgasbord (hors d'oeuvres) and is subordinate to the gardemanger.
- Casserolier cleans, cares for, and services all pans, cooking equipment, and kitchen machines.
- Kitchen boy cleans the kitchen, helps with the preparation of dishes, and has other duties.
- Contrôleur is in charge of supplies, controls their placement and storage, and does the inventory bookkeeping.
- Gouvernante accepts goods, exercises control, supervises the economat, dry storage, linen, and cleaning materials, and hands out staples.
- In European restaurants, the bar lady is responsible for all beverages and often is the representative for the management, and, in smaller restaurants, oversees the waiters.
- Argentier is responsible for the care of silver.
- Office boy
- Dish washer

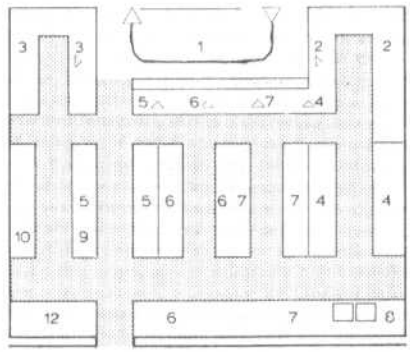


Fig. 1 Hotel or restaurant kitchen or French restaurant of high standard. Capacity for main meals: Hotel—100–200 persons / menu, 100 persons / à la carte. Restaurant—200–300 persons / mealtime from 11:30 to 1:30. Waiters' passageway: tangential. Kitchen: Linear arrangement with large installations in the rear. See Legend for explanation of numbers.

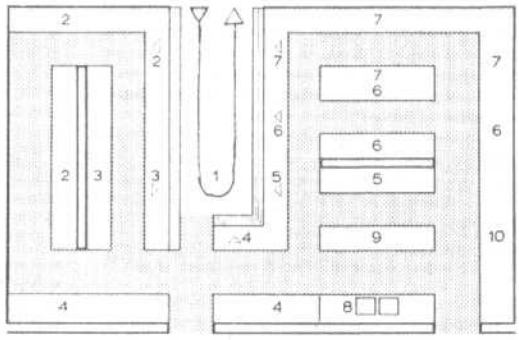


Fig. 2 Hotel or restaurant kitchen. Capacity: With this layout, a 200-seat restaurant will be able to handle three full sittings. This layout can also take care of a hotel with 100 guests and can also accommodate a restaurant open to the general public, an outdoor restaurant, and a private dining area for parties and conferences (altogether, 400 guests). Waiters' passageway: in the center. Kitchen: Linear arrangement with large installations in the rear. See Legend for explanation of numbers.

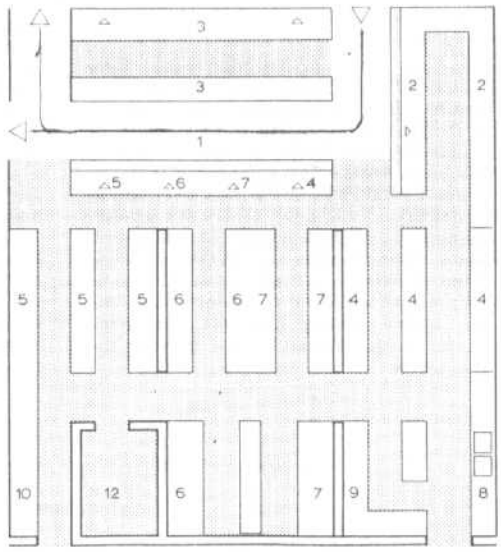


Fig. 3 Large restaurant kitchen for restaurants with many private party and conference facilities or with commissary and catering capacity for other businesses. Suitable also for large hotel with large restaurant for the general public. Capacity: 800–1,000 persons (e.g., 200 seats and fourfold reoccupancy). Waiters' passageway: tangential, with food buffet situated in front. The waiter has access to beverages and other items from the waiters' passageway in the kitchen and from the dining room side as well. The buffet looks over the dining rooms. Kitchen: Linear arrangement with fitted berths for large apparatus. See Legend for explanation of numbers.

Restaurant Architecture and Design, Universe Books, New York, 1971.

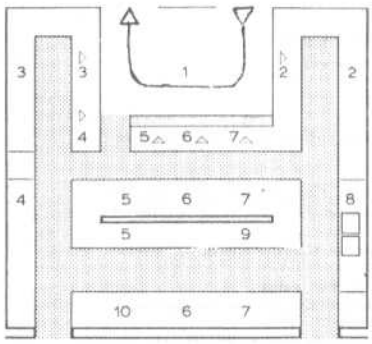


Fig. 4 Restaurant kitchen especially suited for city or excursion restaurants. Capacity: as in Fig. 1. Waiters' passageway: tangential. Kitchen: The cooking, roasting, grill, and frying apparatus are planned as wall structures. See Legend for explanation of numbers.

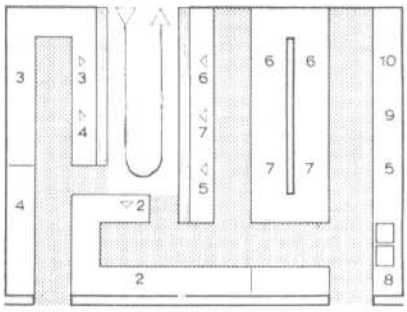


Fig. 5 Restaurant kitchen. Capacity: This arrangement is conceived for a very busy city restaurant of good quality (approximately 600 persons—e.g., 150 seats with fourfold reoccupancy). Waiters' passageway: in the center. Kitchen: The cooking, roasting, grill, and frying apparatus are planned as wall structures. See Legend for explanation of numbers.

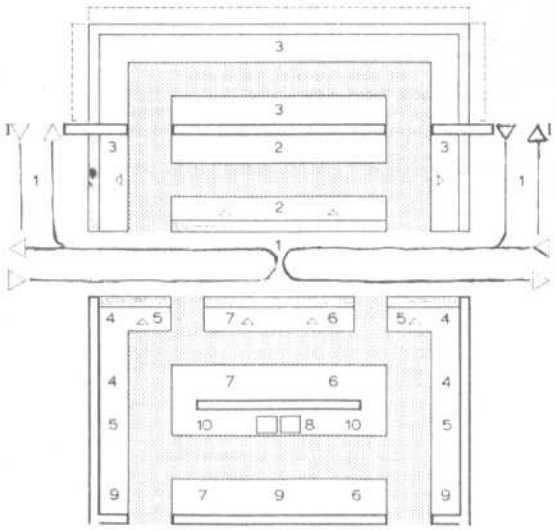


Fig. 6 Large restaurant kitchen for restaurants with many auxiliary rooms, bowling alleys, garden, and a snack bar projecting into the main dining room. Suitable for a highly frequented city restaurant or for an excursion spot with various conference rooms, etc. Capacity: 1,000–1,200 persons. Waiters' passageway: tangential. Buffet and washing-up zone (dish return) placed in front. The waiter can pick up drinks and other items at two places in the kitchen, the drinks coming partly from the bar. Kitchen: Warm kitchen as wall structure with central serving area; cold kitchen and pastry area divided with two serving areas each, symmetrically arranged. See Legend for explanation of numbers.

Legend for Restaurant and Hotel Kitchen Layouts (Figs. 1 to 6)

(Layouts: Scale 1:300)

1. Waiters' passageway—meal and beverage counter—dish return
2. Dishwashing area (dishes, glasses, silver)
3. Beverages—preparation and serving
4. Pastry (cookies, cakes, ice cream, dessert)—preparation and serving
5. Cold kitchen (cold appetizers, salad, fish)—preparation and serving
6. Warm kitchen—saucier/rôtisseur area (sauces, roasts, grill, fish)—preparation including large apparatus area and serving
7. Warm kitchen—entremétier area (soups, vegetables, entrées)—preparation including large apparatus area and serving
8. Pot and pan washing—casserolier area
9. Vegetable preparation
10. Meat preparation
11. Vegetable cold storage
12. Meat cold storage
13. Economat (dry storage)
14. Beverage cold storage
15. Linen, dish, cleaning supplies storage
16. Staple goods storage
17. Goods acceptance and control
18. Empty goods and garbage collecting rooms

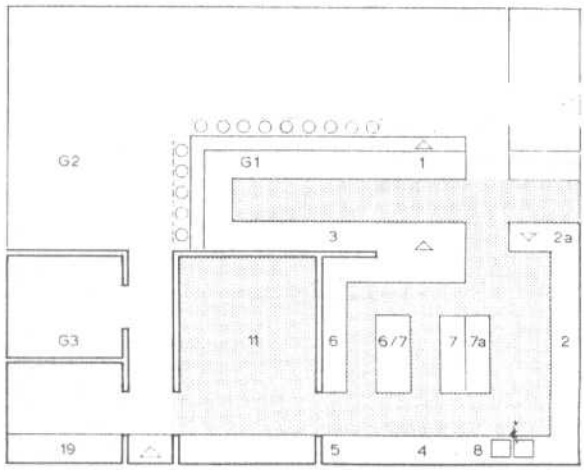


Fig. 7 Snack bar (Pub, tavern, bistro, café, or restaurant). Capacity: 55–60 seats (five- or six-fold reoccupancy over lunchtime, twofold in the evening; at other times, a well-run café, cake, and snack business). The kitchen deals primarily with ready-to-serve articles. In a city business with daily delivery, the storage space does not have to be especially large.

Legend:

1. Meal and beverage serving counter
2. Dishwasher
2a. Dish return
3. Beverage buffet with mixer, toaster, ice-cream container, etc.
4. Oven and small pastry station
5. Garde-manger
6. Saucier / rôtisseur
6/7. Range
7. Entremétier
7a. Cooking vat and high-performance steam cooker
6/7b. Warming cupboard and warm serving counter with warming lamps
8. Pot and pan washing
11. Storage, empty goods, office; instead of cold storage rooms—cold storage and freezer cupboards
19. Employees' toilets
G1. Bar counter—also for meals
G2. Dining room with table seating
G3. Guests' toilets / make-up room / telephone booths

KITCHENS

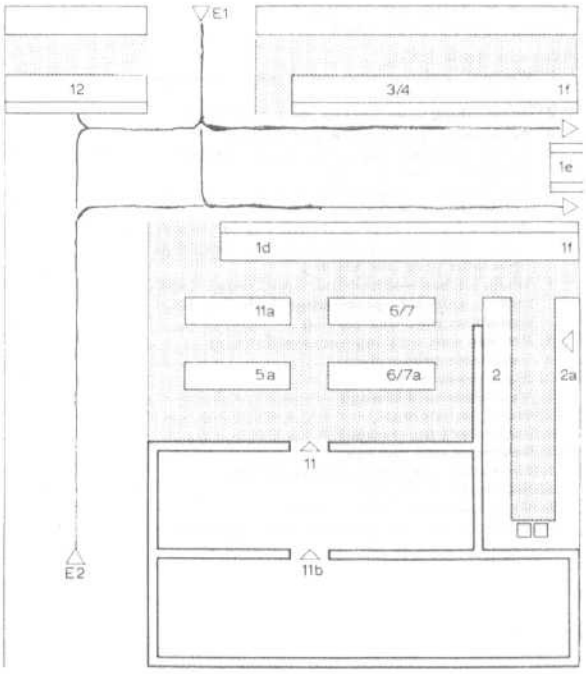


Fig. 8 Self-service restaurant suitable for department stores or office buildings. Kitchen: no independent production; outside delivery and preparation via deep-freeze, boiling-in-the-bag (Nacka), or Régéthermic methods.

Legend:

1d. Self-service buffet with grill and fry unit
1e. Salad dressings, spices, cutlery reserves
1f. Cashier
2. Dishwasher
2a. Dish return
3/4. Sandwich unit, cakes, ice cream, coffee, beverages; service available at an outdoor café
5a. Cold preparation table
6/7. Defrosting, warming-up apparatus front, serviceable on two sides (convection ovens, heating appliances for the Nacka system or Régéthermic ovens)
11. Cold storage and storage (varies in size according to system of servicing and rhythm of delivery)
11a. Refrigerator front, serviceable on two sides
11b. Delivery, empty goods, intermediary storage, personnel cloakroom
12. Kiosk—sales on the inside and to customers on the street
E1. Entrance from street
E2. Entrance from building (department store, office building, etc.)

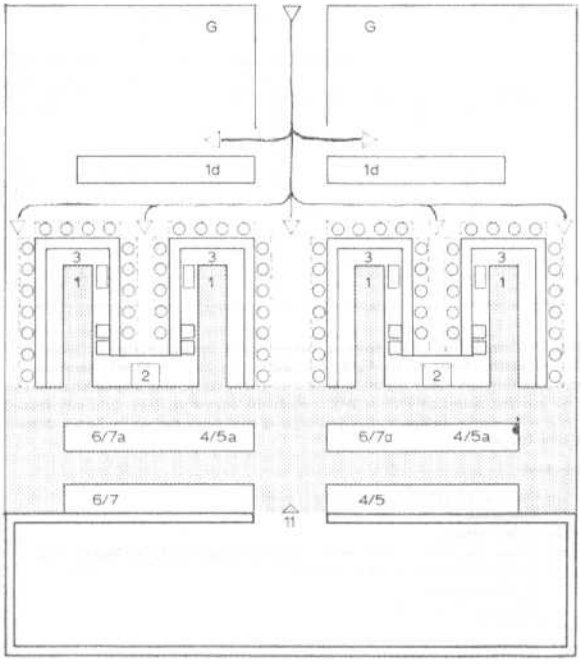


Fig. 9 Restaurant with finger-shaped bar and automats for quick lunch service in restaurants for passersby, cafeterias, department stores, highway restaurants. Capacity: 500 persons per hour. Kitchen: preparation of precooked meals, salads, and ice cream.

Legend:

1. Service passage for U-shaped or finger-shaped counter
1d. Automats for self-service
2. Connection of two fingers with dishwasher having two covers serviceable on both sides; adjoining are two sinks each
3. Coffee machine, refrigerators, soup vat storage
4/5. Salad and ice cream preparation
4/5a. Cold counter—salad, ice cream, dessert
6/7. Frying pan, soup cooker, and other cooking equipment
6/7a. Warm counter—bain-marie, fryer, grill plates
11. Economat, cold storage, and freezer space, staples room (delivery, empty goods room, office, personnel cloakrooms and washrooms not included)
G Guest rooms with standing room and seats (automat service with disposable dishes)

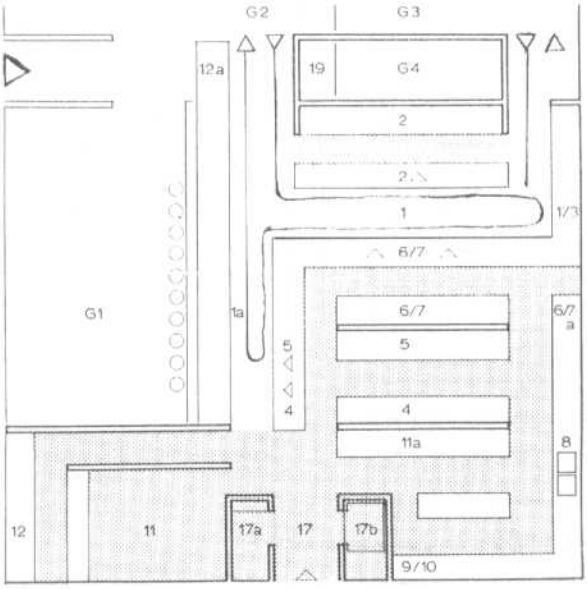


Fig. 10 Restaurant for travelers (Highway restaurant, or café-restaurant at a busy intersection in the city). Capacity:
- Snack—45–50 seats (200 persons every hour)
- Restaurant—80 seats—(two- or threefold reoccupancy during meals; at other times, coffee, ice cream, pastry, and sandwich service)
- Grill—40 seats (one- or twofold reoccupancy, high standard service) Kitchen: Linear-wall arrangement, approximately equal balance between freshly prepared meals and ready-to-serve meals. Storage, empty goods, and personnel cloakrooms in the cellar.

Legend:

1. Waiters' passageway
1a. Service corridor for snacks, and cold meal and pastry-serving counter for restaurant
1/3. Waiters—Beverage self-service
2. Dishwasher
4. Pastry
5. Cold kitchen
6/7. Warm kitchen (roast, grill, fry), bain-marie in the serving counter
6/7a. Cooking and frying apparatus (2 vats, 1 pan)
8. Pot and pan washing
9/10. Meat and vegetable preparation
11. Storage for the day
11a. Cupboard group, cooled and not cooled
12. Kiosk facing the street
12a. Cigarette machine
17. Goods delivery
17a. Office
17b. Elevator to cellar
19. Employee toilets
G1. Snack area with about 40 seats and seats at the bar
G2. Restaurant
G3. Grill restaurant, possibly with small bar for espresso coffee, aperitifs, whisky, and other spirits
G4. Guests' toilets

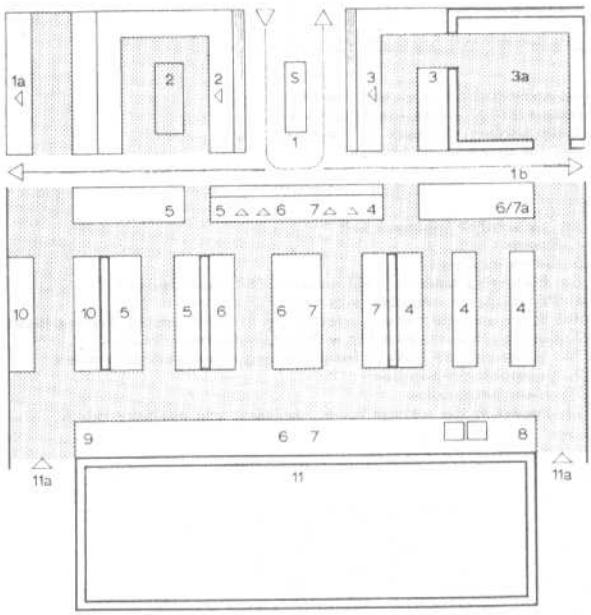


Fig. 11 Large hotel-restaurant kitchen also for large restaurants with some auxiliary rooms and with outside deliveries or production for other organizations (variant of Figs. 3 and 6). Capacity: 800–1000 persons. Waiters' passageway: in the center, with a special serving link to the garden (or, for instance, to a bowling alley) and directly connecting to the auxiliary rooms. Kitchen: Linear arrangement with rear side of large apparatus.

Legend:

1. Waiters' passageway
1a. Meal and beverage serving to garden
1b. Access to auxiliary rooms
2. Dishwashing area
3. Beverage serving area
3a. Beverage cold storage (day cellar)
4. Pastry
5. Cold kitchen
6. Warm kitchen—saucier / rôtisseur area
7. Warm kitchen—entremétier area
8. Pot and pan washing
9. Vegetable preparation
10. Meat preparation
11. Cold storage and storage rooms
11a. Accesses to delivery, empty goods room, and intermediary storage, office, personnel cloakrooms and toilets
S Service accessories (cash register)

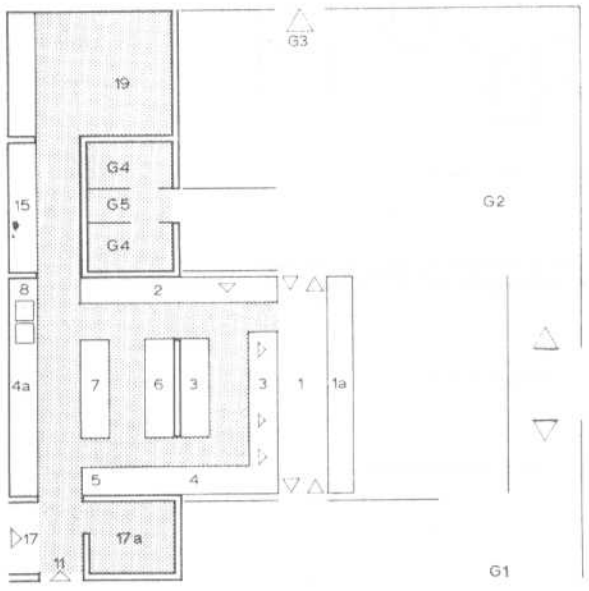


Fig. 12 Café-restaurant with tearoom, or a city restaurant in a busy district.
- Café: alcohol-free beverages, except for bottled beer; pastry and small meals—cold and warm
- Tearoom: alcohol-free beverages, pastry, sandwiches. Capacity: About 150 seats (continuous service from early morning to midnight or later). Kitchen: extensive use of precooked meals; little storage.

Legend:

1. Waiters' passageway
1a. Serving stations and cash register
2. Dishwasher
3. Beverage buffet with mixer, toaster, ice cream container, etc.
4. Pastry
4a. Pastry oven
5. Sandwich unit
6. Defrosting and heating equipment, soup vats
7. Oven, grill, frying apparatus
8. Pot and pan washing
11. Day stores, empty goods (staple goods in cellar)
15. Linen storage
17. Delivery
17a. Office
19. Employees' washrooms, cloakroom for waiters (cloakroom and washrooms for kitchen employees in cellar)
G1. Tearoom
G2. Café-restaurant
G3. Terrace or garden
G4. Washrooms
G5. Telephone booths

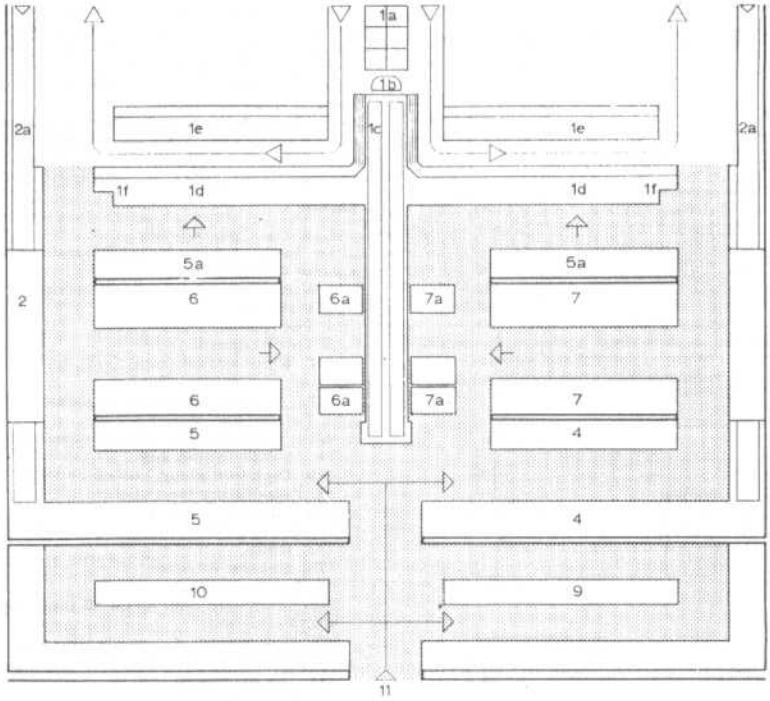


Fig. 13 Student dining hall or cafeteria with two-sided self-service buffet and conveyor belt. Capacity: 12 persons per minute × 2 = 24 persons. Without cash payment: hourly capacity, 1,400 persons. With cash circulation: hourly capacity, 1,100 persons. Seating: at least 340 seats. Kitchen: fully equipped linear arrangement, planned for automatic equipment.

Legend:

1a. Platter and cutlery trolley
1b. Distribution help, regulation of conveyor-belt speed, dietary food storage
1c. Conveyor belt for standard menu
1d. Self-service buffet—Menu:

1 soup of the day	various salads
1 stew	various desserts
1 standard menu	dairy products
1 dietary food	5 cold beverages (beer, wine, carbonated beverages, juice)
2 cold meals	

1e. Salad dressings, condiments, cutlery
1f. Cash register
2. Dishwasher
2a. Soiled-dish conveyor belt
4. Pastry
5. Garde-manger
5a. Portioning table for cold meals, salads, and desserts
6. Roast kitchen, possibly with roasting automats
6a. Warm-storage trolleys—portioning of meat, sauces, dietary foods
7. Cooking kitchen, possibly with automatic steam cookers
7a. Warm-storage trolleys for portioning of vegetables, entrées
9. Vegetable preparation
10. Meat preparation
11. Access to the storage rooms, delivery, and auxiliary rooms

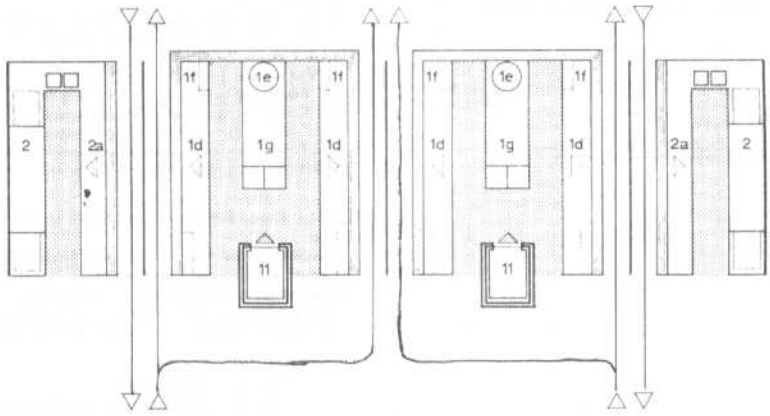


Fig. 14 Student dining hall or cafeteria with four self-service buffets. Capacity: at least 1,500 persons per hour. Seating: at least 400 seats. Kitchen: outside delivery of meals with standard or conveyor-type elevator.

Legend:

1d. Self-service buffet—menu as in Fig. 13
1e. Circular device for salad dressings, condiments, extra cutlery, etc.
1f. Cash register
1g. Preparation table with trolley stand
2. Dishwasher
2a. Soiled-dish return
11. Standard or conveyor-type elevator connection to meal-preparation kitchen

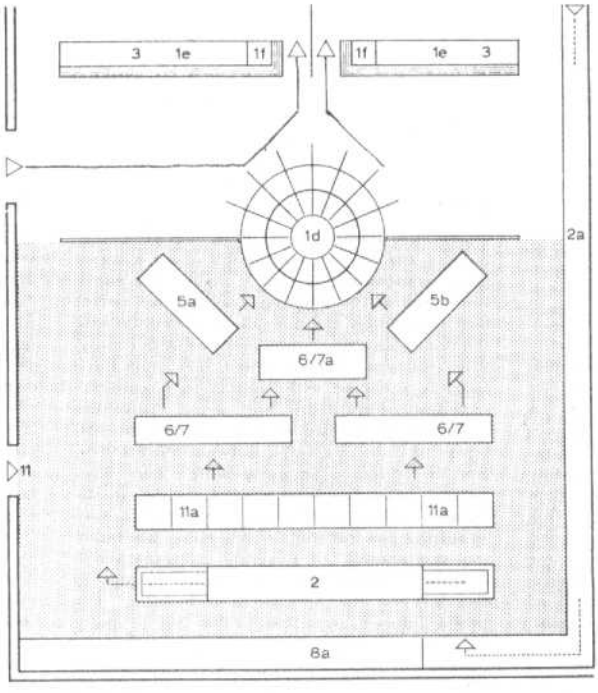


Fig. 15 Student dining hall or cafeteria with self-service carrousel. Capacity: after the initial phase, 1,400 persons per hour. Seating: at least 400 seats. Meal delivery from a central kitchen—deep-freeze, boil-in-the-bag (Nacka), and Régéthermic system.

Legend:

17. Linear-arrangement kitchen with automats. For large output, there are appropriate appliances for steaming and baking.
18. Linear-arrangement kitchen with transport-equipment system. In the foreground: dish washing; soup, vegetable, and entrée vats; stove for general purposes and dietary foods; sauces and meats.
19. Three-tier carrousel (Maison Tricault, Paris) of 2-meter diameter, with a tray slide.

1d. Self-service three-tiered carrousel
Below: 2 cold dishes, various salads, desserts (partly on ice)
Center: warm meals, 3 warm dishes, 2 grilled or fried dishes (with warming lamps above)
Above: sandwiches, pastry, etc.
1e. Salad dressings, condiments, extra cutlery, etc.
1f. Cash register
2. Dishwaster (stacking area, 3 tanks, drying zone)
2a. Soiled-dish conveyor belt
3. Beverage self-service area
5a. Portioning table for cold dishes and salads
5b. Portioning table for desserts, sandwiches, etc.
6/7. Warming and defrosting appliances
6/7a. Portioning table for warm meats
8a. Trolley storage
11. Meal delivery from the central kitchen, access to the supply and auxiliary rooms
11a. Storage cupboards for cold goods and other goods delivered from the central kitchen