PART 4

The Facilities

CHAPTER 10
Facilities Planning and Design

CHAPTER 11
Equipment and Furnishings

CHAPTER 12
Environmental Management
OUTLINE

Definitions and Goals
Preliminary Preparation for Facility Planning
  Trends Affecting Foodservice Design
  Information on Developments in Design and Equipment
  Regulatory Considerations
  Special Considerations for Specific Types of Foodservices
Steps in the Planning Procedure
  The Prospectus
  The Planning Team
  Feasibility Study
  Menu Analysis
  Architectural Features
  Budget/Cost Relationship
Design Development
  Space Allowances and Relationships
  Schematic Drawing
Work Areas
  Mechanics of Drawing
  Designing by Computer
  Architect’s Blueprints
  Specifications and Contract Documents
  Bids, Contracts, Construction, and Inspection
Summary
As has been stated in the first chapters of this book, the foodservice industry gets more and more competitive each day. Since there is documented evidence that the design and layout of an operation is a key factor in determining the success or failure of the business, the initial planning or renovation of a facility takes on added importance.

Facility planning and design are among the responsibilities of foodservice managers. Their involvement can range from planning a new foodservice facility to renovating or making minor changes within an existing facility.

The concepts presented in this chapter apply to all planning projects regardless of size or scope. However, managers must identify their own goals and needs, work to maximize the project’s attributes, and plan for and around any constraints that exist. Providing an appropriate, efficient facility for the production and service of high quality, attractive food with an ambiance that will attract more customers and retain employees is the desired outcome of all foodservices.

**KEY CONCEPTS**

1. Preliminary planning for a foodservice design project should include study of the current trends in foodservice design, innovations in equipment and design, regulatory codes and operating licenses required, and specific needs for various types of foodservices.
2. The first step in a facility design project is to prepare a prospectus, which is a written description of all aspects of the project under consideration.
3. The planning team may include any or all of the following members: the owner or administrator, foodservice manager, architect, foodservice design consultant, equipment representative, business manager, builder/contractor, maintenance/mechanical engineer.
4. The menu is the key to equipment needs, which in turn determines space requirements for the equipment.
5. Decisions made on architectural features are important for determining project cost, ease of cleaning, good sanitation, safety, adequate type and amount of lighting and temperature control for high productivity, and noise reduction for a more pleasant work environment.
6. All initial expenditures must take into consideration the project budget and also such factors as operating costs, life expectancy, conformance to sanitary standards, and provision of comfort for employees and customers.
7. The first step in design development is to determine optimum space allowances and draw a flow diagram showing the location of the work units.
8. In the schematic drawing, equipment is drawn to scale in each work unit with required traffic aisles and work spaces included.
9. The Americans with Disabilities Act mandates some general guidelines for implementing reasonable accommodations in the workplace and dining areas for persons with disabilities.
10. The seven major work areas in foodservice departments are receiving, storage and issuing, prepreparation, preparation, serving, warewashing, and support services.
DEFINITIONS AND GOALS

To understand the planning process thoroughly, foodservice managers and others involved in a design project need to know certain definitions of words and examples of terminology, as used in this chapter, and also the goals to be achieved. Definitions include the following:

- **Physical**: Pertains to material existence measured by weight, motion, and resistance. Thus anything taking up space in a facility must be accounted for and fit the available space.
- **Design**: Refers to the broad function of developing the facility, including site selection, menu, equipment requirements, and other planning functions that will guide the project into reality.
- **Layout**: Refers to the process of arranging the physical facilities, including equipment, such that operational efficiency is achieved. This involves a design drawn on paper to show walls, windows, doors, and other structural components. After this outline drawing is complete, required work areas are designated on the plan, then the equipment and other facilities are arranged and drawn onto the plan.

Foodservice managers must be involved with the development of all aspects of the design plan to ensure that the facility is properly coordinated and functional. Although other professionals will design the electrical, water, and plumbing systems, as well as the lighting, heating, ventilation, and structural components of the building, the foodservice manager must provide input on the specific needs of the foodservice facility. The finished project plan results in either success or failure for the organization involved!

PRELIMINARY PREPARATION FOR FACILITY PLANNING

Before attempting to develop a final design, foodservice managers need to prepare themselves for the tasks ahead, which include:

- Studying trends that affect foodservice design
- Learning what is new in design and equipment
- Obtaining and reading copies of regulatory codes and required operating licenses that have a bearing on foodservice design and operation
- Becoming knowledgeable about special requirements for specific types of foodservices

Thus they will have the information needed for making a worthwhile contribution to the overall planning team and the background to make sound decisions as the project progresses.

Trends Affecting Foodservice Design

*Changes in Patterns of Dining Out.* More people than ever before are eating meals away from home. Depending on the economy, however, the types of foodservices patronized will be affected. The foodservice industry is responding to this
trend by making changes in the style of foodservices, types of food served, and prices charged. All these factors, in turn, influence a facility’s design.

**Change in Desired Menu Items.** Continuing changes in customer preferences for types of foods and meals eaten away from home also affect the design requirements of a foodservice facility. A concern for physical fitness and well-being, for example, has changed the menus of most foodservices. Menus now offer lighter, healthier food selections and limited desserts. This changes the equipment needed and the space requirements and thus affects the renovation or new construction to accommodate preparation of foods customers prefer. For example, today’s customers are seeking just-prepped freshness, or at least the perception of it. This has led to an increase of display or exhibition cooking where customers can see and smell food being prepared at the last minute, or to smaller kitchens using value-added convenience products that do not require multiple cooking steps and equipment.

**Concern for Employees.** Shortages of both skilled and unskilled labor and the desire to retain trained employees has led designers to consider making foodservice facilities both functional and attractive places in which to work. Some of the ways that this is being implemented include: specifying quality equipment and flooring that is easy to clean and safer to use; proper lighting especially chosen for each work area; color and patterns on walls, floors, and painted surfaces; and curves replacing squares and rectangles where possible.

**Economic Factors.** Costs of wages, food, and utilities can influence selection of a type of foodservice and its design. For example, as employees’ wages increase, automation of equipment (e.g., robots) and the purchase of convenience foods become more common. In addition, as costs for food and the energy to prepare it continue to rise, the foodservice design must provide for efficient operation. The basic considerations to ensure that a renovation or new construction will result in the most efficient operation possible are: work flow, traffic flow, energy use, and resource maximization.

- **Work flow** is essential for the efficient use of labor. This requires that workers have as little difficulty as possible moving from task to task, and that tools, supplies, storage, and equipment that they need to do each task are close at hand.

- **Traffic flow** refers to the ease with which customers can move around the facility. The more people that can be served in a given amount of time and the more that are attracted by the ease and convenience of dining in the operation, the greater the potential sales volume.

- **Energy use** involves considering both the type of energy to be used (gas, electricity, steam) and how efficiently it is used. Since energy is cheaper than labor, energy-saving decisions should not make more work for employees. With the current ever-rising energy costs, the trend is to design and equip foodservice facilities to save energy to the greatest extent possible. Equipment manufacturers are producing equipment that gives a high yield of energy for the work accomplished. The energy used by specific pieces of equipment is stated in the specifications. The foodservice manager should make comparisons before selecting a particular make or model.

Other energy conservation trends are toward better insulation, heat recapture for other uses, and recirculation of heat. Solar heat designs are used in some areas,
especially for restaurants, and may be a future trend of other types of foodservices.
(See Chapters 11 and 12 for details on energy-conserving equipment.)

Resource maximization often requires negotiating the best balance between finite resources such as space, labor, money, etc. For example, should a bakeshop be included when it will take up valuable space but potentially increase customer satisfaction and revenue?

One trend in facility design is to make the existing space adaptable either to multiple uses or to meeting future demands. With money for design projects so scarce and the environment in the foodservice industry so dynamic, such that it is difficult to predict what will happen in the future, the challenge is to design a facility that will last at least 30 to 40 years. This may be accomplished in part by selecting wheel-mounted and modular equipment or by using portable units. The key is to choose equipment that is uniform in size, movable, and adaptable for numerous work activities. Another option being implemented in at least one recent 17,000 square foot, $8 million dollar healthcare facility kitchen is to incorporate a blend of three different production systems—conventional, cook/chill, and assembly/serve.

**Built-In Safety, Sanitation, and Noise Reduction.** In planning the total facility, the safety of the employees, safety of food, and overall sanitary conditions are considerations in new designs. These may be achieved by the type of floor covering, ventilation, building materials, lighting, and equipment selected, and by the method of their installation. Ease of cleaning reduces labor costs, and materials and designs chosen for their safety features help reduce accidents. All make for an attractive, safe working environment for the employees. Many of these features reduce noise and worker fatigue, and hence result in greater productivity.

**Information on Developments in Design and Equipment**

Visits to new or renovated facilities of the same type you are planning and talks with managers of those facilities may garner new ideas and serve as a means to obtain firsthand information. Those with recent building experience usually are pleased to share workable ideas, mistakes that were made, and suggestions for improvement.

Obtaining catalogs and specification sheets from various equipment companies for comparative purposes and determining equipment space needs is essential. A file of such reference materials will be invaluable during work on the project. Equipment company representatives can be excellent sources of information for learning what is new and workable in various situations. Design consultants can also be contacted with any specific questions that arise.

Trade journals should be reviewed for articles on planning and design. Information gained can contribute new ideas and helpful suggestions to the planner. If the project is to renovate a facility, present staff and employees may have excellent suggestions resulting from their own work experience. Giving them an opportunity to express opinions is a valuable resource and should be mutually beneficial.

**Regulatory Considerations**

Foodservice managers need to know which federal, state, and local laws, codes, and regulations will affect their building or renovation project. These regulations have to do with zoning restrictions; building standards, including those to
accommodate persons with disabilities; electrical wiring and outlets; gas outlets and installations; health, fire, and safety codes; sanitation standards that govern water pollution and waste disposal systems; and installation of heavy-duty equipment.

Regulations have been established by agencies and organizations such as state, county, and local health and engineering departments, the American Gas Association, Underwriters’ Laboratories, the National Sanitation Foundation International, and by federal legislation such as the Occupational Safety and Health Act and the Americans with Disabilities Act. Copies of these codes may be obtained by writing to or by visiting the appropriate agency or by visiting the Web site (www.usdoj.gov/crt/ada/adabom1.htm). Large libraries also usually have copies of the codes and regulations.

Other professional persons will assist in the identification and application of regulatory codes and standards. These people make up a part of the planning team discussed later in this chapter.

Building permits are required but, in most instances, will not be issued for foodservice projects until health department officials have reviewed and approved the plans. It is expedient, therefore, to contact a local health department official and work closely with that person as plans are developed, so that approval is ensured.

Special Considerations for Specific Types of Foodservices

A brief review follows of some special considerations to keep in mind when planning a specific type of foodservice.

Commercial Facilities. Restaurants catering to downtown shoppers and businesspeople prefer a location near a busy intersection. Their customers, who often have a limited lunch period, may be those within a 10-minute walk of the restaurant. Because rents for prime downtown sites are likely to be high, effective use of every square inch of space is a top planning priority. Many such restaurants are built vertically, with several levels for their various functions. Coordinating these activities with a good transport system between floors is a unique planning challenge. Suburban restaurants typically draw patrons from a larger area, making adequate parking the first essential. In addition, the location should be easily accessible and highly visible to approaching motorists. Shopping centers, which not only attract large numbers of customers but also provide ample parking, are considered desirable locations for commercial foodservices.

Hotels and motels usually have coffee shops located in visible locations, with entrances from both the street and the lobby. However, the main dining, party, and banquet rooms are frequently less visible, with access only through the lobby. For these facilities, basic food items are often prepared in a central kitchen. Finishing or banquet kitchens then should be located adjacent to the various serving areas.

Schools and Universities. School foodservices are preferably located on the first floor, convenient to the central hallway. The area should be well ventilated to allow cooking odors to dissipate rather than to permeate classrooms. Dining areas in some schools may have to double as a study hall or gymnasium, which would present a different planning situation.

Many large city school systems utilize a central production kitchen, or commissary, for food production for all schools in the system. Often, these are cook/chill or cook/freeze systems, which require specialized cooking equipment and good
transportation systems and schedules. With this system, individual schools need only limited equipment for finishing off baking, reheating certain items, and serving the food.

Colleges and universities provide many and varied types of foodservices to accommodate the needs of the entire campus community. Residence halls may have their own kitchen and dining rooms or, if there are several halls on campus, may have a central production unit for certain items, such as baked goods, or for prepreparation of produce or meats. The trend is to have a choice of menu items, usually served cafeteria style.

Peak workloads at the three meal periods may necessitate duplicate pieces of large equipment and adequate work space for personnel. Student unions usually offer a variety of types of foodservices, including large banquet halls for seated service, short-order units, cafeterias/food courts, and possibly small dining rooms for special meals. Some colleges and universities have invited various fast-food companies to operate one of their units on campus to satisfy student requests for that type of food. Each type of foodservice requires different space and equipment, making planning for these facilities a challenge.

**In-plant Facilities.** The in-plant or industrial foodservice area should be central in location, allowing for ready access from as many places in the plant as possible. Every provision should be made to expedite service so that all workers can be accommodated quickly during a fairly short lunch break. Mobile units and vending operations can be used in remote areas of large plants or in those too small to justify the space and expenditure for kitchen equipment, management, and labor. Adequate passageways for such carts are essential.

**Hospitals and Health Care Centers.** Facility planning for hospitals and other health care centers must provide for the needs of staff, employees, visitors, and guests, as well as the patients. The decision as to type of service to use, centralized or decentralized, has to be made at the outset of planning, because space and equipment requirements differ greatly for each. A central kitchen ordinarily provides food for these groups with one dining room/cafeteria that serves everyone except bed patients. Sometimes small, private dining rooms can be planned for official catering functions. For after hours, vending machines can be installed to supplement regular meal service. Adequate passageways for transporting patients’ meals on carts and trucks, as well as space for cart storage, are other special considerations. Elevators or lifts designated solely for foodservice use will expedite meal service to patients. Office space for clinical dietitians in large hospitals is another planning consideration. If off-premise catering, Meals-on-Wheels, or other services are to be provided, adequate space for them must also be included in the facility plan.

**Correctional Facilities.** Kitchen and dining rooms for correctional facilities present a planning challenge different from most other types of foodservices. Because inmates often serve as foodservice workers, the basic design consideration is to provide for personal safety, security, and protection against sabotage. The foodservice manager should have a full view of all operations. Therefore, the office should be centrally located in the kitchen, raised above the floor level, and safety glass windows should be in place on all four sides. For security, all cabinets should be open with no drawers, and secure locks should be provided for all storage areas. A
storage warehouse located outside but adjacent to the kitchen so deliveries for daily use can be made easily, eliminates the need for large storage areas in the kitchen and reduces chances of theft. Serving areas designed to prevent face-to-face interaction between servers and inmate “customers” prevent confrontations. A partitioning wall from the ceiling down to within approximately 24 inches of the front of the serving counter achieves this objective while still allowing easy viewing for selection of foods. The dining area is best divided into small units seating 100 to 125 persons for control of potential riots.

Other planning considerations may include the delivery of food to some inmates in their cells. The choice of centralized service with food portioned and served onto trays in the kitchen for distribution or decentralized service with bulk food delivery to serving areas throughout the facility for service is one to be made by the planning team.

Generally, kitchens and dining areas in any type of foodservice facility should provide maximum convenience and accessibility for customers. For efficiency’s sake, locating dining rooms adjacent to kitchens is preferable. Foodservices are best located on the first floor to obtain the best lighting, ventilation, and outdoor views. Basement-level locations can have a poor psychological effect on both patrons and employees if the area is dark and unattractive. The disadvantages of foodservices that are located above the first floor are inaccessibility to patrons and problems related to bringing in supplies and removing trash and waste. The physical environment has much to do with the success of any foodservice design.

**STEPS IN THE PLANNING PROCEDURE**

After preliminary study to prepare for the facility design project, completing the following developmental steps will lead to a completed layout design:

- Prepare a prospectus (a program or planning guide).
- Organize a planning team.
- Conduct a feasibility study.
- Make a menu analysis.
- Consider the desired architectural features: building materials, floors, walls, lighting, heating, cooling, ventilation, refrigeration, and plumbing.
- Consider (and adjust if necessary) the costs versus money available relationships.

Upon completion of these preliminaries, the design development process can proceed.

**Prospectus**

A written plan for a building/designing project that details all elements of the situation being planned, used as a guide and communication tool to aid clear understanding by all who are involved in the planning.

**The Prospectus**

The **prospectus** is a written description that details all aspects of the situation under consideration and helps other professionals on the planning team understand the exact needs of the foodservice department. It should contain the elements that will affect and guide the proposed design and also present a clear picture of the physical and operational aspects of the proposed facility or renovation project. Usually it is based on questions such as these:
Chapter 10  Facilities Planning and Design

- What type of foodservice is planned?
- What is the foodservice to accomplish?
- Which major type of food production system will be used?
- How many people and what age groups are to be served? How many must be served at one time?
- What will be the hours of service? Style of service?
- What is the menu pattern?
- In what form will food be purchased? How often?
- What storage facilities will be needed? Amount of refrigerated and amount of freezer space?
- What equipment and what capacity for each piece will be required to prepare and serve the menu items?
- What are desirable space relationships?
- How will safety precautions be incorporated in the plan? Sanitary measures?
- What facilities must be planned for persons with disabilities?
- What energy sources are most economical? Available?
- What activities will be computerized?

The prospectus usually contains three major sections:

1. The **rationale** includes title, reason or need for project, and its goal, objectives, policies, and procedures.
2. **Physical and operational characteristics** include architectural designs and features, all details about the menu, food preparation and service, employee and customer profiles, and anticipated volume of business.
3. **Regulatory information** includes built-in sanitation, safety, and noise control features, and energy and type of utility usage desired.

**Rationale.** The title, goal, objectives, policies and procedures, and a statement of need for the project are, perhaps, the most difficult components to define. The following definitions and examples should help make the exercise easier:

- **Title:** Description of the plan. Narrow the title to reflect the actual scope of the design that is proposed.  
  **Example:** Design for a warewashing area of the Coastal Restaurant Foodservice.
- **Goal:** State the single outcome of the project.  
  **Example:** To develop a central warewashing area that will process all dishes, utensils, and pans of the foodservice.
- **Objective:** Specific statements that indicate what is necessary to achieve the goal.  
  **Example:** The warewashing area will (1) utilize no more than 36 square feet of floor space, (2) be operated with no more than four persons, and (3) operate with minimum energy usage.
- **Policy:** A definite course or method of action selected from among alternatives and in light of given conditions to guide and determine present and future decisions.  
  **Example:** All dishes, utensils, and pans will be washed and stored within 45 minutes of use.
• Procedure: A particular way of accomplishing something.  
  Example: Conveyor belts will be used to carry dirty dishes to the warewashing area, or scraping, racking, and washing of dirty utensils and pans and storing clean ones should be accomplished with 80 percent automation.

The statement of need for the project may be simple or complex, depending on the project; for example, “The foodservice dry and refrigerated storage areas need to be expanded 60 percent to accommodate an increase in meal census from 500 per day to 1,200 per day as a result of a recent building addition.”

**Physical and Operational Characteristics.** Physical characteristics relate to architectural or design features, such as building style appropriate to the type of food to be served. Mexican foods, for example, often call for Mexican or Spanish architecture. A necessary design feature to identify in a renovation project could be an existing support pillar, an elevator shaft that cannot be moved, or a desired solar heating system. These must be identified at this stage because they could affect other considerations, such as the style of the roof and types of windows.

Operational data refer to activities that take place in the foodservice department. The types of food on the menu are the key concern in the planning stage. Further, the form in which food will be purchased—fresh, canned, or frozen—and the approximate quantities of each must be estimated with some accuracy. This information helps planners determine the amount and kind of storage space required. Food preparation methods to be used, including on-premise preparation, tell the planners what equipment is needed and the amount of space that is required to accommodate the equipment.

The major operational characteristic, or type of foodservice system, is basic to all design planning. Space requirements for an assembly/serve system are quite different from those of a conventional system. Other decisions to make in advance are whether to use centralized or decentralized service and the method of delivery and service to be employed.

Other operational characteristics are the hours of service, anticipated volume of business (both total and per meal period), and the number of diners to be seated at any one time. These data help determine the required size for the dining area.

A customer profile, including age, size of group, and mobility, helps determine the probable dining space required per person. An employee profile includes the number of employees, the number of shifts and employees on duty per shift, the employees’ sex (to plan locker and rest room space), and each work position as it relates to standing, sitting, walking, pushing carts, and so forth. Special considerations to meet the needs of persons with disabilities are included as well. This information is essential so that adequate space for work and movement of people and equipment will be allocated.

**Regulatory Information.** This section identifies the standards of safety, sanitation and cleanliness, noise control, and waste disposal that the design must meet. Also included are standards established by the Americans with Disabilities Act to provide for employees and patrons with disabilities. Guidelines for selection of the type of utilities to be used and energy constraints are also stated.

Because every project is unique, the various sections of a prospectus will not always include all of the same data. Just those that pertain to the situation are necessary. For example, a dry and refrigerated storage design does not need a customer profile. Instead, employee and equipment characteristics would be the focus, in
addition to information regarding the menu, food items, and safety and sanitation regulations.

The key in writing the plan is to include all pertinent technical data and to always comment on how the data presented will affect the proposed design. The seating space in a cocktail lounge, for example, will depend on the size of the tables and chairs selected. The person who writes the prospectus and later helps develop the design should be a professional foodservice manager with the knowledge and authority to make decisions about the anticipated menu, space, and equipment needs. That person must also be able to provide other operational data required by planning team members.

The Planning Team

When the project plan is complete, it is time to organize a team to develop the design plan. The expertise required of those on the team will vary depending on the extent of the project, its objectives, and its size. Typical planning team members include the following types of persons:

1. Owner or administrator (the person with authority to spend money for the project and give final approval to carry it out)
2. Foodservice manager
3. Architect
4. Foodservice design consultant
5. Equipment representative
6. Business manager
7. Builder/contractor
8. Maintenance engineer/mechanical engineer

Not all team members are involved in all planning stages. Certain members are included at intervals throughout design development. Generally, the owner or administrator and foodservice manager will co-plan the initial design and bring in other team members for planning meetings at appropriate times during the project’s development.

The planning team chooses a floor plan, selects materials, and writes specifications cooperatively. However, team members need to check the plans many times before submitting final proposals to builders and to equipment vendors for bids. It is essential to include every detail and be so specific that no part of the architectural features, equipment layout, and specifications is left to chance or misinterpretation.

Feasibility Study

A feasibility study—the collection of data about the market and other factors relating to the operation of the proposed facility—justifies the proposed project, helping to ensure that the project is worth pursuing. This study follows the prospectus outline, with data being collected for each major category. Because each project is unique, categories vary according to need. For instance, the feasibility study for a new restaurant would include research on the proposed site, potential customer profiles and community growth, building trends, competition in the area, and possible revenue-generating sources, such as catering. For a small renovation project
in an existing building, the feasibility study would focus more on operational details than on community and competitive information.

Because the financial commitment for most projects is so large, cost information for the building or for renovating, and for equipping it, is an essential part of the feasibility study. Many people can assist in this effort, but one person should be the coordinator. This person may be the business or financial manager who also interprets the cost data for the planning team.

Data sources for the feasibility study may include:

1. Payroll, production, cash register, and inventory records
2. City, county, state, and national regulations, obtained from the respective agencies involved or from library copies of those documents
3. Statistics regarding trends, average costs, and customer information obtained from trade journals and independent studies

The feasibility study is a critical component of a project plan. If done well, funds are more likely to be made available, allowing the project to proceed. Resources for a restaurant feasibility study are shown in Table 10.1.

Menu Analysis

An important step in preliminary planning is identifying the type of menu to be served (see Chapter 5 for menu types) and the various food preparation methods required for that menu type. This is the key to equipment needs, which in turn determines the space requirements for the equipment.

Menu, foodservice system, and style-of-service decisions are the major foodservice planning components. The menu affects equipment design and layout, as well as personnel skills and staffing levels required. For example, if the menu and menu pattern contain no fried foods, frying equipment need not be included in the design, and no cooks will be needed to perform this task.

The prospectus should include a sample of several days’ menus and a menu pattern. The pattern specifies meal categories or courses, while the menu identifies the respective preparation methods required. From this sample menu, the foodservice manager analyzes the variables involved in producing menu items, such as type of storage needed, portion size, total number of portions, batch size, processing required, utensils needed, necessary work surfaces, and type of equipment required (see Table 10.2). The estimated time when a batch is needed and when preparation is complete is also helpful in deciding whether equipment could be shared or whether duplication is necessary. The manager also evaluates the menu for production, service, acceptability, and feasibility. At this point, menu changes can be made to balance equipment use, workload, and acceptability.

Architectural Features

During a project’s planning phase, the planning team considers certain architectural features such as building style and materials; types of floors, walls, ceilings, and noise reduction components; lighting; heating and cooling; ventilation; built-in refrigeration; and plumbing. Not only is making a decision on these features essential for determining project cost, but also for ensuring ease of cleaning, good sanitation, safety, adequate type and amount of lighting and temperature control for high productivity, and noise reduction methods for a more pleasant work environment.
Table 10.1  Restaurant feasibility study resources.

<table>
<thead>
<tr>
<th>Sources</th>
<th>Available Information</th>
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<tbody>
<tr>
<td>Chamber of commerce, economic development</td>
<td>Population trends (historical and projected)</td>
</tr>
<tr>
<td>authority, or city planning office</td>
<td>Age, occupation, income level, ethnic origin, and marital status by census tract</td>
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<td></td>
<td>Retail sales, food and beverage sales</td>
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<td></td>
<td>Maps</td>
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<td></td>
<td>Consumer shopping habits and patterns</td>
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<td></td>
<td>Employment and unemployment statistics</td>
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<tr>
<td></td>
<td>Major employers and industries</td>
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<td></td>
<td>Planned commercial, residential, and industrial developments</td>
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<tr>
<td></td>
<td>Demographic and socioeconomic trends</td>
</tr>
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<td></td>
<td>Area master plan</td>
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<tr>
<td>Housing and community development</td>
<td>Residential occupancy and housing</td>
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<tr>
<td></td>
<td>Urban renewal projects</td>
</tr>
<tr>
<td></td>
<td>Property values</td>
</tr>
<tr>
<td>Building commission</td>
<td>Building permits data</td>
</tr>
<tr>
<td></td>
<td>Planned construction developments</td>
</tr>
<tr>
<td>Zoning commission</td>
<td>Planned uses for zoned areas</td>
</tr>
<tr>
<td></td>
<td>Building height, signage, parking, and construction restrictions</td>
</tr>
<tr>
<td>Transportation department</td>
<td>Road traffic patterns and counts</td>
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<tr>
<td></td>
<td>Proposed traffic developments</td>
</tr>
<tr>
<td></td>
<td>Types of public transportation and routes</td>
</tr>
<tr>
<td>Department of revenue</td>
<td>Income and other related sales taxes</td>
</tr>
<tr>
<td></td>
<td>Real estate assessments</td>
</tr>
<tr>
<td>Convention and visitors’ bureau</td>
<td>Number of visitors by month and spending habits/statistics</td>
</tr>
<tr>
<td></td>
<td>Conventions—size, type, frequency, and duration</td>
</tr>
<tr>
<td></td>
<td>Recurring festivals and fairs</td>
</tr>
<tr>
<td>Utility companies</td>
<td>Estimates of gas and electric expenses for the proposed restaurant</td>
</tr>
<tr>
<td>Local newspapers and magazines</td>
<td>Restaurant critiques</td>
</tr>
<tr>
<td></td>
<td>Dining guides</td>
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<tr>
<td></td>
<td>Planned commercial developments</td>
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</tbody>
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Source: Courtesy of National Restaurant Association.

Because certain refrigeration units are usually built in, the number and location of such units must be determined before construction or renovation begins.

Some of the components previously mentioned are included here as a basic information review.

Building Style and Materials. Type of foodservice operation, its geographic location, and its menu markedly influence the type of architecture and materials used. Material selection for any building depends on the type of architecture planned, the permanence desired, the location, and the effect of local weather conditions on the materials. The building engineer and the architect will know the characteristics of the various building materials and help select the most suitable in relation to cost.
### Table 10.2 Menu analysis.

<table>
<thead>
<tr>
<th>Item</th>
<th>Storage Type</th>
<th>Portion Size</th>
<th>Portions</th>
<th>Batch Size</th>
<th>Process</th>
<th>Utensils</th>
<th>Work Surface</th>
<th>Large Equipment</th>
<th>Holding Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinach salad</td>
<td>Refrigerated</td>
<td>1 ounce</td>
<td>350</td>
<td>100</td>
<td>Wash Trim Drain</td>
<td>Knife Drain pan</td>
<td>Sink Counter</td>
<td>Sink Counter</td>
<td>Refrigerator</td>
</tr>
<tr>
<td>Beef patty</td>
<td>Freezer</td>
<td>4 ounces</td>
<td>300</td>
<td>50</td>
<td>Grill</td>
<td>Spatula</td>
<td>Counter Utility cart</td>
<td>Grill</td>
<td>Warming oven</td>
</tr>
</tbody>
</table>
Figure 10.1  (a) The curved facade of the Top of the Falls restaurant overlooks the whole Niagara Falls panorama. (b) The multilevel design of the restaurant interior offers every customer a spectacular view.

Courtesy of Herbert H. Gill, President, Gladieux Corporation, Toledo, Ohio.
Fiberglass reinforced panels (FRP), a plastic-like paneling, is quite durable, available in several colors, and less expensive to install than ceramic tile. A minimum-quality material for kitchen wall surfaces is wallboard painted with washable enamel. Because it lacks durability, it is not suitable for use in wet areas, such as around sinks and in warewashing rooms.

A desirable arrangement is to cover walls with ceramic or other glazed tile to a height of 5 to 8 feet where food and water splashes occur. The remainder of the wall may be smooth-finished washable enamel or semigloss paint.

Stainless steel is another material highly suited for kitchen walls; however, due to its very high cost, its use is often limited to cooking areas. It is also quite reflective and may cause glares from the lighting.

Ceiling heights vary widely, with kitchens typically averaging 14 to 18 feet. Kitchen and dining room ceilings should be acoustically treated and lighter in color than the walls. The use of sound-absorbing materials, such as draperies and carpeting, tends to minimize local noises in dining rooms. There are many acoustical ceiling materials to choose from for kitchen use. They must resist deterioration from rapid temperature and humidity changes and from corrosive cooking fumes. In addition, those that have a low reflectance value, are resistant to fire, and are washable are most suited for new or renovated foodservice kitchens.

Sound-absorbing materials not only are used as surface finishes in construction but also as insulators. Vents, radiator pipes, and water pipes may act as carriers of sound, and the most effective means of noise prevention is their careful and thorough insulation with sound-absorbing material. Because of later inaccessibility and prohibitive costs, it is most important that this precaution be taken in the original construction.

Figure 10.2 shows an example of sound reduction treatment in a noisy area. Features such as automatic lubrication of the so-called noiseless power equipment that keeps it in quiet working condition, rubber-tired carts, rubber collars on openings in dish-scraping tables, and ball-bearing glide table drawers help to minimize noise in the kitchen.

**Lighting.** The amount and kind of lighting required for a foodservice represent a long-term investment and merit the assistance of technical experts in the field. However, the lighting’s adequacy, efficiency, and suitability are far more important concerns than its installation cost.

The design should allow for as much natural light as possible. Natural light not only makes food look more appealing, but it can also reduce operating expenses. In addition, natural light exerts a positive psychological effect on workers and guests. Because it is not possible to rely totally on natural light, it is desirable for foodservice managers to have some knowledge of lighting and its requirements when working with lighting experts.

The amount or intensity of light, the kind and color of light, and type of fixtures and their placement combine to create good lighting. The reflective values of walls, ceiling, and other surfaces also affect lighting. Light intensity is measured in foot candles obtained from light meter readings, and the number of required foot candles per square foot depends on the work to be done. The general guidelines shown in Table 10.3 are helpful for planning.

Planners should choose the light fixtures and their placement during the project’s design phase so outlet and switch locations can be identified. Fixtures should harmonize with the architectural plan and be placed to provide the recommended
**Figure 10.2** Special sound-absorbing ceiling treatments above dishwashing area. (a) Removable perforated acoustical panels hung from ceiling. (b) Box-like corrugated aluminum sheets filled with one inch of fiberglass insulation suspended from ceiling in metal frame.

<table>
<thead>
<tr>
<th>Light Intensity (in footcandles)</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 to 20</td>
<td>Walkways (halls and corridors)</td>
</tr>
<tr>
<td>15 to 20</td>
<td>Dining</td>
</tr>
<tr>
<td>15 to 35</td>
<td>Rough work</td>
</tr>
<tr>
<td>35 to 70</td>
<td>General work or food display area</td>
</tr>
<tr>
<td>70 to 150</td>
<td>Reading recipes, weighing and measuring ingredi-</td>
</tr>
<tr>
<td></td>
<td>ents, inspecting, checking, and record keeping</td>
</tr>
</tbody>
</table>
illumination level and balance for dining areas as well as for food storage, preparation, and serving areas. Studies have shown that proper workplace lighting can increase employee productivity by 3 percent to 4 percent, a significant amount in overall efficiency.

Lighting systems may be indirect, direct, or a combination of the two. In indirect systems, about 90 percent to 100 percent of the light is directed upward, whereas in direct systems, a corresponding amount is directed downward. Luminous ceiling lighting gives an evenly dispersed light that creates the effect of natural sunlight and is desirable in kitchen areas. Brightness, though, should be low enough to prevent glare or cause reflections on shiny surfaces that may affect workers’ eyes. Light fixtures should be positioned to prevent employees from standing in their own shadows while working. Good lighting reduces eyestrain and general worker fatigue, and is conducive to accuracy in work, as well as to good sanitation and safety in the workplace.

**Heating, Ventilation, and Air Conditioning.** The heating, ventilation, and air conditioning (HVAC) system provides comfortable temperatures for employees and guests. An architect, working with an HVAC specialist, is best qualified to specify a system of sufficient capacity for the facility in question. Foodservice presents a somewhat different problem from other building uses because cooking processes generate heat, moisture, and food odors.

Air conditioning means more than air cooling. It includes heating, humidity control, and circulating, cleaning, and cooling of the air. Systems are available with controls for all features in one unit. The system may be set up to filter, warm, humidify, and circulate the air in winter and, by adding cooling coils and refrigeration, maintain a comfortable summer temperature. Dehumidification may be necessary in some climates.

The placement of air ducts is important to prevent direct blasts of cold air onto those in the room. Figure 10.3, which shows a retirement home dining room that seats 400 people, illustrates several points. The ceiling is designed with wood slats backed by sound absorption material. This permits enough sound to create a friendly atmosphere, but reduces the sound level enough to allow people with
hearing aids to be comfortable. The lighting is excellent, with natural light on three sides and adequate, well spaced ceiling lights. Ducts located beside the right-hand row of lights supply conditioned air. The suspended umbrellas add an aesthetic touch.

Satisfactory kitchen ventilation typically consists of an exhaust fan system, built into a hood placed over cooking equipment, to eliminate cooking odors, fumes, moisture, and grease-laden vapors. In the absence of direct air conditioning, cool outdoor air may be drawn into the kitchen by fans to reduce the temperature and increase circulation of air, making body surfaces feel cooler.

Although air conditioning may be considered expensive to install and operate, employee productivity is estimated to increase 5 percent to 15 percent in such a controlled environment. As a result, planners should carefully consider what type of temperature control system is most appropriate for their climate and facility.

**Built-in Refrigeration.** The smooth, efficient operation of foodservice departments will be enhanced by planning for an adequate kind and amount of refrigeration. The foodservice manager should have some knowledge of the principles of refrigeration, types of systems used, and how to determine space needs for the facility being planned. Walk-in, built-in, and reach-in refrigerators and freezers are essential. At this stage of planning, however, only the permanent built-in types need to be considered. Reach-in and portable types are discussed in Chapter 11.

Mechanical refrigeration is the removal of heat from food and other products stored in an enclosed area. The system includes the use of a refrigerant (chemical) that circulates through a series of coils known as the evaporator. It begins as a liquid in the coils, then is vaporized, and pressure is built up by the heat it absorbs from the food. This starts a compressor, which pumps the heat-laden gas out of the evaporator and compresses it to a high pressure. The compressed gas flows to a condenser, which is air or water cooled, the heat is released, the gas is re-liquefied, and the cycle is ready to repeat when the temperature in the refrigerator or freezer becomes higher than desired.

It is desirable for a refrigerant to have a low boiling point, an inoffensive odor, high latent heat, and a reasonable cost, as well as to be nontoxic, non-explosive, nonflammable, non-corrosive, stable, and not harmful to foods. With today’s concerns over depletion of the ozone layer in our atmosphere, refrigerants used must be “ozone friendly.” Less harmful than the formerly used freon are the hydrochlorofluorocarbons (HCFCs), which are now being used by manufacturers for refrigerants in their compressors. Thus, the foodservice industry is doing its share to help alleviate the worldwide concern for stress on the ozone layer.

Refrigeration systems may be central, multiple unit, and single unit. In a central system, one machine supplies refrigeration in an adequate amount for all cooling units throughout the building. This system is rarely used because of the problem of trying to maintain desirable refrigeration in all the different units and because, in case of a breakdown, all refrigeration is gone. In a multiple or parallel system of refrigeration, there is a compressor for a series of coolers, the compressor being of proper capacity to carry the load required to maintain the desired temperature in the series of coolers. A single unit is the self-contained refrigerating system used in the reach-in types.

The location and space allocations for built-in units require careful planning. Generally, they are placed close to the delivery area to minimize distance to transport items received into refrigerated storage. They also need to be close to the...
preparation units that most frequently use the products stored in them. Three separate walk-in refrigerators are recommended as a minimum, one for fresh produce, one for dairy products and eggs, and one for meat and poultry. Each food group requires a different temperature for optimum storage. Walk-in freezers may also be planned.

Many factors influence the amount of refrigerated and freezer space needed:

1. **The size of the establishment:** Since permanent walk-in units that are smaller than about 8 × 10 feet are uneconomical to install, small facilities may use reach-in rather than walk-in units.

2. **The kind of foodservice system used:** Systems with cook/chill methods require a large amount of refrigerated space, whereas cook/freeze and assembly/serve systems require primarily freezer space.

3. **The frequency of deliveries:** Establishments that are close to markets and receive daily deliveries would require less storage space than those foodservices located in remote areas where deliveries are infrequent.

4. **The form in which food is purchased:** If primarily frozen foods are purchased, naturally more freezer space will be required than if all fresh or canned goods are used.

The total space required may be estimated by measuring the size of units of purchase (e.g., cases, bags, crates) and multiplying each by the number of units to be stored at one time. This will give the total cubic feet of space required, which will be divided into the separate food items to be stored together. Most walk-in units are 7 or 8 feet high. Aisle space in the refrigerator must be wide enough for trucks or carts to enter. Width of shelving is based on the items to be stored; 2 to 3 feet is the usual width. Space for the insulation of the walk-ins also has to be included, a minimum of 3 inches on all sides for built-in refrigerators and 5 to 8 inches for built-in freezers.

Floors of walk-ins should be made of strong, durable, easily cleaned tile that is flush with the adjoining floor to permit easy entry and exit of food on trucks or carts. Wall surfaces should be washable and moisture resistant. Each unit should be equipped with an internal door-opening device and a bell as a safety measure. An exterior wall-mounted recorder to show the box’s inside temperature saves energy by eliminating the need to open the door to check temperatures. (See the “Schematic Drawing” section in this chapter for more information on location of refrigerated storage space.)

**Plumbing.** Although architects and engineers plan the plumbing for a facility, foodservice managers must be aware of and able to describe the foodservice’s need for kitchen and dishroom floor drains and proper drains around steam equipment; the desired location for water and steam inlets and for hand-washing sinks in work areas and rest rooms; the water and steam pressure needs for equipment to be installed; and adequate drains to sewer lines for waste disposal equipment.

**Electricity.** Food managers are responsible for providing information on the needed location of electrical outlets and the voltage requirements of all equipment to be used in the facility. Equipment manufacturers’ specifications list power requirements for their equipment. These must be compatible with the building’s power supply or else the equipment will not operate at peak efficiency or will overload the wiring.
The mechanical engineer on the planning team details the electrical specifications, based on the foodservice’s requirements, including the wattage and horsepower of the facility’s equipment. Hospitals and health care facilities may require special electrical receptacles for food carts used to deliver patients’ meals. Because these carts will be moved to various locations, compatible receptacles must be installed at all points of use. Figure 10.4 shows an overhead electrical raceway installation of receptacles for carts in a hospital kitchen.

All pipes and wiring going into a kitchen should be enclosed and out of sight. A modular utility distribution and control system offers many advantages compared with fixed and permanent installations. The entrance of and controls for all utilities are centered in one end-support column or panel of the system. All pipes and wiring are enclosed, but controls for both operation and quick-disconnect are on the outside of the panel within easy reach. Water, steam, gas, and electrical outlets may be installed as desired in panels extending from the one-point control column along a wall, to a center room unit, directly behind equipment or from above as shown in Figure 10.5. Utility distribution systems are usually custom designed. A wall-type unit may house electrical wiring, plumbing assemblies, gas piping, and contain controls for water-wash cleaning for the exhaust ventilator. A fire control system for protection of cooking equipment may be located in the exhaust ventilator, which is located above the utility distribution system.

Budget/Cost Relationship

Because unlimited budgets are rare, studying the costs involved in any facility design project is inevitable. Planners usually establish a predetermined budget, which the project’s total cost cannot exceed. Yet, the quality and features that foodservice managers select for a facility may well affect its operating costs. A detailed financial analysis may reveal that a higher initial expenditure for top-quality design and fixtures will result in lower operating costs during the project’s anticipated life—its life-cycle cost—than a less expensive design.

An example of a renovation that was economical and still provided a significant boost in operational efficiency is the hospital cafeteria shown in Figure 10.6. A few Figure 10.4 Overhead electrical raceways accommodate ten patient food carts. Connection plates are equipped with receptacles and point-of-use circuit breakers.

Courtesy of Louisiana State University Medical Center Hospital, Shreveport.
simple well considered design touches were enough to achieve both goals for this hospital.

Building and construction costs are affected by many interrelated factors, including the prevailing prices for labor and materials, quality and quantity of items selected, and the building’s overall design. It may be helpful to think of these three factors—cost, quality, and quantity—as a triangle. If the project’s budget is a fixed amount, it may be necessary to restrict quantity, quality, or both. However, if a predetermined amount of space is the top priority for the facility, planners must anticipate financing a building or site large enough to accommodate the required size. Alternatively, if planners assign top priority to the quality of fixtures and equipment, they must be flexible regarding the project’s cost and quantity factors.

The particular design selected for the building or foodservice department will impose certain operating costs, especially those for labor. A well planned arrangement on one floor minimizes the distance food and people must travel and permits good supervision. Compact work units, with the proper equipment easily accessible to workers, tend to reduce steps, motion, and fatigue, helping to minimize labor and operating costs. In poorly planned facilities, it is not uncommon for employees to spend at least 10 percent of their time locating and assembling utensils and supplies. Some assessments indicate that in an efficiently planned department, only the dietitian or foodservice supervisor, storeroom clerk, dishroom supervisor, pot and pan washer, and janitor would need to leave their work areas.

It is also important to include the total costs for cleaning materials, utilities, building and equipment depreciation, and the amount of equipment needed. Such cost will vary directly with the amount of space allocated to the foodservice department.
Fine Tuning a Hospital Cafeteria

Original Layout

Renovation Layout

1) Beverage/dessert counter coaxed to increase length and create better traffic circulation.
2) Soiled dish-drop relocated to existing cafe area.
3) Open grab-and-go refrigerated cases added to expedite customer throughput.
4) Soup station expanded to better accommodate customer volume.
5) Salad bar expanded and moved to create efficient traffic circulation.
6) Hot entree station expanded to feature “Daily Special” cooking podium.
7) Existing grill given facelift with new fascia, tray slide and sneeze guard.
8) Cashier counter expanded to two stations to assist better customer throughput at peak periods.
9) Vending area moved out of seating area into a more visible location for 24-hour accessibility.

Figure 10.6 The renovation of a hospital staff cafeteria required a few simple changes to achieve improved operational efficiency at a reasonable cost.
Furnishings and other equipment should contribute to efficient operation and reflect the best design, materials, and workmanship to conform to established sanitary standards. The degree of comfort for both guests and employees depends on the provisions made for them during the project's planning phase. They are particularly sensitive to amenities such as air conditioning, type of lighting, sound deadening, artistic incorporation of color and design, comfortable chair and work surface heights, and clean, well ventilated rest rooms.

The facility's cost directly influences what can be done with a fixed budget. However, the material in the remainder of this chapter assumes that adequate funds are available for foodservice planning on a moderate scale.

**DESIGN DEVELOPMENT**

After completing preliminary preparations, the feasibility study, menu analysis, prospectus writing, and cost considerations, the foodservice manager needs to develop a design and layout plan. Providing adequate facilities for all anticipated activities, incorporating the ideas that planning members generate, and considering the facility's future growth are important aspects of design development.

A logical sequence for developing a design and for completing a foodservice facility follows:

1. Determine space allowances. Draw a flow diagram showing the space relationships of the work units and routes for supplies and workers.
2. Prepare a schematic design to scale, to show space allowances and relationships and placement of equipment, for consideration by the planning team before the architect begins preparing blueprints. Revise as needed.
3. Prepare and submit the architect's complete set of blueprints and contract documents, including specifications, to reliable interested contractors, builders, engineers, and equipment representatives for competitive bids.
4. Formulate contracts with accepted bidders.
5. Inspect construction, wiring, plumbing, finishing, and the equipment and its installation, as specified in blueprints and contracts. This is the responsibility of the architect and contractor.

**Space Allowances and Relationships**

Determining the amount of floor space and how to divide it for foodservice activities varies with every operation. Each needs adequate space to prepare and serve the planned number of meals, yet allowing too much space can result in inefficiency and lost time and effort.

The prospectus and menu analysis specify the number and kind of activities to be performed. For each activity, such as vegetable preparation, cooking specific menu items, and service methods to be used, the required equipment is listed. From the manufacturers' equipment catalogs, the size and, thus, the space requirements for each model to be purchased can be found. The space for equipment plus adequate aisle space represents a fair estimate of the total area required.

One commonly used procedure to determine kitchen space requirements begins with a calculation of the amount of space needed for the dining room. Fairly accurate estimates for dining areas can be calculated if the type of service and number
of persons to be seated at one time are known. Likewise, seating capacity can be
determined by using the generally accepted number of square feet per seat for dif-
f erent kinds of foodservices. Variations from the following suggestions will depend
on the sizes of tables and chairs and whether a spacious arrangement is desired:

<table>
<thead>
<tr>
<th>Type of Facility</th>
<th>Square Feet per Seat</th>
</tr>
</thead>
<tbody>
<tr>
<td>School lunchrooms</td>
<td>9 to 12 sq ft</td>
</tr>
<tr>
<td>Hotel and club banquet rooms</td>
<td>10 to 11 sq ft</td>
</tr>
<tr>
<td>Commercial cafeterias</td>
<td>16 to 18 sq ft</td>
</tr>
<tr>
<td>Industrial and university cafeterias</td>
<td>12 to 15 sq ft</td>
</tr>
<tr>
<td>Residence halls</td>
<td>12 to 15 sq ft</td>
</tr>
<tr>
<td>Restaurants and hotels (table service)</td>
<td>15 to 18 sq ft</td>
</tr>
<tr>
<td>Lunch counters</td>
<td>12 to 20 sq ft</td>
</tr>
</tbody>
</table>

The kitchen size is often about one-third to one-fourth of the dining room area.
This is a rough estimate at best because so many variables are involved. For exam-
ple, dining room and kitchen space requirements are entirely different for a fast-
food restaurant and a school cafeteria serving the same number of persons per
meal period. The restaurant’s turnover rate may be three customers per hour for
each seat during a three-hour meal period; thus, the restaurant would need to pre-
pare food in small batches. In the school cafeteria, one half of the group may be
seated at one time with the total number served during a 50-minute period; there-
fore, larger quantities of food would be prepared and ready to serve the students.
As a result, the restaurant kitchen would most likely be considerably smaller than
the school kitchen with its larger capacity equipment.

Hospital foodservices confront a unique situation for space determination because
only one third to one half of the total number of meals served are eaten in the dining
room; patients are usually served in bed. Consequently, hospital kitchen space re-
quirements are large, relative to dining areas, so the quantity and variety of food
needed for patient, staff, employees, and guests can be prepared and assembled.

Flow Diagram of Space Relationships. Designing the floor plan begins with a dia-
gram showing the flow of work, food, and supplies for one procedure to the next
in logical sequence. To find the shortest, most direct route is the goal. The assembly-
line concept provides for efficient operations by creating a continuous work flow
for the tasks of receiving, storing, issuing, preparing, cooking, and serving the
food, while minimizing traffic lines, backtracking, and cross traffic. After food has
been served and consumed, the direction reverses to remove soiled dishes and
trash. Figure 10.7 shows a typical foodservice flow diagram with desirable work
area relationships. Only those work units required in a specific planning project
need be shown. Because many foods are now purchased ready-to-cook, certain
preparation units may be unnecessary in some kitchens. For example, since most
foodservices no longer purchase carcass meat or wholesale cuts of meat, the meat
preparation unit has been eliminated entirely in those facilities.

The relationship of one work unit to another is also a consideration, that is, de-
claring which work units need to be close to each other, which ones adjacent to
other areas of the building, and which ones need to be located near an outside door.
Figure 10.8 shows the relationship of areas in a medium-size facility using the con-
tentional foodservice system. As can be noted, the main cooking unit is the central
area of most kitchens, with supporting units feeding to or from it. Further discus-
sion of desirable relationship of units is given under the “Work Areas” section
below.
Figure 10.7  Flowchart diagram showing desirable work area relationships and progression of work from receiving goods to serving without backtracking and with little cross traffic.

Figure 10.8  Relationship of main cooking unit to other work areas in a conventional foodservice system.
Schematic Drawing

Translating a flow diagram into a preliminary floor plan schematic is the next step in design development. The floor plan is a sketch or sketches of possible arrangements of the work units, with equipment drawn to scale within the allocated space. The required traffic aisles and work space also have to be included. Some general guidelines and a brief description of various work areas and their basic equipment needs are given on the following pages.

**General Guidelines.** Several considerations should be noted when planning a foodservice facility. The main traffic aisles should be a minimum of 5 feet wide, or wide enough to permit carts or hand trucks to pass without interfering with each other or with the workers in a unit. Aisles between equipment and worktables must have at least a 3-foot clearance; 3.5 to 4 feet are required if oven doors are to be opened or contents from tilting kettles must be removed in the aisle space. Usually one or two main aisles go through a kitchen with aisles into work areas that are parallel or perpendicular to the main aisle but are separate from them. (See Fig. 10.9 for an example of an efficient cook’s unit.)

The Americans with Disabilities Act (ADA) protects the rights of those with disabilities to enjoy and have access to employment, transportation, public accommodation, and communications. It has two main sections, one dealing with employment (see discussion of this part of the act in Chapter 14) and the other with public accommodation. The provisions detailed in the act are voluminous, and anyone wishing to ensure compliance must become familiar with them.

The ADA, which went into effect July 26, 1992, for companies with 25 or more employees (July 26, 1994, for companies with 15 or more), mandates some general
guidelines for implementing “reasonable accommodation” to make the workplace and dining area accessible to persons with disabilities. The ADA applies to almost every public facility, and to new construction and alterations in existing facilities. Accommodations may include installing ramps, widening doors, and lowering shelves and counters. Aisles must be at least 36 inches wide (preferably 42 inches) to accommodate persons with wheelchairs. Figure 10.10 gives dimensions of dining and serving room space requirements for wheelchair accommodation in order to comply with the ADA regulations.

Figure 10.10 ADA requirements for space to accommodate wheelchair patrons in foodservice facilities. Courtesy of Liberty Northwest Insurance Corporation, Portland, Oregon.
Checklists for determining compliance with some of the ADA regulations are given in Figures 10.11 and 10.12. These lists serve as aids in assessing a facility for compliance and for future building programs. Taking the actions outlined in these checklists will not necessarily ensure compliance with the ADA; however, they can be used as tools to identify and eliminate potential problem areas. The diagrams of space requirements, shown in Figure 10.13, help interpret some of the requirements of this act. Refer to the act itself for complete regulations.

A minimum of 4 linear feet of worktable space is recommended for each preparation employee, but 6 feet is preferable. Work heights are generally 36 to 41 inches for standing and 28 to 30 inches for sitting positions (see Fig. 10.13).

Tools and equipment require adequate storage space that is located at the place of use. Sinks, reach-in refrigerators, and space for short-term storage of supplies should be located in or near each of the work areas so employees at one location will have everything needed to perform their work. This includes space for racks to store clean pots and pans. Hand-washing facilities and drinking water should also be in a convenient location for all personnel.

Rectangular or square kitchens are considered the most convenient. The length of a rectangular-shaped kitchen should be no more than twice its width for best efficiency. Employees will save steps if the dining room entrance is on the longer side of a rectangular kitchen. Figure 10.14 shows another efficient arrangement for some restaurants, with a square dining space and the kitchen occupying a smaller space in one corner. The dining area is on two sides, and entrances to the kitchen can be located on each side. During slow periods of service, one section or side of

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**REMOVAL OF BARRIERS**

(a) General. A public accommodation shall remove architectural barriers in existing facilities, including communication barriers that are structural in nature, where such removal is readily achievable (i.e., easily accomplishable and able to be carried out without much difficulty or expense).

(b) Examples. Examples of steps to remove barriers include, but are not limited to, the following:

1. Installing ramps
2. Making curb cuts in sidewalks and entrances
3. Lowering shelves
4. Rearranging tables, chairs, vending machines, and other furniture
5. Lowering telephones
6. Installing flashing alarm lights
7. Widening doors
8. Installing offset hinges to widen doorways
9. Eliminating a turnstile or providing an alternative accessible path
10. Installing accessible door hardware
11. Installing grab bars in toilet stalls
12. Rearranging toilet partitions to increase maneuvering space
13. Insulating lavatory pipes
14. Installing a raised toilet seat
15. Installing a full-length bathroom mirror
16. Lowering the paper towel dispenser in a bathroom
17. Creating a designated accessible parking space
18. Removing high-pile, low-density carpeting

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**Figure 10.11** Compliance with the ADA barriers checklist.
Part 4  The Facilities

Routing servers counterclockwise through the kitchen or patrons through a cafeteria line is more efficient than a clockwise arrangement, at least for right-handed people. This way the right hand of the patron or employee is closest to the food to be selected.

Large kitchens usually have specialized work areas, each with its own equipment and short-term storage facilities. For efficiency in work and to reduce the noise level in the kitchen, these work areas may be divided with semi-partitions, walls 5 to 5.5 feet high. Thus, there is separation of work, but air circulation in the kitchen is not blocked by ceiling-high partitions.

In smaller kitchens, the work areas may merge and hence equipment can be shared by employees. For example, the cook and the salad worker may share an electric mixer that could be located at the end of the cook’s table but close to the salad preparation area. This requires careful planning of work schedules so both workers will not need the equipment at the same time.

**WORK AREAS**

Seven major types of work may occur in foodservice departments: (1) receiving, (2) storing and issuing of dry and refrigerated foods, (3) prepreparation, (4) preparation/cooking, (5) food assembly/serving, (6) warewashing (e.g., dishes, pots and

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**BARRIERS CHECKLIST**

*Building Access*
1. Are 96” wide parking spaces designated with a 60” access aisle?
2. Are parking spaces near main building entrance?
3. Is there a “drop off” zone? at building entrance?
4. Is the gradient from parking to building entrance 1:12 or less?
5. Is the entrance doorway at least 32 inches?
6. Is door handle easy to grasp?
7. Is door handle easy to open (less than 8 lbs pressure)?

*Building Corridors*
1. Is path of travel free of obstruction and wide enough for a wheelchair?
2. Is floor surface hard and not slippery?
3. Do obstacles (e.g., phones, fountains) protrude no more than 4 inches?

*Rest rooms*
1. Are rest rooms near building entrance/personnel office?
2. Do doors have lever handles?
3. Are doors at least 32” wide?
4. Are rest rooms large enough for wheelchair turnaround (51” minimum)?
5. Are stall doors at least 32” wide?
6. Are grab bars provided in toilet stalls?
7. Are sinks at least 30” high with room for a wheelchair to roll under?
8. Are sink handles easily reached and used?
9. Are soap dispensers and towels no more than 48” from floor?
Figure 10.12 ADA requirements for space to accommodate wheelchair patrons in foodservice facilities.
Courtesy of Liberty Northwest Insurance Corporation, Portland, Oregon.

pans), and (7) supporting services such as administration and janitorial work and employee/storage areas such as the locker and rest rooms, and storage for extra china, linens, paper goods, and supplies. The number of work areas to plan for a specific foodservice depends on the type of operating system to be used (see Chapter 2), the volume of business, types of menu items to be prepared, and the form in which food will be purchased.

1. Receiving: The receiving area includes an outside platform or loading dock, preferably covered, and adjacent floor space, large enough to check in, examine, weigh, and count food, and to check invoices when they are delivered. The floor of the platform should be equal to the height of a standard delivery truck bed and on the same level as the building’s entrance. The suggested minimum width is 8 feet. The length is dictated by the number of trucks that are to be unloaded at any one time.
Space should also be allowed for hand trucks, platform scales, and a desk or work space for the receiving clerk for checking off items delivered. Large institutions that process their own meat need to include an overhead track with hooks for carcass meat. This track would extend from the loading platform through to the meat department’s refrigerators.

The exterior door must be wide enough (6 feet is common) to accommodate hand trucks, large cartons, and any large pieces of equipment that are to be

Figure 10.13  Optimum heights for worktable and for working area.
Courtesy of Arthur C. Avery.

Figure 10.14  Efficient kitchen/dining room arrangement.
installed in the kitchen. A glass-walled office facing the loading dock that is equipped with a double-faced platform scale is efficient for a clerk in the office to check weights of goods being delivered and received.

2. Storing and Issuing Food: The storage areas should be close to the delivery entrance so goods will not have to be moved far to be stored. Space needed for canned foods, staples, and grocery items is known as “dry stores.” This area should be easily accessible to the bakery and the cook’s units in particular. Dry storerooms must be cool and well ventilated. Other requirements are moisture-proof floors, screened windows, metal-slatted shelves for case goods, and tightly covered storage bins for items such as cereals, rice, and condiments. Wooden, or polypropylene, mobile pallets should be provided for stacking sacks of flour, sugar, and similar products to keep them off the floor. These pallets should be mobile for ease in cleaning the floor. Space should be arranged to accommodate carts and hand trucks. A desk and files should be included for keeping inventory records, either by computer or manually. Scales are a necessity. Lockable double doors or a wide single door should open to the preparation areas.

Walk-in refrigerators and freezers must be provided for perishable foods. Reach-in refrigerators located in the work units used for daily supplies and leftovers are usually not considered as storage. Refrigerated storage areas should be as close as possible to the receiving platform and accessible to the work unit that will use it most frequently.

The amount of storage required depends on the frequency of deliveries, daily or less frequent, and the form of food purchased. Also, the extent of the menu and the variety of foods offered will influence the amount and kind of storage required. Restaurants may also require space for storing wines and liquor.

Cleaning supplies must be stored separate and apart from all foods, helping to ensure that none of those poisonous chemicals will be mistakenly issued as a food product. Also, additional space must be allocated for extra stocks of paper goods and reserves of china, glassware, linens, towels, uniforms, and aprons.

3. Prepreparation: A central ingredient room, if used, will be located adjacent yet connected to the storage areas. Adequate table or counter space for weighing, measuring, and counting ingredients and ample aisle space for carts carrying assembled ingredients to the production units are basic requirements for this room.

The vegetable preparation area should be located near the refrigerated storage and the cooking and salad areas (see Fig. 10.15). The usual vegetable preparation area is equipped with a chopper, a cutter, a two-compartment sink, worktables, a cart, knives, and cutting boards. If a peeler is needed, it may be either a pedestal or a table model, placed to empty directly into a sink. Figure 10.15 shows three possible arrangements for this unit.

Two separate sinks should be provided to permit unhampered use. Food waste disposals are placed in the drain board to the sink or on a worktable near the end of the sink, or space for a garbage can may be provided, often under an opening cut into the worktable or drain board.

Because the vegetable preparation area is often responsible for pre-prepping some items for the salad unit, ample space for many workers may be needed.

Tables that are 30 to 36 inches wide and 6 to 8 feet long are adequate, permitting employees to work on either side for most types of preparation. Providing at least one table low enough for employees to sit at comfortably to perform certain tasks is advisable. Figure 10.16 shows a close-up view of part of a vegetable preparation unit in a large, central production kitchen. Workers are slicing potatoes
Figure 10.15  Three possible arrangements for vegetable preparation unit: (a) straight line, (b) parallel, and (c) L-shaped.

Figure 10.16  Vegetable preparation for the cook’s unit in a large, central production kitchen.  Courtesy of Bob Honson, Director, Nutrition Services, Portland, Oregon Public Schools.
for use by the cook’s unit. Note the electrical circuit posts on the left side to accommodate heavy-duty equipment requirements.

4. Preparation: The preparation area for meat, fish, and poultry includes butcher blocks, an electric saw and grinder, sinks, storage trays, and refrigerators. The overhead tracks for bringing in carcass meat from the delivery area that were mentioned earlier would lead to this unit.

For many foodservices, however, this unit is almost a thing of the past except in very large facilities. The trend toward buying prefabricated and pan-ready meats, poultry, and fish decreases the need for this once necessary work unit.

The main cooking area is the hub of the kitchen, which is usually located in or near the center of the kitchen. It is most efficient when adjacent to the vegetable preparation area, the storage rooms, and behind or near the serving area (see Figs. 10.17 and 10.18). The equipment needs are entirely dependent on the amount and type of foods to be cooked on the premises. The usual for a conventional type of production method would include ovens, broilers, fryers, steam equipment, mixers

![Figure 10.17](image-url)Four suggested arrangements for a main cooking area: (a) straight line, (b) back-to-back or double, (c) L-shape, and (d) U-shape. Note the amount of aisle space and total floor space required for each.
Figure 10.18  Four suggested arrangements for a salad unit: (a) straight line, (b) parallel, (c) L-shape, and (d) U-shape. Note that equipment is arranged so work progresses from right to left (preferred progression) in all except (c).

with attachments, and cook’s tables with a sink, pot and pan storage racks, and overhead utensil racks. Ranges may also be used although, in many cases, they have been replaced with specialized pieces of equipment such as pressure steam cookers for batch cookery, tilting fry pans, meat roasting ovens, convection ovens, and grills. These may be more energy efficient and generate less heat than the ranges.

The grouping of equipment varies according to the size and shape of the kitchen. However, steam equipment is usually installed together in a row with the appropriate floor drains in front. Grills and broilers for short order cooking should be closest to the serving unit but not next to deep-fat fryers. Fire danger is great when the intense heat from grills and broilers is close to hot fat that may splatter. Figure 10.17 illustrates four possible arrangements for the cook’s unit. Note the amount of space required for each arrangement, including a 12- to 18-inch cleaning space between back-to-back rows of cooking equipment.

Ceiling-mounted hoods with separately vented exhaust fans, which extend one foot down over all cooking equipment, help ventilate the kitchen by removing odors, smoke, moisture, and fumes. Hoods also facilitate the installation of direct lighting fixtures to illuminate cooking surfaces.

Water outlets at each point of use, such as a swing-arm faucet between each pair of steam-jacketed kettles, above or beside a tilting fry pan, or over the range area, are a great convenience and a timesaver for the cooks. A cook’s table, located
directly in front of the cooking equipment, may contain a small hand sink at one end and an overhead rack for small utensils. A rack for storing clean pots and pans should be easily accessible to the cook’s unit, the pot and pan sink, and the power washer, if one is used. Much of the equipment in the cook’s area can be wall or wheel mounted for ease in cleaning.

The salad area is generally located at one side or at the end of the kitchen, as close as possible to the serving unit and to the product walk-in refrigerators. The unit requires a liberal amount of worktable space and refrigeration for set-up salads. In cafeterias, it is most efficient to have the salad preparation area located directly behind the salad counter on the cafeteria line. A pass-through refrigerator allows kitchen workers to place the trays of set-up salads in the refrigerator from their side, and the counter workers remove them as needed.

Mobile refrigerated units are available for banquet or special party use so that set-up salads may be refrigerated in them until mealtime, and then moved directly to the dining area for service. For short-order salad making, a refrigerated table is a convenience for storing salad ingredients between times of use. In a hospital, nursing home, or restaurant that is built on more than one floor, easy access to service elevators, subveyors, or dumbwaiters enables made-up salads to be delivered in good condition. Figure 10.18 shows some possible arrangements for the salad unit.

The bakery and dessert preparation area operates as a fairly independent unit. Having little direct association with the other preparation areas, it may be separated from them. Because the quality of the products from this unit is not as dependent on time and temperature as are meats, vegetables, and salads, the bakery need not be as close to the serving area as the other units.

Equipment for a typical bakeshop unit includes baker’s table with roll-out bins, ovens, pan storage and cooling racks, mixers, steam-jacketed kettle, dough divider and roller, pie crust roller, and reach-in or small walk-in refrigerator. Large bakery units may include dough mixer, proof box, dough troughs, and reel ovens. Small operations may not have a separate bakery unit, but placing a baker’s table near the cooking unit allows the equipment to be shared.

Routing of work and placement of equipment should be in a counterclockwise arrangement for greatest efficiency. The finished product should be on the side closest to the serving unit for shortest transport distance. Performance of tasks should proceed in a direct line from one function to the next without any backtracking or crisscrossing of workers.

If frozen desserts such as ice cream and ices are to be made on the premises rather than purchased, a separate room with specialized equipment to handle these products will have to be provided. It must meet strict sanitation codes and requirements established for production of frozen dessert items.

5. Food Assembly/Serving: The assembly/serve area may be at various preparation centers in the kitchen where servers pick up their orders for table service or for assembling trays for hospital tray service. The latter requires a tray line as described in Chapter 9. Separate serving rooms may adjoin the kitchen and, in some facilities, serving pantries may be located throughout the building. Cafeteria counters located between the kitchen and dining room can be of many different configurations. The length and number of counters needed depend on the number of persons to be served, the number of menu items offered, and the desired speed of service. Speed of service can be increased if the counter is designed for customer movement from right to left or counterclockwise, making it easier for right-handed persons to pick up and put food on their trays.
Serving counter designs depend on the amount of available space. Counters can be arranged in a straight line, in a parallel or double line with a serving station in between, in zigzag sections, or in a hollow square. Whatever configuration is selected, the design should permit speedy service and prevent long waits for patrons, as well as keep labor at a minimum. To speed the flow, silverware, napkins, condiment bars, and beverage dispensers are often placed in the dining room area, encouraging patrons to move away from the serving area more rapidly. A revolving counter section, placed near the wall to the kitchen, is ideal for displaying cold items, such as salads, sandwiches, and desserts.

The hollow square arrangement (sometimes called the “scramble” or “supermarket” system) may be constructed with a center island for trays, silverware, and napkins, and with serving counters on three sides. With this design, patrons enter the square, pick up a tray and utensils, and move to any section of the counter that they desire without standing in line to wait for others to make their choices. A typical arrangement is illustrated in Figure 10.19.

Cafeteria counters are usually custom made so that the desired length and design can be obtained. Sections for hot food, once heated with steam, are now mostly electrically heated and have thermostat-controlled units. Hot foods may be placed

![Figure 10.19](image-url)

**Figure 10.19** An example of a hollow square cafeteria arrangement with revolving three-tiered salad display.
on the counter in the pans in which they were cooked, if the counter openings are the same size as the pans. This hot unit should be located as close as possible to the kitchen cooking area. Heated, pass-through holding cabinets can be installed into the wall between the kitchen and serving room close to the hot-food section to facilitate supplying foods to the counter.

The arrangement of food items on a cafeteria line may be in a logical sequence, that is, in the order that the food would be eaten. Schools usually prefer this arrangement so that students will choose the most nourishing items first and desserts last. For commercial cafeterias, however, a psychological arrangement might be more profitable; for example, the most eye-appealing items, such as salads and desserts, are placed first for greater selection, and hot foods placed near the end of the counter. Counter units can be mobile to provide flexibility in arrangement.

The size of serving pantries, such as those in hospitals, depends on whether centralized or decentralized service is used. Refer to Chapter 9 for details of the equipment and space requirements for these two service systems.

6. Warewashing: Warewashing includes dishes, silverware, glassware, trays, and pots and pans. Each of these is discussed individually. The pot and pan washing area should be located near the cooking and bakery units because most of the soiled pots and pans come from those units. The area should not be in a main aisle or traffic lane. It is often at the end or back of the cook's unit or in an alcove allocated for this purpose.

Equipment needs include a three-compartment sink: one for soaking and washing, one for rinsing, and one for sanitizing (with drain boards). Racks for clean pots and pans are also needed and, in some facilities, a mechanical pot and pan washer. Hand washing of pots and pans may be aided by a manually guided power scrubber or a pump-forced flow of water to loosen food from pans as shown in Chapter 4, Figures 4.4 and 4.5. After hand washing, pots and pans may be sanitized in a steam cabinet or run through the dish machine.

Large foodservices, particularly hospitals with serving carts for meal delivery to patients, may need space for a room-sized cart and pan washer as shown in Fig. 10.20.

Dishwashing areas should be compact, well lit, and well ventilated. It is desirable to locate this unit away from the dining room because of the noise. If this is not possible, surrounding the area with acoustical material will help muffle the sounds. Two examples of such installations are shown in Figures 10.20a and 10.20b. Mechanical conveyors save time and money by transporting soiled dishes from the dining area to the dishwashing room. The location of the dishwashing area should be such that the return of soiled dishes will not interfere with the routine of service or cross through work units.

The process of dishwashing is described in Chapter 4. The design of, and space for, the dishwashing area must allow for the smooth flow of dishes through the processes of sorting, scraping, washing, rinsing, drying, and storage. The overall arrangement of the area and the size and type of dishwashing machine to be selected depend on the number of pieces to be washed, the speed with which they must be returned for reuse, and the shape of the available space. Arrangements for a dishwashing area may be straight line, L-shaped, U-shaped, open-square, platform, or closed circle. The straight-line type is often installed near a sidewall in small operations. The U-shaped arrangement is compact and efficient for small
spaces, whereas the open square might be preferable for a larger facility and could easily accommodate a glass washer. Machines are designed for either right- or left-hand operation, although the usual flow direction is from right to left. Figure 10.21 shows one layout plan for a small space. Figure 10.22 shows a closed-circle, or fast-rack conveyor, arrangement that mechanically moves racks continuously to the soiled dish end of the machine. Although this arrangement requires about the same amount of floor space as a straight-line type, it is more compact and can be operated by fewer employees.

Any dishwashing layout should be arranged far enough away from the walls to permit workers to have easy access. At least a 4-foot aisle is desirable on either side of the dishwasher.

Equipment for the dishwashing unit may include a prewash arrangement, the dish machine, possibly a glass washing machine, soiled and clean dish tables, waste disposals, storage carts, and carts or conveyors to transport dishes to and from this area. The usual division of space allocated to dish tables is 60 percent for soiled dishes and 40 percent for clean. (See Appendix B for further details on dishwashers.)

Prewashing or preflushing equipment includes a unit built into the dish machine, a hose and nozzle, or a forced water spray as illustrated in Figure 10.23. The forced-water spray method uses more water than the other methods; therefore, it is
Figure 10.21 A dishroom layout plan for a small space. This company's power loader and unloader enables many facilities to use larger dish machines in a small area. The unloaders eject dish racks at a right angle to the machine, which is a space-saving feature. Courtesy of Insinger Machine Co., Philadelphia.

not a desirable choice if water conservation is a concern. The hose and nozzle can be near the machine, but the forced spray should be far enough away so that dishes can be easily racked following the pre-flush. Food waste disposals can be installed with either type. A method for returning emptied racks to the soiled dish table for reuse should also be provided. (See the power-driven conveyor in Figure 10.22.)

A booster heater to increase the temperature of the usual 120°F to 140°F water used throughout the building to the 180°F required for the sanitizing rinse water for the dish machine should be installed near the machine. Some dishroom layouts may include an oversized sink for washing serving trays that are too large to go through the dish machine. If many trays are to be washed (as in hospitals serving patients in bed), a special machine designed for washing trays would be desirable. Such a machine is shown in Appendix B.

Proper ventilation of the dishwashing area is essential. A hood-mounted exhaust fan should be installed over the unit, or rustproof, watertight exhaust ducts, which are vented directly to the outside, may be attached directly to the machines to remove steam and hot air.

7. Supporting services: Supporting/auxiliary services must not be forgotten when planning a facility. Space for employees' rest rooms, lockers, showers, and hand-washing facilities are to be included. The number of toilets and other amenities is
Figure 10.22  Fast-rack conveyor warewashing system can be custom designed to fit the space and needs of the situation. Reprinted courtesy of Hobart Corporation, Troy, Ohio.

determined by the number of workers of each sex on duty at any one time and by the Health Department’s standards and codes. Requirements of the ADA must be met when planning these facilities as well.

Office space for the foodservice management staff is preferably located so the staff has a view of the kitchen and the work going on. This may be accomplished in part by using glass walls or large windows for the office. The number of persons who will need desks, files, chairs for visitors, and aisle space will determine the size of the offices. Those staff members not directly supervising food production may have offices in an area adjacent to the kitchen.

Janitors’ closets for storage of mops, brooms, and cleaning materials, as well as a large low sink for washing mops, require consideration in planning a foodservice facility. An area equipped with a steam hose, often located near the back door, may be required for sanitizing food carts and trucks, especially in hospitals that

Figure 10.23  Three arrangements for preflushing soiled dishes. (a) Forced water spray, (b) hose and nozzle, and (c) water scrapping unit on dish machine.
have many such items to clean. This should be a separate area with curbing around it, and it should be equipped with floor drains.

Trash and food waste storage and removal space is necessary if disposal facilities are not available in the building. Many buildings have their own incinerator for burning trash, central compactors to compress trash and cans, and preparation unit waste disposals. When such facilities are not available, both garbage and trash must be collected and held for frequent removal. A cooled room near the back entrance may be provided for the daily storage of garbage, but when feasible, unit or central disposers incorporated into the system are more desirable and efficient.

The dining room is generally a part of the total foodservice design plan. For greatest efficiency, it is located adjacent to the kitchen or serving area, sometimes opening off the cafeteria. Dining rooms that are quiet, well lit, and well ventilated are conducive to the enjoyment of food and hospitality. The size of the dining room was discussed in the “Space Allowances and Relationships” section.

Equipment for dining areas includes the tables, chairs, and small serving stations. Two- and four-seat tables that can be combined to accommodate larger groups are typical of most public dining rooms. Tables in school foodservices are larger to conserve space, but difficult for waiter or waitress service and less satisfactory for socializing. The size of the tables to be used, the type and size of chairs, and the number of people to be seated at one time are basic to determining space needs. Also, space between tables and aisle space must be added; minimum space between chair backs is 18 inches after guests are seated. Main traffic aisles of 4.5 to 5 feet are recommended. Public dining rooms should accommodate patrons who may be in wheelchairs or who use walkers, and so may need wider aisles. (See Figure 10.10 for details.)

Folding partitions that are decorative as well as functional may be used to close off part of the dining room for special groups or when all of the room is not in use. Customer rest rooms are located close to the dining area for convenience and security. See Chapter 11 for more on dining room furnishings.

The planning team, supplied with this information, should now have a conference to discuss ideas. They should reject or discard features and components of the plan until agreement is reached on what shall be included and the boundaries for the project. If it is a renovation project, the team decides how much can be done and, perhaps, what has to be left undone. Decisions on quantity and quality within the confines of the budget will be made. Only with this agreement among all team members will each be fully committed to the project and continue to devote work time and provide the expertise needed to bring the project to a successful conclusion—to bring the menu and customers together through a planned system of time and motion.

Mechanics of Drawing

The actual drawing of a plan to scale requires certain tools and techniques. Paper with a 1/4-inch grid is a convenient size with which to work (usual scale is 1/4 inch to 1 foot) and yet also provides a good scale for visually depicting the layout. (If a 1/8-inch scale is used, buy 1/8-inch squared paper and so on.) A pen and India ink, or a heavy black ink pen, a good ruler, preferably an architect’s ruler with various scales marked on it, and some tracing paper and masking tape are other needed supplies.
An outline of the size and shape of the space allocated is first drawn to scale with pencil on the squared paper. When the location of doors and windows has been decided on, these are marked off on the outline. Then, the outline of the space is inked in, using proper architectural symbols for walls, doors, and windows as illustrated in Figure 10.24.

The next step is to obtain a set of templates, to-scale model drawings, of each piece of equipment to be used. They must be to the same scale as the floor plan.

**Figure 10.24** Architectural symbols used on blueprints to show placement and arrangement of various types of doors and windows.
Label each template with the name and dimensions of the piece of equipment it represents (see Figure 10.25). Sometimes a different color is used for each work unit. Templates should include overall measurements of features that require space, such as the swing of door openings, control boxes or fittings, and any installation needs as specified in equipment catalogs. The templates are then cut out, placed on the floor plan, and moved about until a good arrangement is found. Templates may then be secured to the plan with a bit of rubber cement (for easy removal if changes are made).

A sheet of thin tracing paper is taped over the floor plan, and lines are drawn on it to show the route used in the preparation of several menu items. Drawing lines that trace the movements of food and workers from one key work point to the next within a unit, as well as from one work area or department to the next, is a
good check on the efficiency of the arrangement. Actual measurement of the distances can be made by passing a string over pintacks at each key point during the preparation of a menu item, and then measuring the string. At this time, a check on width of aisles, work area space, location of hand-washing sinks for employees, storage space for carts and trucks, and similar details is made.

The above procedures afford good checks of the adequacy of: the tentative floor plan; necessary equipment; and work areas before the final plan is made. The space allowances for passageways between working areas, between tables, between ranges and cook’s table, and between other major pieces of equipment should also be checked for adequacy. Changes and adjustments should be made on paper instead of after construction has begun, because it is costly to make revisions at that time.

Separate drawings are made by the architect for plumbing, electrical, and gas installations in addition to those for the building construction. All must be coordinated and checked carefully to ensure that gas, water, and waste outlets and vents will be in the correct positions for the equipment planned. Also, the electrical wiring with convenient switch control boxes, power and regular outlets and turn-on switches, and locations and kinds of light fixtures must be noted. Telephone conduits and outlets, wiring for computers, and intercom, public address, or TV system as decided on are indicated.

Designing by Computer

Computer-aided design/Computer-aided manufacturing (CAD/CAM) planning began in the early 1960s and has grown and expanded rapidly during the past four decades. Computer capability for graphically designing a floor plan and equipment layout and converting two-dimensional drawings to three-dimensional computerized renderings can replace the method just described in the “Mechanics of Drawing” section. However, all of the preliminary studies, analyses, and team input remain as necessary steps to obtain the data needed to create the design on a computer.

CAD for foodservices is based on an interactive graphic concept; that is, the software programs are developed to assist with schematic planning. Software programs use variables that must be identified by the foodservice manager and the planning team.

Today, programs are sophisticated and technologies that have been developed led to the use of the terms “before CAD” and “after CAD.” Before CAD is computer-modeling software meant to replace the use of “sketching on napkins and tissues” as the starting point for conceptual design. After CAD refers to computer-aided facilities management (CAFM), which provides a greater range of services for managing the building project beyond the designing function.

CAD software systems have been adapted and expanded by many companies. An update of the most recent systems is best obtained by reviewing trade journals and contacting companies that sell CAD systems. Many software programs can be used on personal computers, as well as on more powerful, networked workstations. CAD systems run on a variety of platforms, such as UNIX, DOS, MAC, and VAX.

Many add-on packages are available today to make floor plan design faster and easier. They have features such as instant viewing and zooming, display of several
views simultaneously, cutting and pasting of drawings to create new ones, and marking drawings for modifications and easier version control. The output devices may include high-end digital plotters, interactive video displays, or virtual reality programs.

Foodservice managers or planning teams wishing to design facilities by computer will want to search the market carefully for appropriate software and add-ons. New developments appear almost daily, and any listing of components today may soon be outmoded or obsolete. Some resources for keeping abreast of developments are listed at the end of this chapter under “Selected Web Sites.”

**Architect’s Blueprints**

After the dietitian, foodservice manager, and others thoroughly check the preliminary plans, the architect prepares a complete set of drawings that are reproduced as blueprints. Blueprints always include the name and address of the facility, the scale used, and the date the plan was prepared. Details of construction, material, plumbing, and electrical wiring, connections, and fixtures are indicated and coded. Side elevation drawings are included for door and window finishings, stairways, and built-in or attached equipment.

When reading and checking blueprints, one must constantly consider the scale to which they are drawn. The scale should be sufficiently large to permit detailed study. The heavy, solid lines indicate walls; the space between lines indicates the wall thickness; and the markings in between denote the kind of materials, such as stone, brick, and concrete blocks. Three or four parallel lines at a break in the wall denote the position and size of windows. The direction in which doors will open appears in blueprints as an arc extending from the door hinge to the door’s fully open position (see Fig. 10.24). Steps are shown as parallel lines with an arrow and the words “up” or “down.” Dimensions of all spaces are indicated, and rooms and equipment are labeled. Architects use a variety of symbols to identify special features; for example, some electrical symbols are shown in Figure 10.26. All the symbols the architect uses are explained in a legend on the drawing.

**Specifications and Contract Documents**

The architect must also prepare a set of written documents to accompany the blueprints when presented to contractors for bid. These documents include a statement of general conditions and scope of the work to be done; a schedule of operation, which includes a timetable for contractors to complete their work and detail of penalties resulting from failure to meet deadlines; who has the responsibility for installations and inspections; and specifications for all aspects of the work and for the equipment required.

Specifications include details such as the location of the building; type of base construction; mix of cement; size and kinds of conduits, drains, and vents; type and installation of roofing and flooring; wall finishes and colors; hardware; doors and windows; and all other construction features. Equipment specifications generally include the brand name and model number, material to be used, size or capacity, and the number required (see Chapter 11 for details). In large installations, separate contract documents may be prepared for bids on the electrical or HVAC
Part 4 The Facilities

Punch list
A detailed checklist that would reveal any defective, substitute, or inferior equipment so that corrections could be made prior to an opening or training date for a new or renovated facility.

Figure 10.26 Electrical symbols used on blueprints to indicate type and location of wiring and outlets.

system. All specifications must meet applicable building and installation codes, and all the documents must be clearly worded to avoid misinterpretations.

Bids, Contracts, Construction, and Inspection

When the contract documents are completed, they are advertised and made available to interested bidders. Certain reputable contractors and equipment dealers may be notified that the plans are complete and be invited to bid on the project.

The contract is generally awarded to the low bidder, who then works closely with the architect until construction is complete. The foodservice manager closely monitors developments during the construction phase of the project, checking frequently with the architect. Conditions of the contract, as well as the individuals concerned, will determine what adjustments can be made after the contract is signed.

The actual construction time will vary, depending on the type and size of the building and the availability of labor, materials, and equipment. During construction, the architect will frequently check the progress and quality of work to be sure that both meet contract specifications. In addition, the architect must inspect and approve all construction, equipment, and installations before the sponsoring organization accepts the facility. At least 2 to 3 weeks before the scheduled opening, a punch list should be prepared. A punch list is a detailed checklist that would reveal any defective, substitute, or inferior equipment so that corrections could be made prior to the opening or training dates. A qualified professional who is neither supplying nor installing the kitchen should prepare the punch list. Each item of
equipment is performance tested to see that it meets specifications and claims and that it has been installed correctly.

In addition, performance tests, usually conducted by the equipment vendor’s representative to demonstrate proper operation, care, and maintenance of the equipment, should be attended by the dietitian, foodservice manager and assistants, the kitchen supervisor, maintenance personnel, and the architect. The demonstrations may be videotaped, too, for use in training future employees and for later review sessions for present personnel.

The various contractors usually guarantee necessary adjustments and some service for a specified period following the project’s completion. After some predetermined date, all repairs and full maintenance become the foodservice management’s responsibility. Any warranty contract forms supplied should be completed and returned promptly to the manufacturer.

**SUMMARY**

The principles and guidelines for facility design planning presented in this chapter apply to all types of foodservice building projects. In fact, the general considerations for making and checking floor plans are similar for different kinds of institutions, regardless of the type of service, menu, clientele, and other governing conditions. Parts of a project that were originally eliminated can possibly be included at lower cost in the future if basic plans for them are incorporated during the construction period. For example, if a monorail system for transporting supplies and food is anticipated in the future, the necessary overhead rails and other requirements could be incorporated into the original construction.

During the project’s planning phase, foodservice managers would have been collecting a list of items that should be included in the proposed plans. These could range from a telephone jack in the dining room to storage space for banquet tables, high chairs, reserve china, and utensils. A written list of such details is an excellent way to ensure that these items are included in the final plans.

A balance of beauty and utility in the structure, furnishings, and equipment is helpful for successful foodservice planning. Colorful walls and floor coverings, modern lighting, streamlined modular kitchen equipment made of well-finished metals, machines with mechanical parts and motors enclosed, and the use of attractive woods and metals in dining room furniture are but a few of the many features contributing to the functionality of modern foodservice areas. Sanitation, ease of maintenance, noise reduction, and controlled environmental temperatures for comfort are built-in features that contribute to making a facility successful and help to achieve the objectives outlined in the prospectus for the foodservice operation.

**APPLICATION OF CHAPTER CONCEPTS**

The schematic drawing of Madison Metropolitan School District foodservice and distribution center is shown in Figure 10.27, and a drawing of the exterior of the center from the northwest corner is shown in Figure 10.28.
Figure 10.27 Schematic drawing of the Madison Metropolitan School District Foodservice Center.
Figure 10.28  Exterior view of the Madison Metropolitan School District Foodservice Center.
The Systems Model

CRITICAL THINKING QUESTIONS

1. Where does “facilities planning and design” fit on the systems model? In what ways does it affect outputs?
2. What clues do you have in the floor plan that this is a commissary foodservice operation?
3. Analyze the advantages of this floor plan.
4. Diagram the flow of food from receiving to delivery.
5. What is different about the location of the warewashing subsystem? Why is this function located here in this operation?
6. What do the dotted lines on the right-hand side of the layout denote?
7. What would be of particular importance in the design of the food production office?

CHAPTER REVIEW QUESTIONS

1. What does facilities planning and design encompass?
2. What preliminary studies and data collection are essential to prepare for a facilities planning project, and why?
3. How can a foodservice manager keep abreast of new developments in foodservice design equipment?
4. What are some of the sources of information on the ADA regulatory considerations that must be observed in planning a new foodservice facility?
5. Generally, who are the members of the team that cooperatively plan a foodservice facility? What contributions does each make? What information must the foodservice manager be prepared to provide for the other team members?
6. Why is a prospectus an important document in a planning project? What are the three parts of a prospectus?
7. Point out some ways that energy conservation, sanitation, safety, and noise control can be built in to a facility plan.

8. For greatest efficiency, what is the recommended flow of work and people, and the space relationships for a foodservice facility?

9. What determines the number and kind of work units that are to be included in any given floor plan design?

10. What are the mechanics of drawing a floor plan and arranging the equipment layout by hand? By computer-aided design/computer-aided manufacturing (CAD/CAM)?

11. What contract agreements and specifications must be prepared and included in the documents sent out for bid for the facility construction?

12. After construction is complete, what inspections and performance tests should be made before the sponsoring organization formally and finally accepts the facility?

SELECTED REFERENCES


**SELECTED WEB SITES**

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