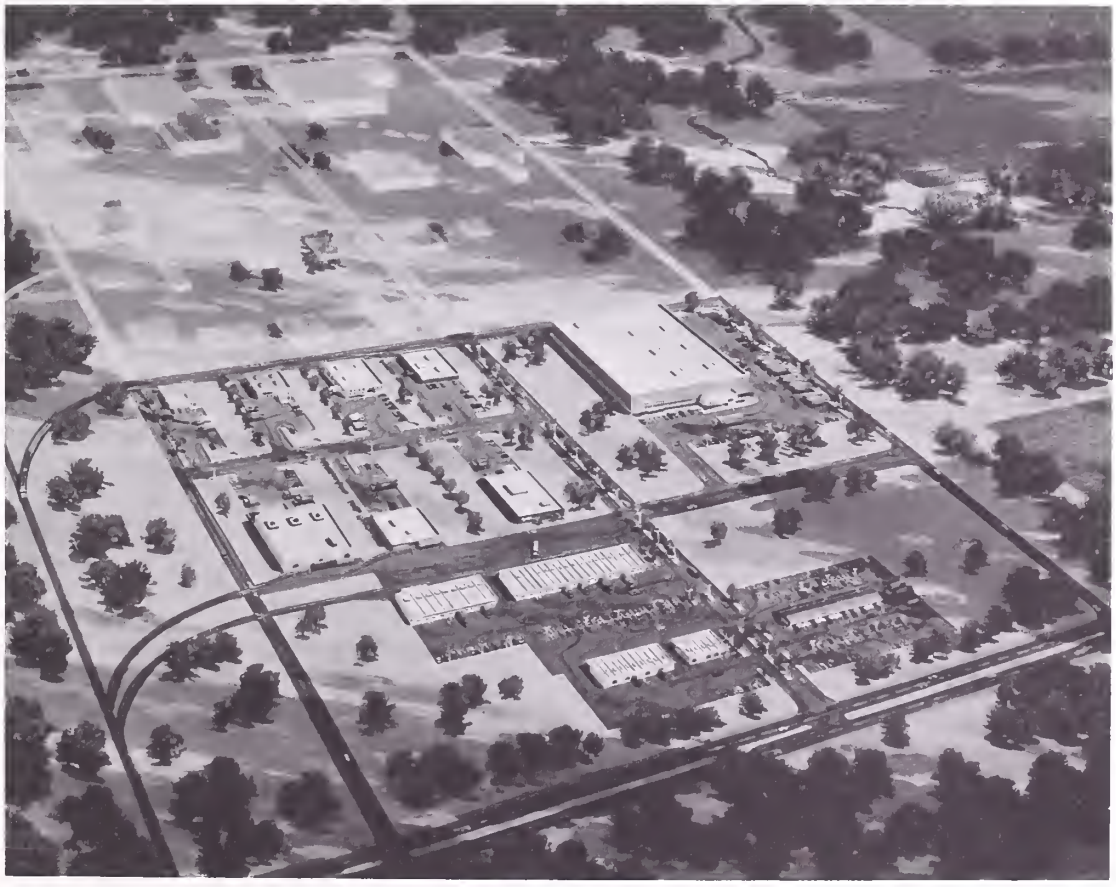
FOOD DISTRIBUTION FACILITIES FOR MEMPHIS, TENNESSEE 1976-2000



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This study was conducted under the general supervision of Kenneth H. Brasfield, Chief, Food Distribution Research Laboratory, Science and Education Administration.

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ABSTRACT

A study of 71 wholesale food firms in the Memphis, Tenn., area revealed that 27 face imminent relocation because of antiquated and inefficient facilities, urban rehabilitation, or both. Their relocation is necessary if they are to operate efficiently and remain competitive. They include fresh fruit and vegetable, grocery and frozen food (including several affiliated wholesale food distributors and major chains), meat and meat product, poultry and egg, dairy product, and other food and food-related firms. They handle about 26 percent of the total volume of food and occupy about 26 percent of the total primary warehouse space. Although 44 firms have adequate facilities, they, too, will eventually need to relocate or otherwise improve their operations.

Assuming past trends continue, the volume of food handled in Memphis will increase by over 60 percent by the year 2000. Improved facilities and methods will be needed to efficiently handle the increased volume. To provide these facilities, a well-conceived, long-range master plan is needed. It should be an integral part of the overall development of the area.

One such plan resulting from this study requires about 300 acres of land—120 acres for the initial development and 180 acres for future construction. Buildings with about 535,000 square feet of floorspace are proposed initially and over 2 million square feet by the year 2000.

The total annual volume of food handled initially is estimated at about 344,000 tons, which would increase to an estimated 2.2 million tons by the year 2000.

Many sites in Memphis might be acceptable for a wholesale food center; however, the following representative sites were selected: Frayser, Airport, Frank C. Pidgeon Industrial Park, and Mullins Station Road.

The proposed initial food distribution center might be financed in several ways. Examples of both private and public financing show that the estimated annual revenue required to amortize the cost of the proposed center including operation costs would be Frayser—private $1.9 million, public $1.3 million; Airport—private $2.3 million, public $1.4 million: Frank C. Pidgeon Industrial Park—private $2.1 million, public $1.4 million; and Mullins Station Road—private $2.0 million, public $1.3 million.

Implementation of the proposed plan for such a center will solve many problems existing in the Memphis marketing system, such as inadequate facilities, lack of expansion space, traffic congestion, inadequate parking, and inaccessibility to major transportation outlets.

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INTRODUCTION

This study of the current wholesale food distribution facilities and methods used in the Memphis metropolitan area was requested by officials of the city of Memphis, Shelby County, the Greater Memphis Chamber of Commerce, and the Shelby County Growers' Association and was endorsed by members of the local wholesale food industry.

The study was begun in mid-1974. Participating were the former Agricultural Research Service of the U.S. Department of Agriculture; the Department of Agricultural Economics and Rural Sociology of the University of Tennessee, Knoxville; the Tennessee Agricultural Extension Service, Shelby County; the Executive Office of Policy Planning and Analysis of the city of Memphis; and local wholesale food firms in Shelby County, Tenn., including Memphis, and in Crittenden County, Ark.

Data and information on volume of food, handling facilities, methods, and practices were obtained through interviews with wholesale food firms in the metropolitan area for 1973, as this was the most recent year for which they were available.[2] Additional data and information were provided by the city of Memphis, Shelby County, the Greater Memphis Chamber of Commerce, the University of Tennessee, Memphis State University, and others both inside and outside the city.

To avoid revealing confidential information, data pertaining to wholesale firms were combined. Only totals for a commodity category are included. Firms handling a combination of products are classified by the major product.

The objectives of this study were to determine the adequacy of the present wholesale facilities and methods used in receiving and distributing food and to develop a plan for improvements to meet the needs not only of the present but of the foreseeable future.

This report analyzes the present food distribution system in the metropolitan area and presents a guide for developing initial facilities for a wholesale food distribution center for those firms that must relocate. It also includes the requirements and considerations necessary for planning such facilities to serve the greater Memphis area to the year 2000.

HISTORY OF FOOD MARKETING IN MEMPHIS

This city has maintained a continuing interest in helping to provide food market facilities. In about 1820, the first market was established at Auction Square and was operated by private businessmen for about 25 years until its location became inconvenient.

In the 1840's, the city constructed two markets closer to the center of population. The one at Poplar Avenue and Law Street (Danny Thomas Boulevard) was known as North Market and the other at Beale and Third Streets was South Market. They consisted of large sheds with roofs supported by steel girders and with brick floors 300 feet long and 40 feet wide. Meat stalls were on one side and fruits and vegetables on the other. The standard rental was 25 cents for a wagon space. Only perishable foods were sold in these markets; grocers in surrounding areas were limited to selling across-the-counter staples. In fact, it was a violation of the law for other retail stores in the city to sell fruits, vegetables, and meat; hence, these items could be purchased only in these markets. When they closed at 10:30 a.m., if there were leftovers, wagons were permitted to peddle them on the city streets.

In 1872, when the city government suffered severe financial problems and epidemics of cholera and yellow fever swept the city, controls were relaxed. Grocers were permitted to sell fruits and vegetables and later meat so there were full-line grocery stores.

In 1896, the city constructed at Third and Beale a large three-story brick building with a glass roof to provide a public retail market. There was such civic pride in the building that firms in the vicinity upgraded and remodeled their facilities. At the rear of this market, grocers purchased produce from waiting wagons and thus a wholesale market developed. By 1900, when this location was no

[2] Although the data on which this report is based were collected during 1973, the findings are still valid and useful as guidelines for evaluating the need for improved wholesale facilities in Memphis.

longer practical for a retail market, it became a wholesale market area.

During the 1920's, the city relocated the market again. It constructed sheds on the river slope at Front and Poplar. The auditorium "West Hall" was used as a wholesale market, which included a cold storage plant. This wholesale market remained until 1929, when there was dissatisfaction among the wholesale firms. The market was disbanded and wholesale firms were scattered throughout the city.

In 1934, a group of truck farmers formed the Shelby County Growers' Association and developed its own facilities on 4 acres at Washington and High Streets in downtown Memphis. This farmers' market remained during the early postwar period until the 1950's, when the site became too small.

In the early 1950's, the Shelby County Farmers' Market relocated from its downtown location to a 22-acre site in the northwest section of the city bounded by Scott Street, Cyprus Creek, and South Pershing Street extended. This became known as the Scott Street Market.

The remainder of the wholesale firms either retained their previous locations or developed facilities near the new farmers' market. Since then, the market has become more fragmented, with the only readily identifiable market area remaining in the vicinity of Scott Street.

PRESENT FOOD DISTRIBUTION SYSTEM

Wholesale Food Marketing Facilities

In the Memphis area, 71 wholesale food distribution firms have one or more warehousing facilities; there are 68 independents, 2 affiliated firms, and 1 national food chain.[3]

Of the 71 wholesale firms, 8 specialize in fresh fruits and vegetables, 17 in grocery and frozen foods, 15 in meat and meat products, 7 in poultry and eggs, 11 in dairy products, and 13 in other food and food-related products. Figure 1 shows their location.

Fresh Fruits and Vegetables

The eight independent wholesale fresh fruit and vegetable firms are located in two general areas of Memphis. One area is in the north part of the city and includes the Shelby County Farmers' Market on Scott Street. The other area is in downtown Memphis.

Five firms are located in this farmers' market area. Some of them maintain separate operations with one in and one outside this area. Of the three firms in the downtown area, one is near the old farmers' market and two are just west of the center of the city.

The fruit and vegetable facilities vary in age, type, and condition. Most are single story and some are relatively new; others are old and most have been modified from other uses to handle fresh fruits and vegetables (fig. 2).

Both retailers and wholesalers are located at the Shelby County Farmers' Market. Only about 8 acres of the facility are used for food marketing, however, and the 14 remaining acres are vacant or used for nonagricultural purposes.

The farmers' sales area contains 2 open sheds (fig. 3) with 200 individual sales stalls, each about 10 by 15 feet. Additional stalls, used primarily for direct sales from trucks, are in an open paved area near the sheds. Five single-story buildings provide space for individual wholesale firms, a restaurant, a market office, and public restrooms. Buildings are often shared by more than one firm. (fig. 4). A security gatehouse is at the entrance to the fenced market site.

None of the five wholesalers in the Scott Street area have direct rail service to their facilities. Adjacent railroad yards are used for receiving rail shipments. Two of the three downtown firms have direct rail service.

All eight firms have convenient access to major transportation arteries. During certain periods of the day, however, especially in the morning, nearby streets are congested and traffic is delayed occasionally. Parking space is almost nonexistent for anyone visiting the fruit and vegetable firms

[3] Independent wholesale firms have warehousing facilities and sell directly to outlets they do not own or control. Affiliated wholesale firms have warehousing facilities and sell directly to outlets they may or may not own or control or with which they have a contractual relationship. National food chains have warehousing facilities but sell only to outlets they own or control.

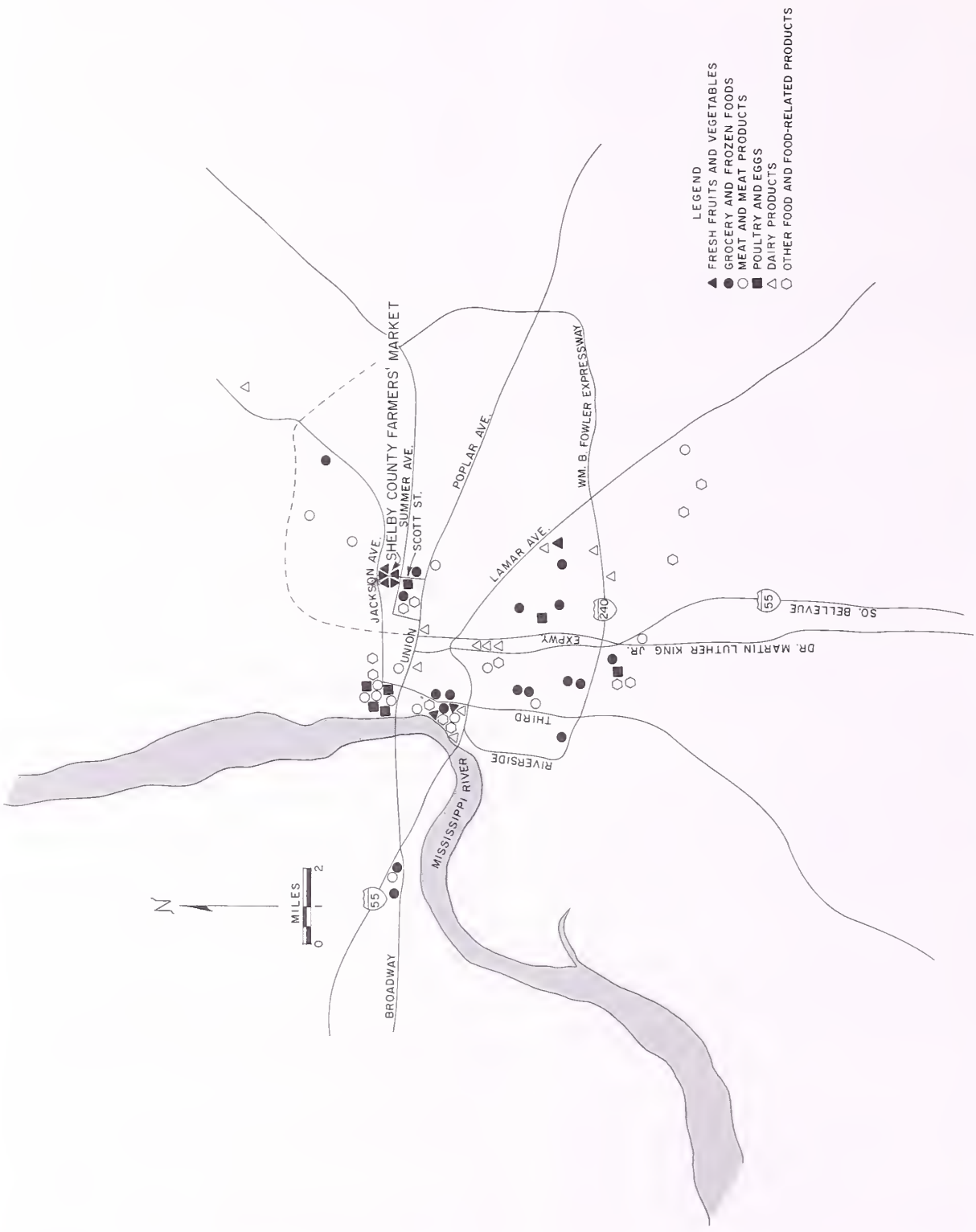

FIGURE 1.—Location of wholesale food firms, Memphis, Tenn.

PN-6398, PN-6399

FIGURE 2.—Fresh fruit and vegetable warehouses: Modern single-story (above) and old multistory building (below).

PN-6400

FIGURE 3.—Street-level shed in Shelby County Farmers' Market.

during business hours. Parking during the peak marketing season is a constant problem.

Refrigeration is generally adequate at most facilities. However, during peak seasons when larger quantities of products are handled, additional refrigerated storage space at other locations is utilized. High stacking of products in refrigerated rooms often is not possible because of low ceilings, and modern mechanized handling equipment sometimes cannot be used because of unsuitable building structure.

Sanitation is well maintained at all facilities. Security at the farmers' market is relatively satisfactory but is often a problem at other facilities.

Grocery and Frozen Foods

Seventeen grocery and frozen food firms maintain wholesale facilities in the Memphis area. Five are near the intersection of Interstate Highways 55 and 240, 2 are between Broadway and Interstate Highway 55 in West Memphis, and 10 are scattered throughout this area.

Most of these firms have convenient access to major arterial streets and are served directly by rail. Although most facilities have off-street parking and truck maneuvering areas, others must use public streets to park, load, and unload (fig. 5). All the downtown firms experience traffic congestion and delay. To minimize this, some schedule their shipping and receiving operations to avoid peak traffic periods.

Facilities vary widely, ranging from large, modern, single-level warehouses on isolated sites to small antiquated, multistory facilities in crowded city areas. Occasionally firms operate from leased space in public refrigerated or dry storage facilities. (Fig. 6.)

Refrigerated space is generally adequate. Handling equipment varies from two-wheel handtrucks to forklift trucks and pallet racks.

Meat and Meat Products

Six of the fifteen meat and meat product firms are concentrated near Third Street in northwest

PN-6401

FIGURE 4.—Fresh fruit and vegetable warehouse in the Shelby County Farmers' Market.

PN-6402

FIGURE 5.—Truck loading and unloading from sidewalks.

PN-6403, PN-6404, PN-6405, PN-6406

FIGURE 6.—Wholesale facilities used by grocery and frozen food firms: *A*, Modern grocery warehouse; *B*, building shared with other wholesalers; *C*, old facility used for warehousing groceries; *D*, public refrigerated warehouse with space for frozen food wholesalers.

Memphis and in the old cotton warehousing section near Riverside Drive and Third Street. Nine firms are scattered throughout the metropolitan area.

Some of the facilities in use are modern and efficient and others obsolete and inefficient (fig. 7). A few firms have computerized operations and highly mechanized handling systems. Others lack such basic needs as dock facilities and adequate storage space. Most of them use commercial cold storage to supplement their refrigerated storage facilities. Rail service is available to some firms.

Some firms in outlying areas of the city generally have adequate facilities, including sufficient truck maneuvering and parking areas. Others, however, in old sections of Memphis are less fortunate. For some, front sidewalks serve as loading and unloading areas, with little or no room for truck maneuvering. Traffic congestion, parking, security, and sanitation are serious problems. Buildings are old, obsolete, multistory structures, with low ceilings and support columns that prevent effective use of materials-handling equipment. Interior lighting is not adequate.

Poultry and Eggs

Seven firms with distribution facilities in the Memphis area handle poultry or eggs or both. About half of them are in the center of the city and the others are widely scattered.

Facilities range from new, modern, one-story buildings designed for handling food products efficiently to old, obsolete, multistory buildings that have been converted from other uses (fig. 8). Adequate handling methods in use can often be correlated with the adequacy of the facilities involved.

Firms in industrial parks and in the suburbs tend to have better facilities than those in the downtown area. Also, they have only occasional traffic congestion, whereas those downtown have constant traffic problems. Truck parking and maneuvering spaces are virtually nonexistent for the downtown firms. Narrow streets serve as maneuvering and parking areas and are often blocked by trucks being loaded and unloaded. Most of the firms have reasonably satisfactory access to arterial highways.

Sanitation problems are evident in the older facilities and can be directly attributed to building design and deterioration. Adequate refrigerated space is available for most firms except during periods of peak supply and demand when it is necessary to use supplemental cold storage facilities. Maintaining adequate security is a problem.

PN-6407, PN-6408, PN-6409

FIGURE 7.—Wholesale facilities used by meat and meat product firms (top to bottom): Converted warehouse used for meatpacking and processing, meat products plant without dock platform, and meat processing plant with modern receiving facilities.

PN-6410, PN-6411

FIGURE 8.—Wholesale poultry and egg facilities: Modern poultry building (above) and old converted building used for handling shell eggs (below).

Dairy Products

There are 11 dairy product firms with facilities in the Memphis metropolitan area. They consist of four fluid milk processors, five ice cream manufacturers, and two dairy product wholesale distributors.

Three of the fluid milk processors, who represent the major dairy firms in Memphis, are located

east of the center of the city. They are in multistory buildings with processing and handling, dry storage, and offices occupying the various floors (fig. 9). The fourth fluid milk processor is in a single-story building on a farm in the northeast section of the city. All four firms' facilities are of brick and concrete construction. Each has adjacent but separate facilities that are used mostly for storage and maintenance, but sometimes they are used for processing operations.

Although these facilities have been used for many years, they still meet the needs of the individual firms. However, because of continuing growth and lack of space for expansion, it will be necessary to acquire adjoining property or relocate to meet future needs.

Of the five ice cream firms, three are east of the center of the city and one is on the north and the other on the south side. All except one have one-story brick and concrete structures. Two firms have separate but nearby facilities for storage and maintenance.

The two dairy product distributors are in the south part of the city. One firm has relatively modern brick and concrete structures. It also maintains separate facilities on the site for offices and for receiving, handling, and distributing its products (fig. 10). The second firm maintains only offices on its site; all wholesale distribution is from public storage facilities.

Most of the firms are on or near arterial streets, but access to the expressways is limited. Lack of parking space and traffic congestion are problems for most of them. Only a few have direct rail service to their facilities.

Sanitation is well maintained; however, security is a problem for some.

Other Food and Food-Related Products

A total of 13 firms handle primarily other food and food-related products. These products include confectionery, tobacco, health, beauty, and sundry items customarily handled in retail food stores.

These firms are located throughout the Memphis area. Many are in industrial parks with convenient access to major streets and highways, whereas some are in renovated buildings converted to warehouses for distribution operations (fig. 11), where off-street parking and maneuvering areas are a problem.

PN-6412

FIGURE 9.—Multistory dairy products plant.

PN-6413

FIGURE 10.—A dairy products distribution facility.

PN-6414

FIGURE 11.—Renovated building used for other food and food-related warehousing.

Handling equipment varies from simple two-wheel handtrucks and wooden storage shelves to specially constructed lift trucks and storage racks. Conventional forklift trucks and pallet racks are used by a few firms.

Space Utilization, Tenure Status, and Employment

The total space used by the 71 wholesale food firms exceeds 2.3 million square feet (table 1). About 92 percent is in primary buildings and 8 percent at other locations in secondary facilities. Of the total primary floorspace used by all firms, more than half is utilized by grocery and frozen food firms. The dairy product firms use almost half of the total secondary facilities space.

The floorspace usage by individual firms in the handling and distribution of products varies widely among the firms studied. No two operations are alike, even for firms within the same commodity category. For this study, however, floorspace is categorized into broadly defined areas to reflect its general kind of use. These are sales and storage, cooler, freezer, office, and other, which includes processing space. Approximately 65 percent of the total primary facility floorspace is for sales and storage, 19 percent for coolers and freezers, 6 percent for offices, and 10 percent for other uses.

Forty-seven firms rent or lease their facilities and 24 own them (table 2). Dairy product wholesalers have the most owners with 7 out of 11, or 64 percent, followed by grocery and frozen food, meat and meat product, other food and food-related, fresh fruit and vegetable, and poultry and egg firms.

A very high ratio of first-floor space compared with space on other floors exists in primary facilities. Of the 2.1 million square feet of total space in the primary facilities, about 92 percent is on the first floor (table 3). This space ranges from 70 percent for dairy products to 100 percent for fresh fruits and vegetables. The average for all firms is slightly over 85 percent. Dairy and meat and meat product firms are the highest users of multifloor facilities.

One measure of the relative economic importance of an industry to a metropolitan area is the number and types of jobs it provides. The 71 whole-

TABLE 1.—*Amount and usage of selected facilities by type of food firm, Memphis, Tenn., 1973*

Type of firm	Amount of facilities			Use of primary facilities					
	Primary	Secondary [1]	Total	Sales and storage	Cooler	Freezer	Office	Other [2]	Total
	Sq ft	*Sq ft*	*Sq ft*	*Sq ft*	*Sq ft*	*Sq ft*	*Sq ft*	*Sq ft*	*Sq ft*
Fresh fruits and vegetables	77,100	[3] 0	77,100	35,434	36,032	[3] 0	5,634	[3] 0	77,100
Grocery and frozen foods	1,329,772	1,360	1,331,132	1,065,382	77,100	131,930	54,000	1,360	1,329,772
Meat and meat products	270,319	84,254	354,573	65,136	58,103	39,172	23,654	84,254	270,319
Poultry and eggs	63,034	7,954	70,988	35,140	10,485	4,729	4,726	7,954	63,034
Dairy products	262,003	96,234	358,237	77,918	16,642	45,412	25,797	96,234	262,003
Other food and food-related products	129,405	180	129,585	99,605	400	2,400	6,000	21,000	129,405
Total	2,131,633	189,982	2,321,615	1,378,615	198,762	223,643	119,811	210,802	2,131,633

[1] Does not include refrigerated storage space that is used only occasionally.
[2] Includes processing.
[3] None reported. (Amount in use at Shelby County Farmers' Market is negligible.)

TABLE 2.—*Tenure status in primary facilities by type of firm, 1973*

Type of firm	Tenure status		
	Rent	Own	Total
	Number	*Number*	*Number*
Fresh fruits and vegetables	6	2	8
Grocery and frozen foods	11	6	17
Meat and meat products	10	5	15
Poultry and eggs	7	0	7
Dairy products	4	7	11
Other food and food-related products	9	4	13
Total	47	24	71

TABLE 3.—*Use of multistory facilities for primary facilities by wholesale food firms, Memphis, Tenn., 1973*

Type of firm	First floor	Other floors	Total
	Sq ft	*Sq ft*	*Sq ft*
Fresh fruits and vegetables	77,100		77,100
Grocery and frozen foods	1,304,772	25,000	1,329,772
Meat and meat products	232,319	38,000	270,319
Poultry and eggs	52,814	10,220	63,034
Dairy products	183,053	78,950	262,003
Other food and food-related products	107,905	21,500	129,405
Total	1,957,963	173,670	2,131,633

sale food firms included in this study employ approximately 3,100 people (table 4). The three leading employers are grocery and frozen food, dairy product, and meat and meat product firms with 44, 22, and 21 percent, respectively, of the total. Of the job categories included, administrative and sales have the largest number followed by handlers, processors, and truck drivers. They range from skilled to unskilled.

Volume of Products Handled

Over 1.3 million tons of products were handled by the 71 wholesale food firms in 1973. This volume included 12.6 thousand tons of products that were transferred among the wholesalers. These products had an estimated wholesale value of almost $700 million (table 5). The percentages of this tonnage handled by the firms were grocery and frozen foods 67, dairy products 14, fresh fruits and vegetables 10, meat and meat products 4, other food and food-related products 3, and poultry and eggs 2.

Many firms handled more than one kind of product. As a group, grocery and frozen food firms handled more different kinds of products than the others. Over 22 percent of their tonnage included items other than grocery and frozen foods. Table 6 provides a breakdown of products handled by the wholesale food firms.

Methods of Receipt and Distribution of Products

The source and volume of the approximately 1.3 million tons of food products arriving in the

TABLE 4.—*Estimated numbers and types of employees in wholesale food firms, Memphis, Tenn., 1973*

Type of firm	Administrative and sales employees	Handlers [1]	Processors	Truck drivers	Total
	Number	*Number*	*Number*	*Number*	*Number*
Fresh fruits and vegetables	29	42	0	36	107
Grocery and frozen foods	424	648	0	302	1,374
Meat and meat products	160	101	298	95	654
Poultry and eggs	31	6	24	36	97
Dairy products	199	8	345	132	684
Other food and food-related products	111	47	17	15	190
Total	954	852	684	616	3,106

[1] Includes maintenance personnel.

TABLE 5.—*Estimated total annual volume handled and gross product value by type of firm, Memphis, Tenn., 1973*

Type of firm	Total direct receipts	Interwholesaler transfers [1]	Total volume handled	Gross value
	Tons	*Tons*	*Tons*	*Dollars*
Fresh fruits and vegetables	126,007	2,618	128,625	19,746,000
Grocery and frozen foods	896,369	7,993	904,362	422,130,523
Meat and meat products	53,213	280	53,493	96,287,400
Poultry and eggs	27,389	50	27,439	21,933,800
Dairy products	[2] 194,905	634	195,539	95,119,507
Other food and food-related products	34,298	1,043	35,341	44,566,490
Total	1,332,181	12,618	1,344,799	699,783,720

[1] Products transferred among wholesalers.
[2] Includes 184,855 tons of fluid milk.

TABLE 6.—*Estimated volume of different commodities handled by wholesale food firms, Memphis, Tenn., 1973*

Type of firm	Food products handled						Total
	Fresh fruits and vegetables	Grocery and frozen foods	Meat and meat products	Poultry and eggs	Dairy products	Other	
	Tons	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Fresh fruits and vegetables	128,625	0	0	0	0	0	128,625
Grocery and frozen foods	145,195	701,248	28,275	0	2,697	26,947	904,362
Meat and meat products	0	0	53,493	0	0	0	53,493
Poultry and eggs	0	50	0	27,389	0	0	27,439
Dairy products	0	10,656	0	0	184,883	0	195,539
Other food and food-related products	0	95	0	0	0	35,246	35,341
Total	273,820	712,049	81,768	27,389	187,580	62,193	1,344,799

greater Memphis area were as follows: Metropolitan area 22 percent, State of Tennessee excluding the metropolitan area 6 percent, and outside the State 72 percent (table 7). The largest volume originating in the metropolitan area was dairy products. The largest volume from sources both within and outside the State was grocery and frozen foods.

Direct receipts from producers or manufacturers were unloaded at the wholesale firms' facilities, rail tracks, or public warehouses (table 8). About 67 percent of the direct receipts arrived by truck, including piggyback shipments, and 33 percent by rail either directly at the wholesaler's facility or at team tracks.

A factor in the flow of food commodities through a market is the losses due to spoilage, waste, deterioration, and pilferage. They can be attributed to the perishability of the product, inadequate facilities and handling practices, and lack of sufficient security. Although such losses cannot be eliminated, they can be reduced. The loss from these causes averaged 0.3 percent of the total volume handled or over $2 million (table 9).

Approximately 74 percent of the total tonnage handled by the 71 wholesale firms was delivered by the individual firms using their own vehicles. Twelve percent was picked up by customers and 14 percent was delivered to customers by commercial carriers (table 10).

The largest percentage of total volume delivered in firm-owned trucks was from poultry and egg firms followed by meat and meat product firms. The largest percentage of volume picked up in cus-

TABLE 7.—*Source and tonnage of products received by wholesale food firms, Memphis, Tenn., 1973*

Type of firm	Metropolitan Memphis area	State of Tennessee [1]	Outside Tennessee	Total
	Tons	*Tons*	*Tons*	*Tons*
Fresh fruits and vegetables	4,910	3,682	120,033	128,625
Grocery and frozen foods	106,201	60,326	737,835	904,362
Meat and meat products	5,666	3,173	44,654	53,493
Poultry and eggs	50	3,744	23,645	27,439
Dairy products	[2] 178,710	6,809	10,020	195,539
Other food and food-related products	7,893	368	27,080	35,341
Total	303,430	78,102	963,267	1,344,799

[1] Within State but outside metropolitan Memphis area.
[2] Mostly fluid milk. Point of origin at assembling and processing facility.

TABLE 8.—*Method of receipt by wholesale food firms, Memphis, Tenn., 1973*

Type of firm	Truck [1]	Rail		Total direct receipts	Interwholesaler transfer [2]	Total volume handled
		House tracks	Team tracks			
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fresh fruits and vegetables	109,694	13,687	2,626	126,007	2,618	128,625
Grocery and frozen foods	480,491	415,878	0	896,369	7,993	904,362
Meat and meat products	51,498	1,715	0	53,213	280	53,493
Poultry and eggs	27,389	0	0	27,389	50	27,439
Dairy products	194,905	0	0	194,905	634	195,539
Other food and food-related products	27,031	6,917	350	34,298	1,043	35,341
Total	891,008	438,197	2,976	1,322,181	12,618	1,344,799

[1] Includes piggyback receipts.
[2] Receipts from other local wholesalers transported by truck.

TABLE 9.—*Estimated losses at wholesale food firms due to spoilage, waste, deterioration, and pilferage, Memphis, Tenn., 1973*

Type of firm	Loss in value	Proportion of sales [1]
		Percent
Fresh fruits and vegetables	$58,643	0.3
Grocery and frozen foods	1,080,109	.3
Meat and meat products	768,600	.8
Poultry and eggs	[2] 0	0
Dairy products	[2] 0	0
Other food and food-related products	93,947	.2
Total or average	2,001,299	.3

[1] See table 5.
[2] Negligible.

tomers' trucks was from dairy product firms followed by other food and food-related firms. The largest percentage of volume delivered by commercial carriers was from other food and food-related firms.

About 40 percent of the over 1.3 million tons of food products distributed was within the metropolitan Memphis area, 11 percent outside the area but within the State of Tennessee, and 49 percent outside the State (table 11).

Of the volume distributed, institutions, restaurants, and retail stores received 66 percent, chain-store warehouses and affiliated wholesale firms 23 percent, other wholesale firms 7 percent, and unknown purchasers 4 percent. Table 12 shows the volume distributed by commodity group.

Grocery and frozen food firms distributed about 82 percent of the total volume to institutions,

TABLE 10.—*Method of distribution by wholesale food firms, Memphis, Tenn., 1973*

Type of firm	Delivered in firms' vehicles	Picked up in customers' vehicles	Delivered in cartage or commercial carriers	Total
	Tons	*Tons*	*Tons*	*Tons*
Fresh fruits and vegetables	91,001	37,624	0	128,625
Grocery and frozen foods	729,023	14,050	161,289	904,362
Meat and meat products	43,085	1,893	8,515	53,493
Poultry and eggs	27,198	241	0	27,439
Dairy products	97,437	90,266	7,836	195,539
Other food and food-related products	7,684	11,647	16,010	35,341
Total	995,428	155,721	193,650	1,344,799

TABLE 11.—*Destination of products sold by wholesale food firms, Memphis, Tenn., 1973*

Type of firm	Metropolitan Memphis area	State of Tennessee [1]	Outside Tennessee	Total
	Tons	*Tons*	*Tons*	*Tons*
Fresh fruits and vegetables	53,747	28,488	46,390	128,625
Grocery and frozen foods	327,049	82,907	494,406	904,362
Meat and meat products	25,725	5,120	22,648	53,493
Poultry and eggs	23,428	3,933	78	27,439
Dairy products	90,527	31,840	73,172	195,539
Other food and food-related products	14,617	3,649	17,075	35,341
Total	535,093	155,937	653,769	1,344,799

[1] Within State but outside metropolitan Memphis area.

TABLE 12.—*Estimated quantities of products distributed to different types of customers by wholesale food firms, Memphis, Tenn., 1973*

Type of firm	Institutions, restaurants, and retail stores	Chainstore warehouses	Other wholesale food firms	Unknown	Total
	Tons	*Tons*	*Tons*	*Tons*	*Tons*
Fresh fruits and vegetables	53,222	9,075	30,614	35,714	128,625
Grocery and frozen foods	729,101	145,847	29,414	0	904,362
Meat and meat products	39,308	9,335	4,772	78	53,493
Poultry and eggs	12,485	13,817	1,137	0	27,439
Dairy products	45,056	131,558	10,480	8,445	195,539
Other food and food-related products	10,752	2,950	11,064	10,575	35,341
Total	889,924	312,582	87,481	54,812	1,344,799

restaurants, and retail stores and fresh fruit and vegetable firms about 6 percent. Grocery and frozen food firms supplied the greatest percentage of the total volume by type of firm to chainstores followed by dairy product firms. Fresh fruit and vegetable and grocery and frozen food firms each supplied 34 percent of the total volume by these firms to other wholesale food firms. About 65 percent of the tonnage distributed to unidentified customers was by fresh fruit and vegetable firms. Other food and food-related firms supplied 19 percent to unidentified customers.

Evaluation of Present Facilities and Methods

Many of the wholesale food distribution facilities in the Memphis area are modern and efficient. As a result, their handling and marketing operation costs are as low as could be reasonably expected. Other facilities in the area, however, are not adequate. Some are in older downtown areas, whereas others are scattered throughout the city. They range from old, outmoded warehouses to new, modern facilities.

Of the 71 wholesale food firms operating in the Memphis area in 1974, about 27 firms or 38 percent require immediate relocation based on an evaluation of their facilities and methods. These 27 firms handle fresh fruits and vegetables, grocery and frozen foods, meat and meat products, poultry and eggs, and other food and food-related products. They handle about 26 percent of the total volume of food and they occupy about 26 percent of the total primary warehouse space (table 13).

Some firms are located where it is impossible to adopt more efficient handling operations. Uneven floors and obstructions make the use of supporting mechanical equipment difficult. Low ceilings preclude the use of pallet racks. Inadequate lighting contributes to errors made in order selections. Leaking roofs also contribute to interior handling problems and product deterioration. Inconveniently located entrances with improper size and type of doors limit the facilities. These are some of the built-in inefficiencies affecting handling operations.

Processing operations carried on in crowded facilities make acceptable working conditions difficult. As a result, many firms have to operate under less than desirable conditions or extensively remodel their facilities to comply with government regulations.

Shipping and receiving operations at many firms are extremely inefficient, especially where sidewalks or streets are used extensively. Often when both receiving and shipping operations are performed simultaneously from a single entrance, the confusion increases costs.

Fire and liability insurance costs in the older facilities are higher than in comparable new ones. Health and sanitary regulations are difficult to enforce in the older facilities.

Many wholesale firms, both old and new, do not have adequate expansion area. They have expanded to their physical limit and therefore have no choice other than relocation.

The lack of adequate parking for unloading vehicles is a serious problem with many food firms.

TABLE 13.—*Number of firms, volume handled, and space used in primary facilities by wholesale food firms requiring immediate relocation, Memphis, Tenn., 1974* [1]

Type of firm	Firms	Volume handled	Space used
	Number	*Tons*	*Sq ft*
Fresh fruits and vegetables [2]	8	128,625	77,100
Grocery and frozen foods	4	171,184	284,050
Meat and meat products	6	10,185	86,518
Poultry and eggs	5	21,695	46,434
Other food and food-related products	4	12,035	56,700
Total	27	343,724	550,802

[1] No dairy product firms needed to relocate.
[2] Does not include farmers' market.

Traffic congestion about the facility and on access streets is a constant problem. The results are unnecessary delays in loading and unloading and general traffic congestion.

Many of the wholesale food firms have adequate access to arterial streets and highways, but others do not, with problems of delay for incoming and outgoing trucks.

A few firms are served directly by rail, but most must use rail team tracks located some distance from their facilities. Costly rehandling of products is the result and also subjects products to unnecessary damage and spoilage.

Working conditions in the newer facilities are generally better than in the older firms, which, however, do attempt to provide the basic items for efficient working conditions.

Security and pilferage are a problem in many older facilities, particularly where readily salable commodities are available. In the newer facilities where control measures are in effect, security and pilferage are less of a problem.

IMPROVING FACILITIES AND METHODS FOR FOOD DISTRIBUTION

Improved facilities for wholesale food firms could solve many of their problems. The needs of these firms for adequate low cost facilities, security, rail service, and access to highways and particularly their dependency on one another can best be served in or by a single location.

A logical solution to the problem of providing improved facilities would be a well-conceived master plan for long-range facility development. It would serve as a guide and help assure that the kinds and amounts of wholesale facilities needed by the local food industry could be provided and that adequate and orderly additions to the facilities would be possible as the need arises. Such a plan should be an integral part of the overall development of the area. It should adhere to a policy of promoting free enterprise in the marketing of food, and it should foster and encourage the development of the local food industry.

A master plan for the food distribution facilities is shown in figure 12. It is a centralized, wholesale food distribution complex designed for efficient handling and distribution of all kinds of food, with a capability of expansion to meet the needs of the foreseeable future. The plan will eliminate many of the physical problems that now exist for many of the firms and should prevent many such problems in the future.

The plan provides for (1) buildings that promote handling efficiency, (2) room for expansion and growth, (3) wide streets where traffic can flow freely into, within, and out of the center, and (4) direct rail service.

Since a complete food center would be a long-term investment for the firms locating in it, each type of unit should be simple, functionally designed, and capable of being modified to meet future requirements as the technology of the industry changes. The facilities should be carefully arranged so that firms are located where traffic generated by their operations would least interfere with normal market traffic. Similarly, firms receiving large volumes that require extensive unloading or loading should be located where their operations will cause a minimum of traffic interference. The actual number and size of the buildings should be based on space requirements of specific firms that sign leases. Overbuilding should be avoided.

THE COMPLETE WHOLESALE FOOD DISTRIBUTION CENTER

A complete wholesale food distribution center to serve the Memphis area would require about 300 acres. It should be designed so it can be constructed in stages. The first stage, requiring about 120 acres of land, should provide for those wholesale food firms with an impending need to relocate. Subsequent stages of construction could accommodate requirements until after the year 2000. Space could be made available during each stage of development for necessary support facilities, such as dry storage warehouses, public refrigerated warehouses, banks, offices, truck service centers, and allied food industries.

The facilities for individual wholesale food firms

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FIGURE 12.—Artist's conception of a centralized wholesale food distribution complex.

in the food center should be designed to meet their requirements. Ample space should be provided for unloading, processing, storage, display, sales, assembly, loading, parking, and expansion for growth of the firms' operation. The larger the volume of business and the greater the variety of products handled at one location, the more attractive the market becomes to buyers as well as to food-oriented firms seeking new locations.

Although 44 firms have adequate facilities, they, too, will eventually need to improve their operations. By the year 2000, most of the present wholesale food facilities in Memphis will have been replaced by new ones. Two major factors will affect this change. First, the area's expanding population will increase the total demand for food, which will be reflected at the wholesale level. Second, changes in marketing practices and in the forms in which products are marketed will change the type and size of wholesale facilities required.

Because of its location in the heart of the mid-South, its industrial development, and the intensive agricultural production in the surrounding area, Memphis is expected to remain a major distribution point for food products. Improved facilities will be needed to handle these products efficiently.

Food warehousing technology appears to be rapidly changing toward increased application of highly sophisticated materials-handling equipment for receiving, storage, and selecting operations. Some firms have already constructed and installed warehouse prototypes that may be common by the year 2000. Although these new warehouses vary in design, some features are found in more than one of them. Some recently designed warehouses are 80 feet or more above ground level requiring extensive use of mechanized storage retrieval with power and gravity conveyors.[4] A number of the more innovative designs use depalletizing machines, live storage with remote release, sorting stations, and conveyorized truck loading. Building appearance and shape are very dependent on the particular equipment selected for warehouse operations.

Many of the highly mechanized warehouse designs anticipated in future food handling facilities will require receiving in unitized shipments, which in turn may encourage suppliers to market their products in more uniform master containers. Warehouse designs will reflect the need to quickly move unitized shipments from point of receipt to storage.

The extensive investment required for highly mechanized warehouses will accelerate the moving of long-term storage functions back to locations nearer the producing or manufacturing points. Fewer but larger food wholesale firms will be giving more attention to turnover rates of their products. These changes will minimize the need for extensive warehouse space near the points of consumption. Increasing availability of computer services will assist wholesalers in developing management information required to achieve substantial increases in annual product turnover rates. Direct computer communication between store and warehouse will also assist wholesalers seeking to minimize inventory requirements by providing current data on product movement.

The assumption is made that warehousing systems will involve extensive use of storage-retrieval machines and conventional selection from pallets in racks or from live storage onto conveyors at several levels in the warehouse. This type of design will result in substantial reduction in the floorspace requirements compared with those in conventional warehouses but will require some buildings with very high ceilings. Not all food firms, however, have the product mix, business complexity, or annual sales volume to justify extensive use of sophisticated mechanization in their warehousing operations. Such firms will probably use improved versions of present warehousing technology, such as higher pallet racks, rail stabilized forklift trucks, and remotely guided vehicles for order selection. Some firms may require conventional warehousing for some commodity lines while employing highly mechanized warehousing for the remainder.

Food firms will continue the existing trend of selling an increasing variety of food, nonfood, and equipment lines. Also, the opportunities for serving the institutional and restaurant trade will expand.

Specialized processing will probably be extended. Improvements in packaging, transportation technology, and shifts toward microwave cooking may offer additional sales opportunities, especially in institutional feeding.

Truck transportation will continue to have a major role in the distribution of food products.

[4] Computer controlled stacker cranes for moving unitized loads into and out of storage.

Reflecting the multicommodity product mix of firms, some trucks will be designed to handle nonrefrigerated, chilled, and frozen products in the same vehicle. Maneuvering areas may have to be increased to accommodate increased length allowances for over-the-road and delivery trucks.

The logical method in developing facilities to meet increasing food distribution needs of metropolitan Memphis and its distribution area is to expand the proposed initial food distribution center.

To determine the facilities that will be required, it is necessary to estimate the volume that will be handled by the various commodity groups. Future volume [5] has been estimated from historical observations and time series analysis. The basic premise is that trends of the recent past will continue.

The future volume of products handled by Memphis wholesale food firms depends on three considerations: (1) The population growth of the area serviced by Memphis-based wholesale food firms, (2) the ability of these firms to increase the volume they handle as local demand increases, or as their regional market share increases as a result of their managerial efforts, or both, and (3) adjustments in per capita income of consumers in the market area and the changing habits, tastes, and preferences of the consumers.

The future volume of the food handled by Memphis wholesale food firms in 1980, 1990, and 2000 was estimated for each of the six types of firms shown in table 14. Assuming that trends of the recent past continue, the increase of all food commodity volume over that of 1973 was estimated to be 13.6 percent by 1980, 37.2 percent by 1990, and 60.6 percent by 2000. The smallest increase was for dairy products, only 19 percent by the year 2000 over the base year. However, if their competitive market position in the region is enhanced, then the volume could be much larger. On the other hand, if their competitive market position is decreased relative to other wholesale food firms in other locations, the volume could be effectively lower.

After estimates have been made of the volume of food to be handled to the year 2000, it is necessary to estimate the facility requirements for this projected increase. In table 15, the estimated volume and floorspace requirements of the various types of firms are shown.

[5] See Appendix II.

Building New Facilities

To meet the needs of Memphis wholesalers, different types of facilities are proposed consisting of multiple- and single-occupancy wholesale buildings, a farmers' market, and support facilities.

Multiple-Occupancy Wholesale Buildings

This type of facility is specifically planned to accommodate a wide range of different types of wholesale firms. Each multiple-occupancy building is designed to allow several individual wholesalers to share a common facility. Each building consists of individual units, each 30 feet wide and 100 feet deep, with common walls that enclose 3,000 square feet of first-floor space. These units are completely enclosed and without open platforms. Removable partitions separate individual units. Optional mezzanines with 600 square feet of floorspace per unit can be located across the front of the building. Figure 13 illustrates a section view and an artist's conception of a multiple-occupancy building.

Several design features enhance the flexibility of the multiple-occupancy buildings. Floors are level with those of railcars and trucks. Vertical bumper strips protect the building from damage by vehicles used for loading and unloading. Stairs at the front of the building and recessed ladders at the back provide pedestrian access.

Single-Occupancy Wholesale Buildings

Single-occupancy buildings are designed to meet the needs of individual firms. Figure 14 illustrates an artist's conception of a single-occupancy building. These buildings are planned for firms that handle a large volume of products or that need space arrangements not possible in multiple-occupancy buildings.

Farmers' Market

A farmers' market is necessary to provide space for local farmers to sell their products. A long shed-type building divided into stalls is designed to be flexible so that the space can be increased or decreased as the need arises.

Support Facilities

The kind and type of support facilities needed by the food distribution center cannot be determined until actual development begins. A bank, service station, container dealer, cartage company, and an

TABLE 14.—*Quantities of various food categories handled by wholesale food firms in 1973 and projected for 1980, 1990, and 2000 A.D., Memphis, Tenn.* [1]

Year and type of firm	Food category							Total
	Fresh fruits and vegetables	Grocery and frozen foods	Meat and meat products	Poultry	Eggs	Dairy products	Other food and food-related products	
	Tons	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
1973								
Fresh fruits and vegetables	128,625							128,625
Grocery and frozen foods	145,195	701,248	28,275			2,697	26,947	904,362
Meat and meat products			53,493					53,493
Poultry and eggs		50		20,512	6,877			27,439
Dairy products		5,741				189,798		195,539
Other food and food-related products		95					35,246	35,341
Total	273,820	707,134	81,768	20,512	6,877	192,495	62,193	1,344,799
1980								
Fresh fruits and vegetables	146,193							146,193
Grocery and frozen foods	165,026	801,221	35,006			2,799	31,156	1,035,208
Meat and meat products			66,228					66,228
Poultry and eggs		57		27,608	7,356			35,021
Dairy products		6,559				196,989		203,548
Other food and food-related products		108					40,751	40,859
Total	311,219	807,945	101,234	27,608	7,356	199,788	71,907	1,527,057
1990								
Fresh fruits and vegetables	175,808							175,808
Grocery and frozen foods	198,457	986,942	43,711			3,022	37,749	1,269,881
Meat and meat products			82,696					82,696
Poultry and eggs		70		38,498	7,727			46,295
Dairy products		8,080				212,682		220,762
Other food and food-related products		134					49,374	49,508
Total	374,265	995,226	126,407	38,498	7,727	215,704	87,123	1,844,950
2000								
Fresh fruits and vegetables	204,917							204,917
Grocery and frozen foods	231,315	1,175,337	52,709			3,159	44,336	1,506,856
Meat and meat products			99,721					99,721
Poultry and eggs		84		50,531	7,819			58,434
Dairy products		9,622				222,328		231,950
Other food and food-related products		159					57,990	58,149
Total	436,232	1,185,202	152,430	50,531	7,819	225,487	102,326	2,160,027

[1] For discussion of projection methods, see Appendix II. Population figures rounded prior to calculation of projected volumes.

TABLE 15.—*Present and future annual volume and floorspace requirements for all wholesale food firms, Memphis, Tenn.*

Type of firm	Firms requiring immediate relocation				Firms not requiring immediate relocation				Requirements for all firms in 2000 [5]			
	Present volume (1973) [1]	Volume projected to be handled in 2000 [2]	Initial planned space [2]	Maximum potential space after expansion [3]	Present volume (1973) [4]	Volume projected to be handled in 2000 [2]	Initial planned space	Maximum potential space after expansion [3]	Present volume (1973) [6]	Volume projected to be handled in 2000 [5]	Initial planned space	Maximum potential space after expansion [3]
	Tons	*Tons*	*Sq ft*	*Sq ft*	*Tons*	*Tons*	*Sq ft*	*Sq ft*	*Tons*	*Tons*	*Sq ft*	*Sq ft*
Fresh fruits and vegetables	128,625	204,917	70,600	155,400	0	0	0	0	128,625	204,917	70,600	155,400
Grocery and frozen foods [7]	171,184	285,228	295,600	571,750	733,178	1,221,628	730,000	730,000	904,362	1,506,856	1,025,600	1,301,750
Meat and meat products	10,185	18,987	114,900	244,050	43,308	80,734	25,000	25,000	53,493	99,721	139,900	269,050
Poultry and eggs [7]	21,695	46,202	24,000	57,000	5,744	12,232	[8] 12,000	[8] 12,000	27,439	58,434	36,000	69,000
Dairy products [9]	0	0	0	0	195,539	231,950	155,000	155,000	195,539	231,950	155,000	155,000
Other food and food-related products	12,035	19,802	30,000	54,000	23,306	38,347	44,000	44,000	35,341	58,149	74,000	98,000
Total	343,724	575,136	535,100	1,082,200	1,001,075	1,584,891	966,000	966,000	1,344,799	2,160,027	1,501,100	2,048,200

[1] Table 13.
[2] Assumed commodity volumes will change equally within all firms of a particular type.
[3] Expansion of facilities of firms requiring relocation would conclude after 2000 and is not included in this report.
[4] Table 5 and table 13.
[5] Table 14.
[6] Table 5.
[7] Grocery and frozen food and poultry and egg firm volumes combined to protect confidential data.
[8] Anticipated location in multiple-occupancy building expansion area of initial facilities.
[9] No dairy firms required immediate relocation.

office building are types of businesses that could be appropriately included.

Streets and Parking

Streets in the proposed center should be sufficient to handle both present and anticipated traffic. The main access street through the center is 90 feet wide and main cross streets 70 feet wide. A service street on two sides of the center is 40 feet wide. This network of streets should provide for an orderly flow of traffic through the center.

Adequate parking is an integral part of a food center. Paved parking areas should be designated at building sites to serve the needs of individual firms, and future expansion of these parking areas should be indicated.

Rail Facilities

Rail service should be provided to building sites where needed. The individual firms would determine whether direct rail service was required. A properly designed center should provide for extending rail service to any firm should the need arise.

Expansion

A firm should consider its future needs at the time of site acquisition. Additional land for expansion should be considered by individual firms selecting building sites, particularly where substantial investment is required because additional space may not be available in the future.

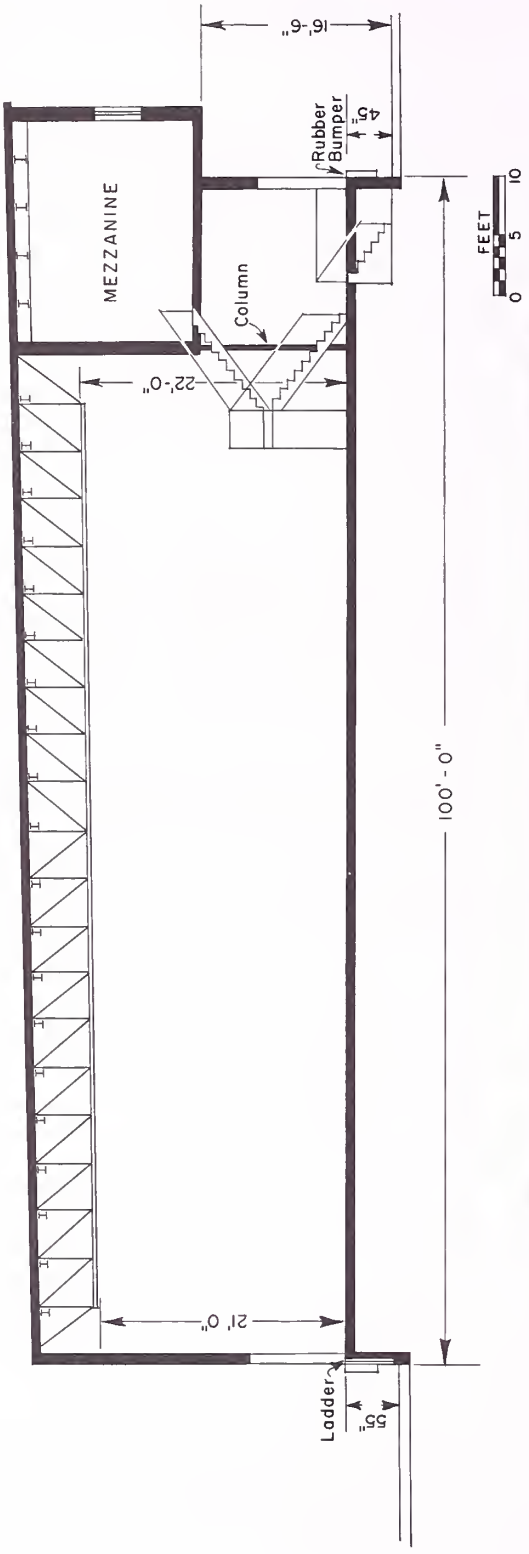
Restaurants and Ancillary Facilities

A restaurant located at a strategic point in the center is desirable. Equipment and supplies could be furnished by the tenant.

An office building could be planned to provide space for such supporting facilities as brokerage firms, banks, and retail stores. No structures are indicated because the size and type for prospective tenants have not been determined. They could be located in the support facilities area. Also, provision for servicing automobiles and trucks should be considered.

Central Energy Plant

A central energy plant for heat and refrigeration should be evaluated for feasibility. A centralized system would produce all the refrigeration at one location and distribute it through a network of underground pipes to the wholesalers who require



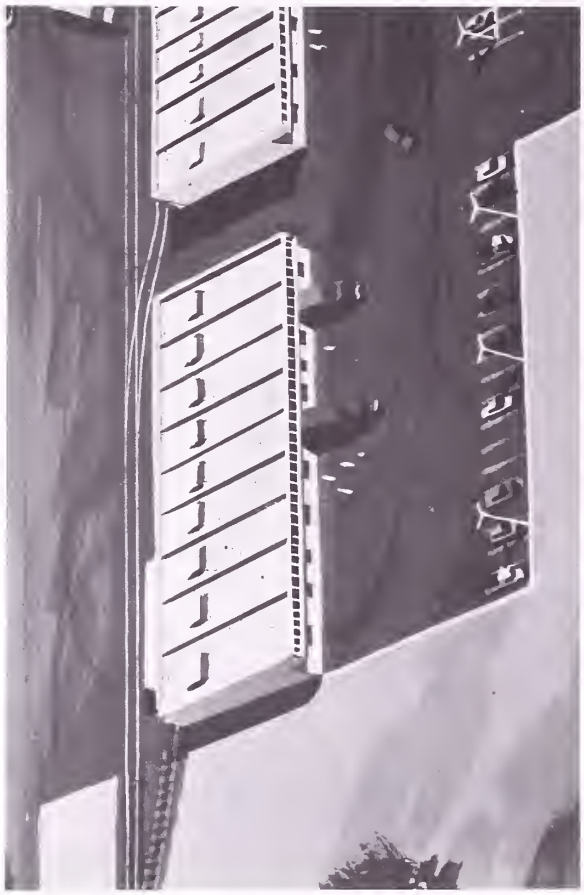


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FIGURE 13.—Section view (above) and artist's conception (below) of multiple-occupancy building.

PN-6417

FIGURE 14.—Artist's conception of single-occupancy building.

it. Findings from one study [6] showed that a centralized refrigeration system would have lower ownership and operating costs than individual units. Heat and air-conditioning would probably be less costly, also, with a central plant.

Commodity Facility Requirements

Fresh Fruits and Vegetables

Eight fresh fruit and vegetable firms would need 17 units in a multiple-occupancy building, totaling 51,000 square feet of first-floor space, and a single-occupancy building, with 19,600 square feet of first-floor space.

One possible layout in a unit of the proposed multiple-occupancy building is shown in figure 15. The general storage area is intended for nonrefrigerated items and the cooler area for refrigerated items. A lintle is provided for a future door opening at the rear of the building.

Offices and restrooms could be located on a mezzanine at the front of the unit. First-floor space then would be available for product receiving, loading, storage, and handling.

A possible layout of a fresh fruit and vegetable firm in a single-occupancy building is shown in figure 16. Each of the three storage areas (wet cooler, dry cooler, and general storage) has direct access to the outside of the building to facilitate receiving and shipping operations. They also adjoin each other to allow rapid and efficient movement from one area to another.

A shed-type structure, 70 feet wide by 360 feet long, is provided for the farmers' market. Figure 17 shows a plan and section view of the farmers' market shed and an artist's conception of the build-

[6] STAHLMAN, R. L. A STUDY OF REFRIGERATION SYSTEMS FOR URBAN DISTRIBUTION SYSTEMS. U.S. Dept. Agr. Mktg. Res. Rpt. 921, 107 pp. 1972.

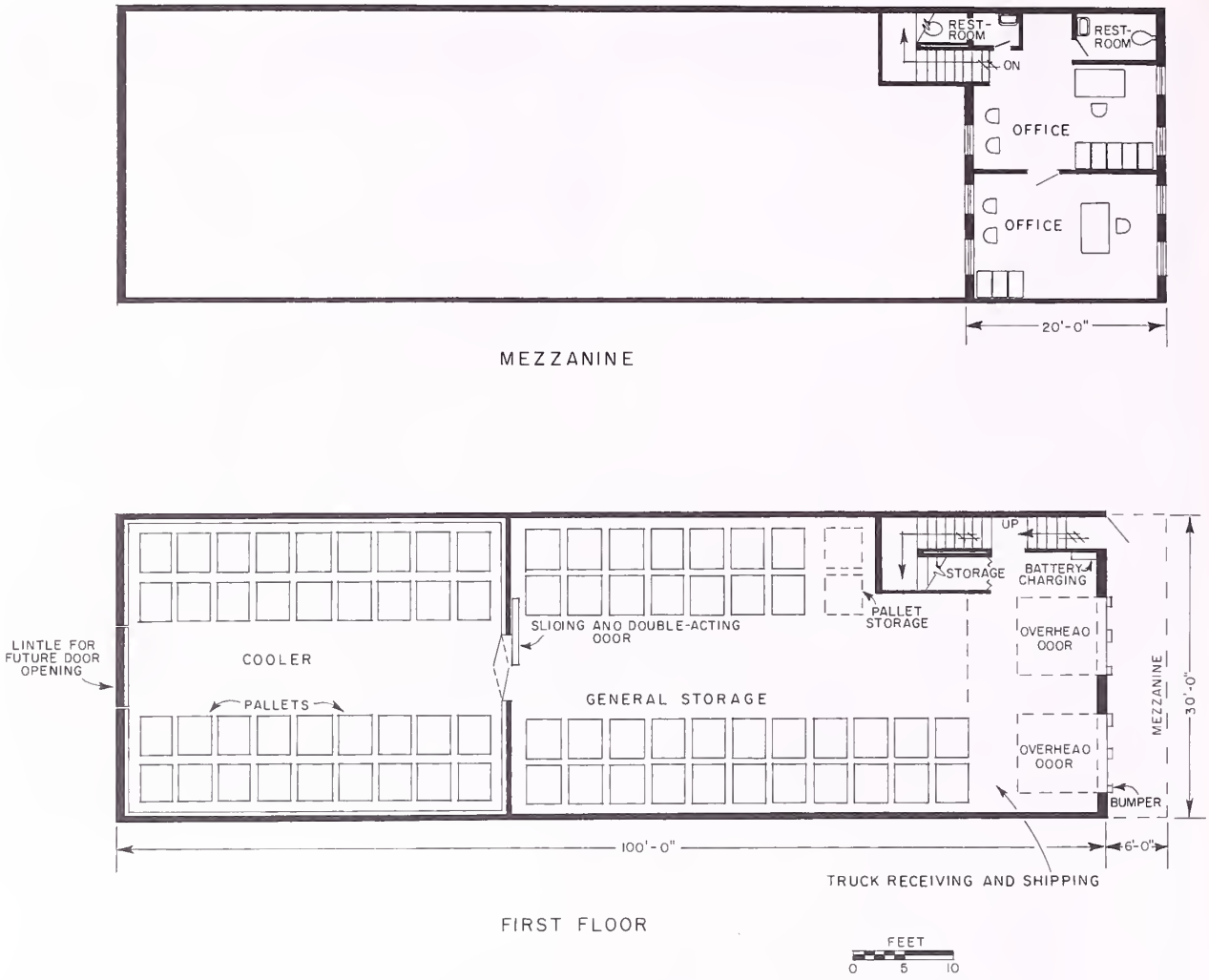


FIGURE 15.—Layout of fruit and vegetable wholesale firm in multiple-occupancy building unit.

ing and parking area, which has adequate space for 48 trucks under cover.

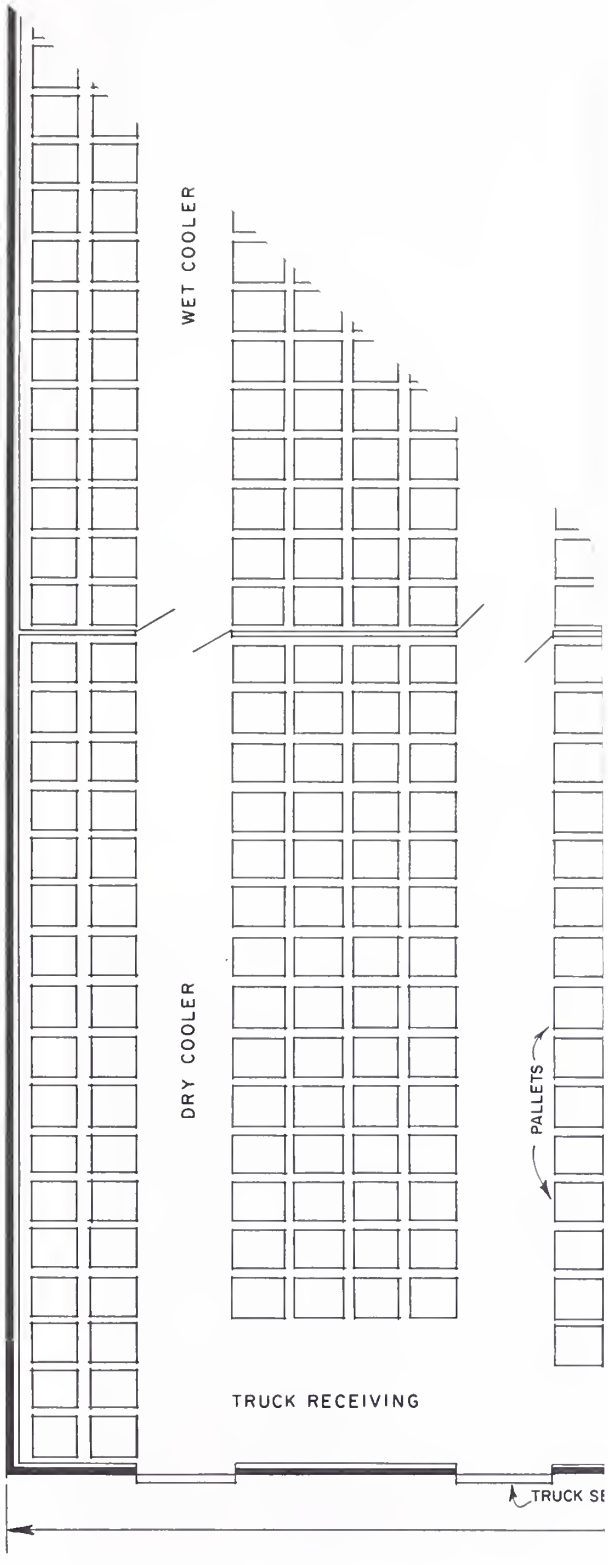
Trucks on both sides of the facility would be backed into lined-off, 15-foot-wide bays. Behind each vehicle is a 15-foot-deep display space, which faces a 10-foot center aisle running the length of the building.

The recommended shed utilizes a continuous roof beam that spans 40 feet between two rows of columns and cantilevers 15 feet beyond. The 14-foot-high structure should be erected on grade to permit easy access for customers and for motorized cleaning. The floor should be slightly sloped from the centerline to facilitate drainage.

Grocery and Frozen Foods

Four grocery firms will require single-occupancy buildings with 295,600 total square feet of first-floor space, each building ranging from 10,000 to 202,500 square feet.

Figure 18 illustrates a possible layout for a grocery firm in a single-occupancy building. It is designed for straight through flow of rail receipts and U-flow for truck receipts. Receiving and shipping areas are adjacent to storage areas designed for fast moving items and products sold in large quantities. The number and location of aisles are planned for orderly selection of products and rapid movement in and out of storage.



FIGURE

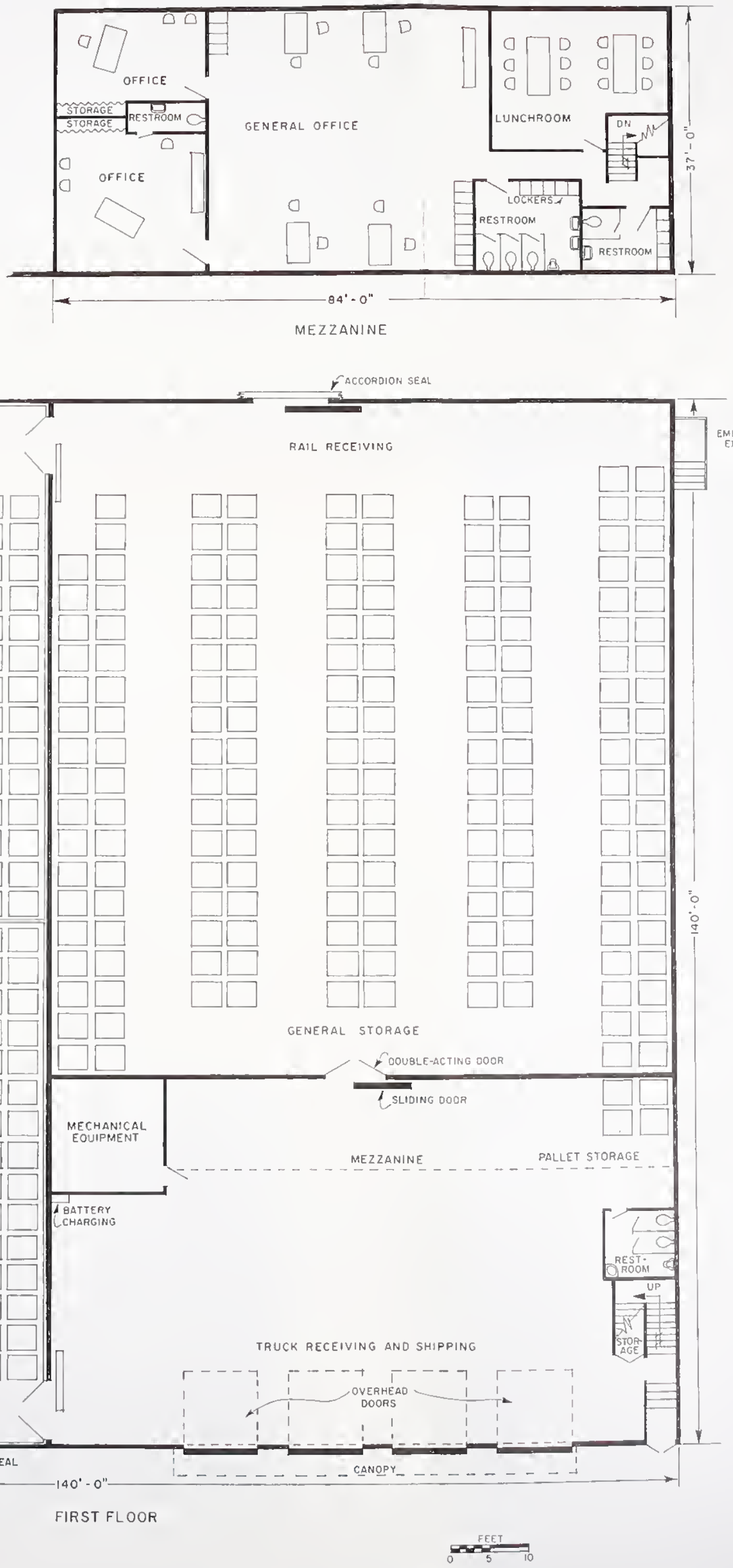
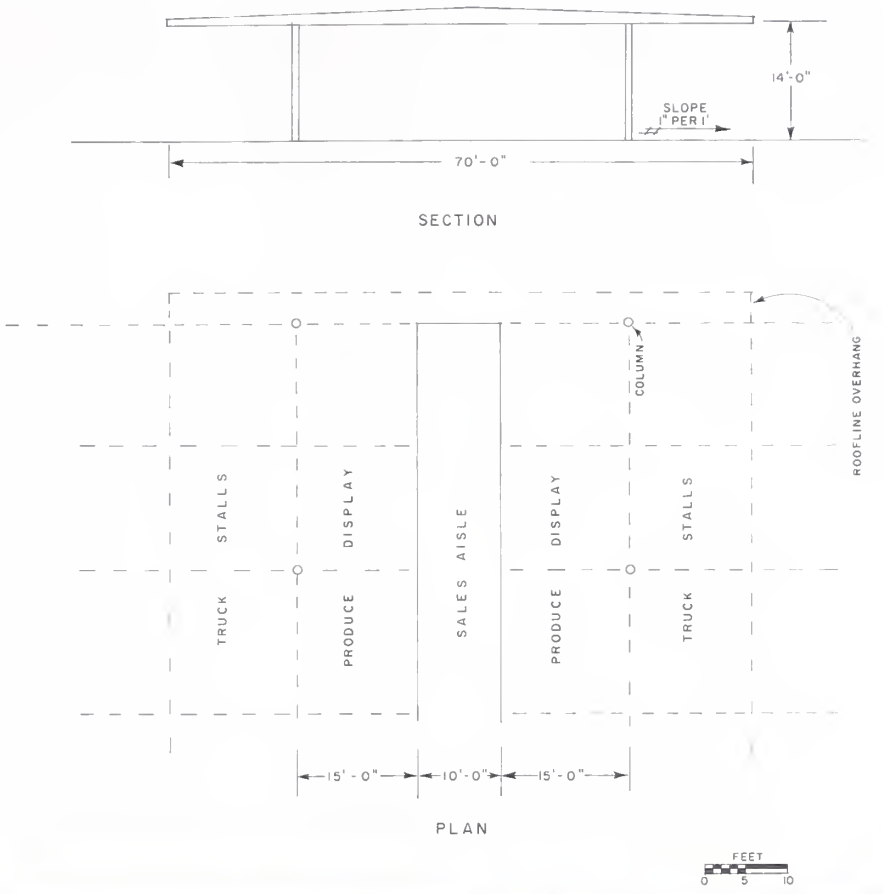


FIGURE 16.—Layout of fresh fruit and vegetable firm in single-occupancy building.



PN-6418

FIGURE 17.—Plan and section view (above) and artist's conception (below) of farmers' market.

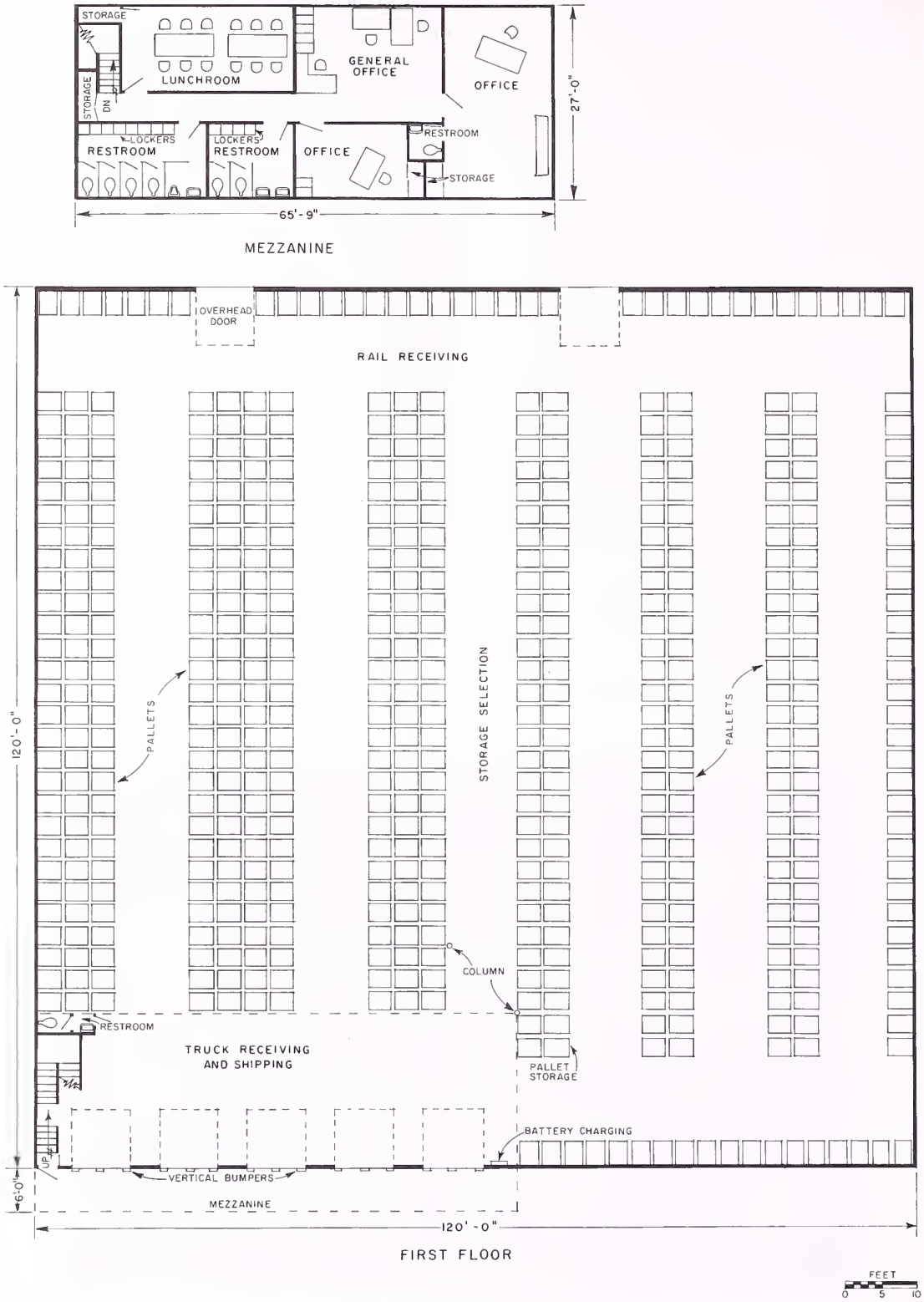


FIGURE 18.—Layout of grocery firm in single-occupancy building.

The first-floor ceiling height is 21 feet to allow four- or five-tier pallet racks and floor slots. The upper tiers provide for reserve storage and the lower tiers for order selection. Offices, restrooms, and a lunchroom could be on a mezzanine above the loading area.

Meat and Meat Products

Six wholesale meat firms require four units of the multiple-occupancy building and three single-occupancy buildings. The multiple-occupancy building space would consist of 12,000 square feet on the first floor and 6,610 square feet on the second floor. Offices, an employee welfare area, restrooms, and storage for packaging materials would be on the second floor. Ceilings should be 12 and 8 feet high on the first and second floor, respectively. Figure 19 shows a possible layout of a double unit in a multiple-occupancy building.

The access door in the enclosed receiving and shipping area should be 45 inches above the street at truck-bed height. It is recommended that meat rails be supported from the first floor on steel columns rather than suspended on rods attached overhead. The area directly above the coolers is cordoned off with a false ceiling. A future conversion from handling carcass meat to handling boxed meat would eliminate the need for conventional meat rails and therefore permit removal of the false ceiling without damaging the basic building. Such flexibility would enable meat firms to efficiently handle palletized boxed meat by stacking the product three tiers high in the cooler. Thus, the proposed structural design can satisfy both present and anticipated future needs for handling meat products.

The offices over the receiving and shipping area extend 6 feet beyond the edge of the enclosed dock and 16 feet above ground level to provide protection from the weather during loading and unloading. Vertical rubber bumpers should be attached along the front edge of the dock to prevent damage by trucks. Cooler doors with inner double-acting doors should be installed in refrigerated workroom and storage areas. All first-floor walls, ceilings, and floors should be insulated. Floor insulation should be installed during building construction, along with the necessary reinforcements to support the meat rails.

Interior wall surfaces and floors must be finished according to Federal meat inspection regulations, such as high-density, acid-resistant, waterproof concrete or good quality vitrified brick. Brick should be bonded with acid-resistant, waterproof mortar and laid in a waterproof concrete base. Floors must be sloped to provide adequate drainage, with at least one drainage outlet for each 400 square feet of floorspace.[7]

Three meat and meat product firms would require single-occupancy buildings, which would contain 25,000, 30,000 and 50,000 square feet of first-floor space, respectively. Figure 20 shows a possible layout for a meat firm in a single-occupancy building containing approximately 25,000 square feet of first-floor space.

This layout is designed to provide a U-shaped product flow for both carcass and boxed meats. It provides a maximum inventory flexibility and product movement free of backtracking, bottlenecks, and excessive labor handling. Each operational product area has been organized within the overall plan for effective use of labor and materials-handling equipment.

Offices and a lunchroom are located above the receiving and shipping platform at the front of the building. The overall interior ceiling height in the coolers should be at least 21 feet to provide sufficient room for three-tier pallet-stacking operations. With the trend toward shipping boxed primal meat cuts rather than carcass beef, the same ceiling height should be adopted for the carcass cooler to prevent the facility from becoming prematurely obsolete. However, a false ceiling should be installed about 12 feet from the floor to reduce the space to be refrigerated. Recommended ceiling heights for platform docks are 12 feet, and 8-foot-high ceilings are recommended for offices, restrooms, and the lunchroom.

Poultry and Eggs

Five poultry and egg firms would require eight units in a multiple-occupancy building. An example of a layout for a poultry and egg firm in a multiple-occupancy building is shown in figure 21.

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[7] For sanitary meat inspection requirements for a facility to be granted USDA approval to store and handle federally inspected meat, refer to "U.S. Inspected Meat Packing Plants, a Guide to Construction, Equipment, Layout," U.S. Dept. Agr., Agr. Handb. 191, 77 pp. (1972).

The facilities needed for handling poultry require certain construction features. Wall surfaces of poultry coolers must be impervious to water to a height of 6 feet above the floor. Wall surfaces above 6 feet and the ceiling must be smooth finished with a moisture-resistant material. All floor drains in poultry handling facilities should be vented and have deep seal traps.

Restroom soil lines should be separated from the floor drainage system to a point outside the building. Details of the poultry facilities must comply with the facility requirements of the U.S. Department of Agriculture regulations for the inspection of poultry and poultry products.

Similar features are desirable and recommended for facilities that handle only eggs, although facility requirements are not specified by regulation as for poultry. A firm that handles both poultry and eggs, however, must comply with facility requirements stipulated for handling poultry.

Dairy Products

No immediate need for new facilities was found at the time of the study.

Other Food and Food-Related Products

Four other food and food-related firms require 10 units in a multiple-occupancy building. A possible layout for one of these firms in two adjoining units of a multiple-occupancy building is illustrated in figure 22.

This layout reflects the diversity of products sold by many of these firms. Some products handled in fairly large quantities may be stored in the pallet racks, whereas shelves may be more suitable for storing low volume items. Operations such as cigarette stamping could be at the rear of the unit to isolate it from other wholesaling activities.

Offices and restrooms are on a mezzanine over the receiving and shipping area at the front of the unit.

SELECTING A SITE FOR A FOOD DISTRIBUTION CENTER

Availability of Land

It is very difficult in preliminary planning to determine the exact amount of land that will be sufficient for a complete food distribution center with an objective of growth. Assembling individual parcels of land may be complicated if dealing with several owners with small parcels. Therefore, if possible, the total acreage needed should be purchased from one owner or a small number of owners who are willing to sell their property reasonably.

Cost of Land

Although the purchase price of the site is important, it may not represent the major cost item when total land cost is distributed over the amortization period. Furthermore, in nearly all areas where food centers have been constructed, the market value of the surrounding land increased. Thus, sufficient land should be purchased at the outset or placed under option to purchase since the total cost will be less than it is likely to be in the future.

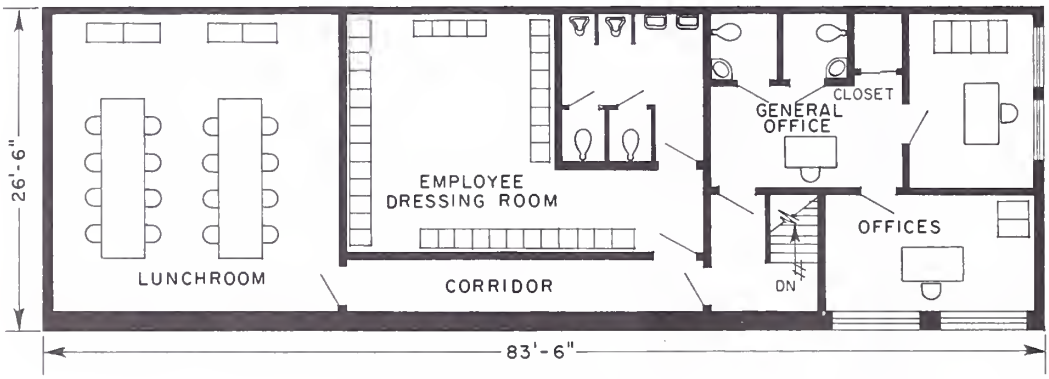
The physical features of a site are important. The cost of grading, filling, piling, and removing obstructions, such as trees and buildings, could be more than that of the land. A vital factor is the cost of land prepared and ready to use for construction. Subsoil conditions should be determined before a site is purchased. Its shape should permit the greatest utilization. Irregularly shaped sites do not lend themselves to this requirement as well as do rectangular or square sites. Ineffective land use will increase the total cost of the food center, increase ownership costs, and inconvenience users of the center.

Accessibility of Transportation

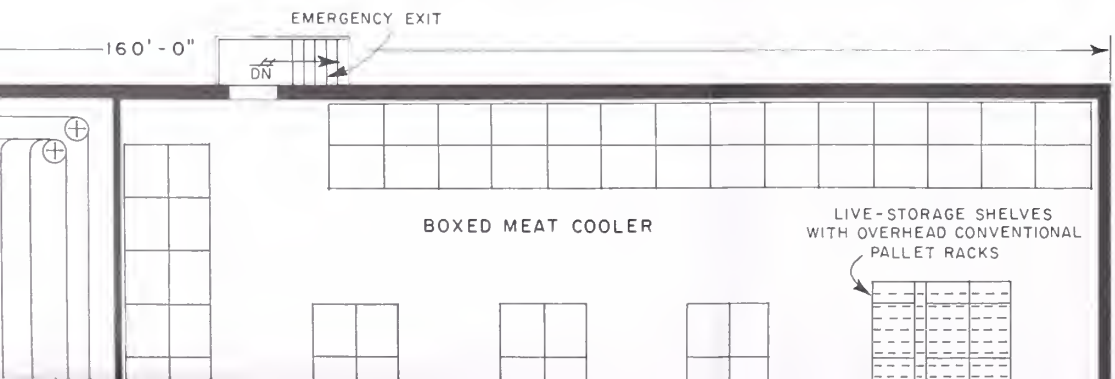
Because of the importance of rail receipts to the food industry in Memphis and the need to conserve energy, it is essential in planning to include direct rail service to all potential sites. The area has such service provided by seven major railroads.

The large volume received by truck and the almost exclusive use of trucks for distribution require adequate access to major arterial highways. Eight Federal highways, two interstate highway systems, and a circumferential interstate highway help to make Memphis the transportation hub for the mid-South.

Although negligible amounts of food arrive in the Memphis area by air or boat, these modes of


26'-6"
LUNCHROOM
EMPLOYEE
DRESSING ROOM
CORRIDOR
GENERAL
OFFICE
CLOSET
OFFICES
DN
83'-6"

MEZZANINE


EMERGENCY EXIT
160'-0"
DN
BOXED MEAT COOLER
LIVE-STORAGE SHELVES
WITH OVERHEAD CONVENTIONAL
PALLET RACKS

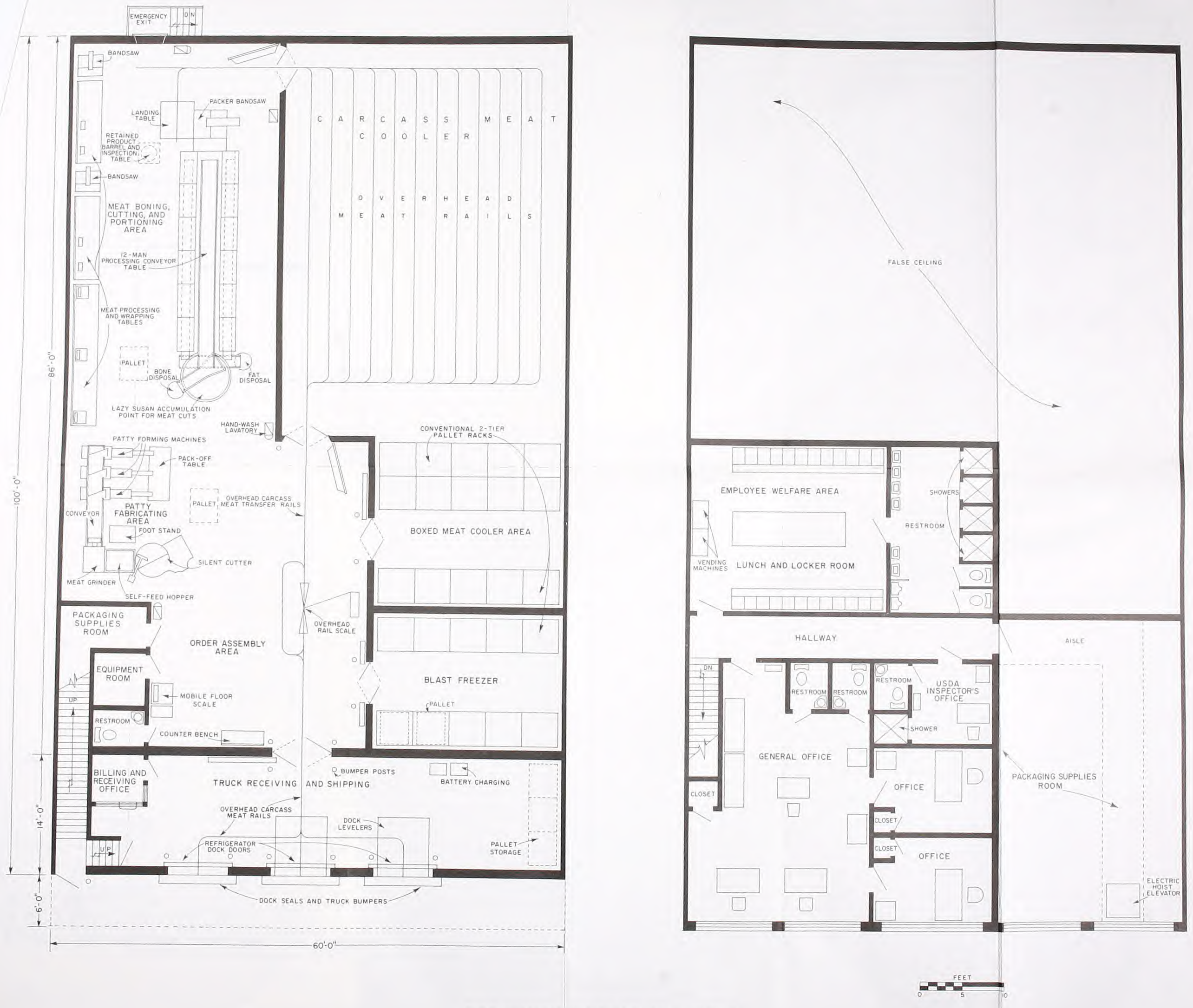
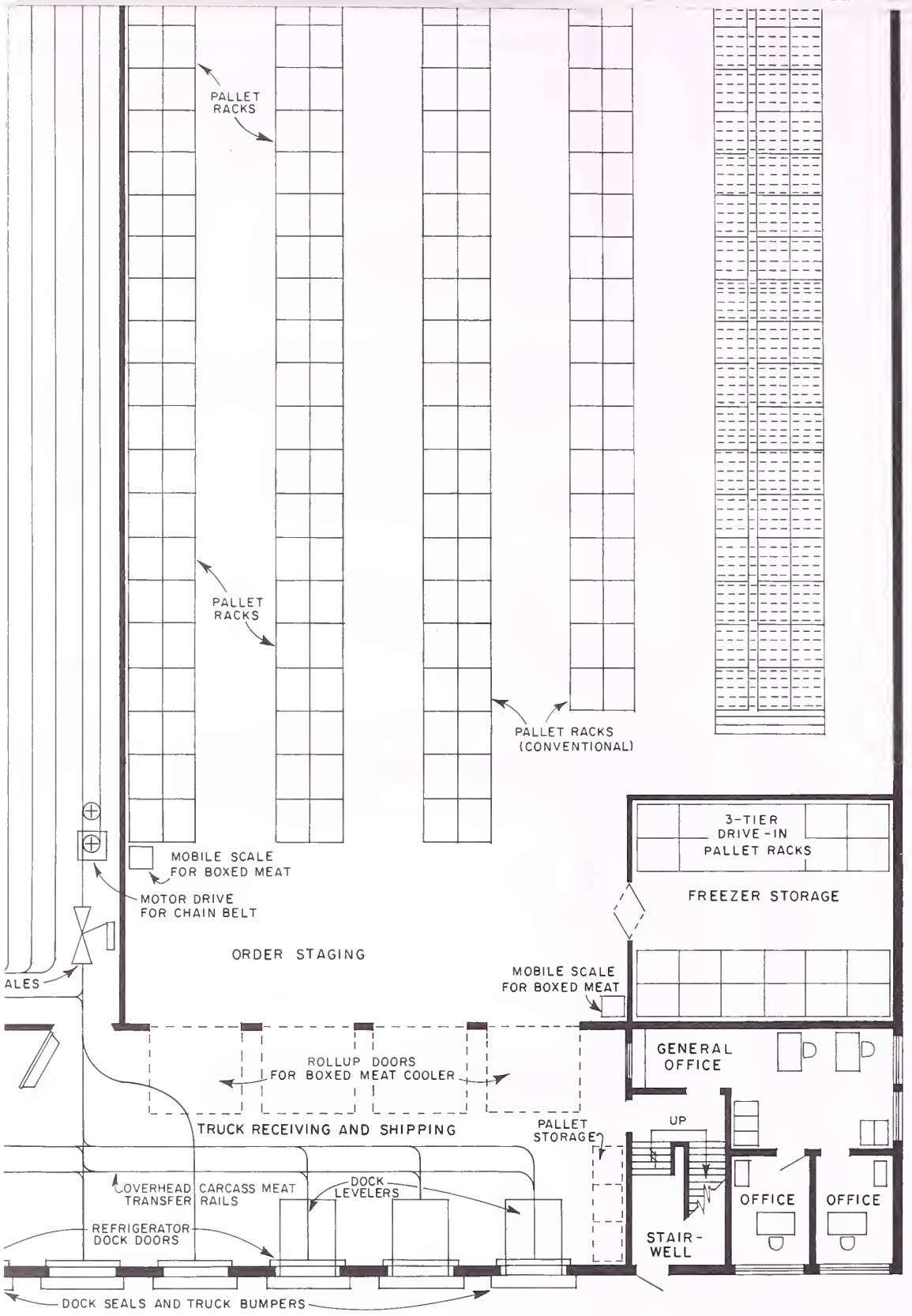
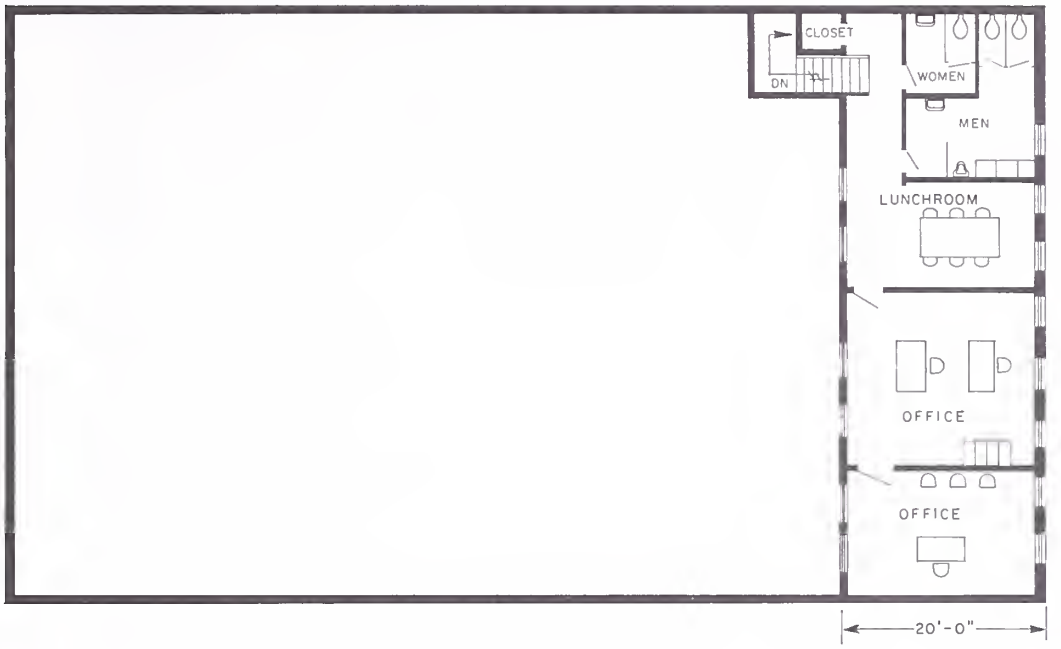


FIGURE 19.—Layout of meat and meat product firm in double multiple-occupancy building unit.

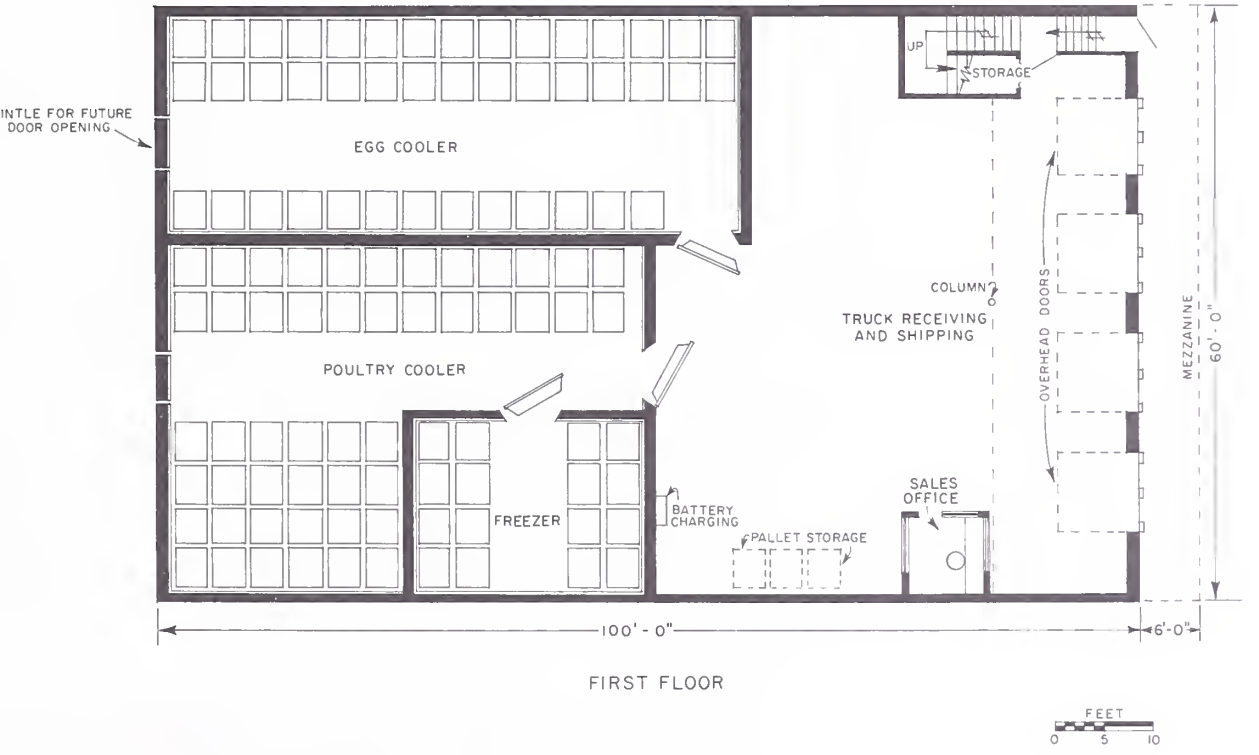


FIRST FLOOR

meat and meat product firm in single-occupancy building.

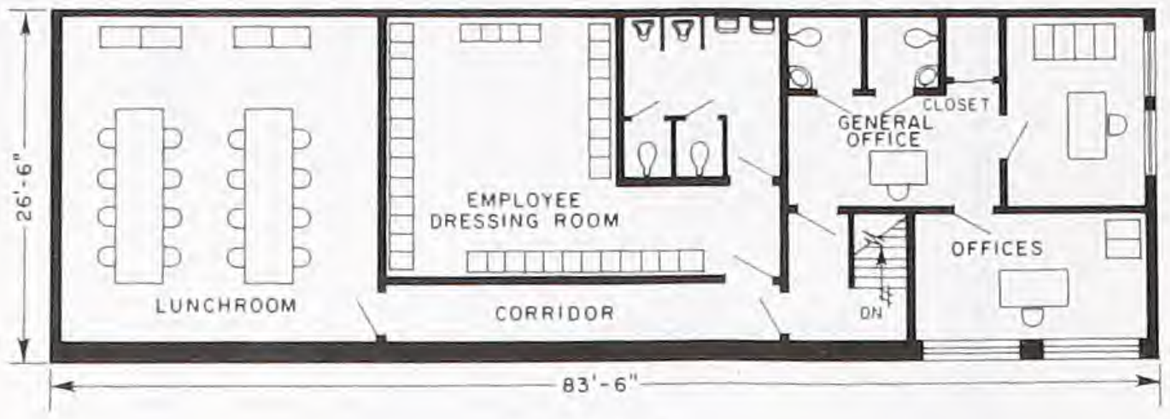


MEZZANINE

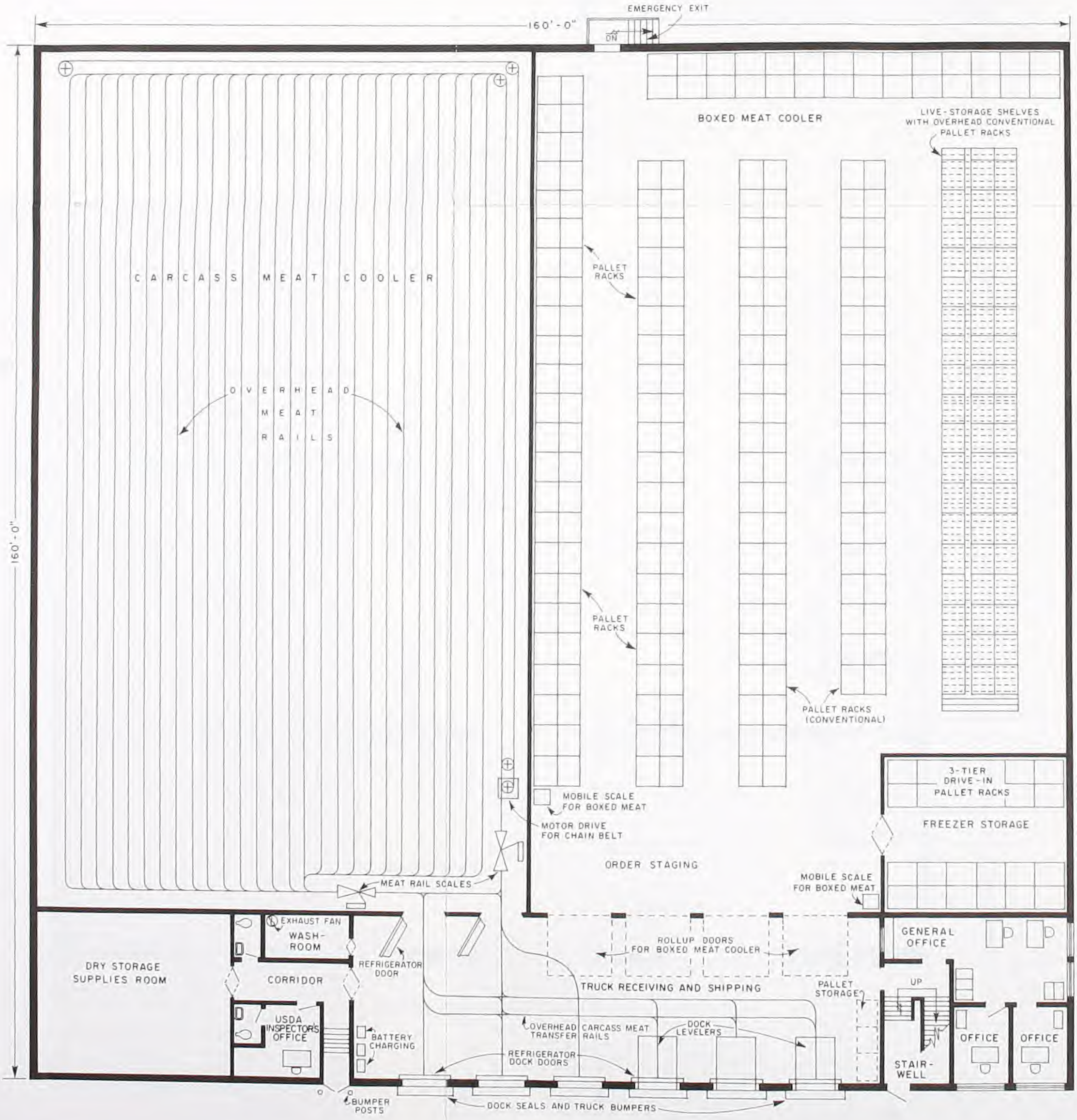


FIRST FLOOR

FIGURE 21.—Layout of poultry and egg firm in two multiple-occupancy building units.



MEZZANINE



FIRST FLOOR

FIGURE 20.—Layout of meat and meat product firm in single-occupancy building.

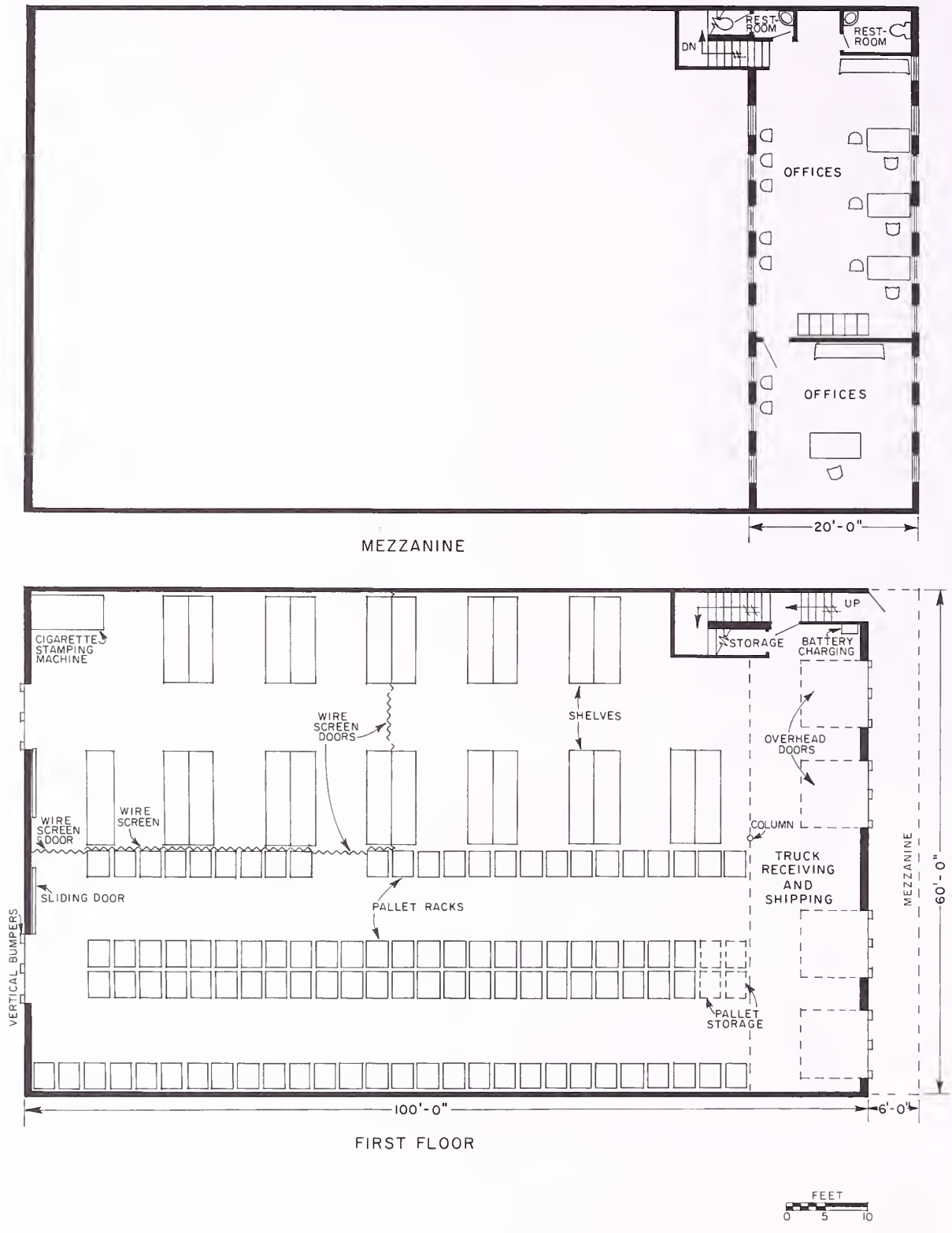


FIGURE 22.—Layout of food and food-related firm in two multiple-occupancy building units.

transportation should be considered for future planning. The Memphis international airport, designated by U.S. Customs as a "Port of Origin," has facilities for clearing import and export air shipments directly from and to foreign destinations. The river port of Memphis also provides excellent facilities and extremely favorable transportation rates for waterborne shipments.

Availability of Utilities

Availability of such public utilities as water, gas, electricity, and sewerage systems affects the suitability of a site. In rapidly expanding areas, some utilities may not be immediately available but may be planned. Utilities should provide commercial service and be readily accessible. Under certain conditions, the costs for extending utilities must be borne by the developer; under other conditions, the cost may be paid by the city or county as a public improvement.

Avoidance of Nonmarket Traffic

A site should be selected that will minimize the congestion caused by nonmarket traffic. A high volume of vehicular traffic is necessary for transporting food products to and from wholesale facilities, and traffic congestion is common at some locations. Vehicles not related to market business further complicate the traffic problem.

Convenience to Customers

Because of the importance of quick delivery, a food distribution center must be located where travel distance between wholesalers and their customers is minimized.

The population center of both the city of Memphis and Shelby County is approximately the same. In the past, these centers have moved eastward and indications are that the trend will continue. The present and proposed highway system for the area would make nearly any acceptable site adjacent to it convenient for a food distribution center.

Flood Conditions

Memphis is located on a series of bluffs overlooking the Mississippi River. The Wolf River on the north, the Nonconnah Creek on the south, and other smaller tributaries empty into the Mississippi River within the Memphis area. When the river reaches flood level, it backs up in its tributaries, creating flood conditions at many points along its banks. Although such measures as levees, dikes, dams, pumping, and dredging have alleviated some of the problems, flooding still represents a major problem in the greater Memphis area. Therefore, in evaluating a potential site, the likelihood of flood conditions must be considered.

Land Use and Zoning

The land use prior to purchase can be an important factor in selecting sites. Vacant areas with sufficient acreage to develop a food center are nearly impossible to find in the center of a city, and those in proximity to the center of population could involve impossible acquisition problems even with the use of eminent domain proceedings. As an alternative to costly urban areas where lengthy litigation proceedings could be involved, planners should consider areas where land use programs permit a food center development.

Zoning of sites considered should be such that surrounding properties do not detract from the center nor the center does not detract from surrounding properties. Zoning regulations for Memphis that may be applicable to a food distribution center include M-L or M-I. The designation would depend on the precise nature of the facilities.

The M-L zoning district includes "Planned Wholesale Distribution Parks" facilities. This zoning classification is preferred by the Planning Commission because it provides for more city control over the developers' usage of any proposed facility. The M-L designation provides for a system of site planning review that requires any developer to submit detailed plans to the Planning Commission for approval, or proposed changes and recommendations, or both.

Other Factors

The potential market to be served by the food center is another consideration in selecting a site. Memphis as the distribution center for the 105-county mid-South area is served by a vast new network of interstate highways, which have been completed or are under construction. This will make the time-distance distribution factor less expensive.

Figure 23 indicates the 105 counties that comprise the primary Memphis trade area.

The possibility of air pollution is another factor to consider in selecting a site. Noxious odors and air contaminants could affect food. Likewise, the environmental impact on an area should be considered.

Possible Sites

Several sites were suggested by various organizations and interested parties. Some were eliminated because of insufficient acreage, inadequate transportation access, or serious flooding problems.

Four acceptable representative sites were evaluated: Frayser, Airport, Frank C. Pidgeon Industrial Park, and Mullins Station Road. Figure 24 shows their location and table 16 summarizes important characteristics.

Frayser

This 382-acre site, which is comprised of several parcels of land with different owners, is within the north boundary of the city. The north end is subject to extensive spring flooding. The south end, although heavily wooded, would be most suitable for development as a food center. It would require some fill for low spots. Test borings would be necessary to determine the amount of piling required. On the west along Highway No. 51 N are several small commercial firms; a steel fabricating plant is on Millington Road, which intersects the site.

Rail service could be provided by the Illinois Central Railroad. Such utilities as water and sewerage are available.

The area is zoned M-I light industrial and would be desirable for serving the north section of the city; however, travel to the downtown or to the east could be difficult and time consuming. Nonmarket traffic would probably not be a problem.

It is estimated that this site could be acquired for about $480,000, which does not include piling or conditioning the land for building.

Airport

This site is directly adjacent to the Memphis International Airport within the city and is owned by the Memphis Airport Authority. It contains approximately 300 acres with additional acreage available for expansion. This rectangular site was formerly part of the Nonconnah flood plan. Piling will be required near the Nonconnah Creek; however, definite piling determinations cannot be made until test borings are completed.

Highway travel by interchange with I-240 provides excellent access for local and out-of-town buyers as well as distributors throughout the metropolitan area. Nonmarket traffic would probably not create any problem.

Rail service could be made available to the site by extending the Frisco Railroad Line, which serves the immediate vicinity. Gas, electric, water, and sewerage service would be available.

The area is zoned M-I light industrial and no existing land use conflict exists. The Memphis airport approach, which intersects the west end of the site, could present a problem because of noise or air pollution. Therefore, before any construction is planned, clearance would have to be obtained from the Federal Aeronautics Administration.

The acreage required for an initial food center would cost about $3.60 million. An alternative might be to develop a long-term lease with the airport authority to reduce the cost of acquisition.

Frank C. Pidgeon Industrial Park

This area contains about 4,000 acres in the southwest section of the city. A TVA power-generating plant on the site has high tension lines that bisect a part of it. Since the plant is equipped so that it meets State emission requirements, air pollution would not be a factor. A city waste-water treatment plant near the power plant at the north edge of the site would not create problems for a food center.

The area is flat, although some sections are low and would require fill. This location would require piling for construction of facilities. The amount of piling could only be determined after test borings are completed. Sufficient acreage for the proposed development could probably be assembled in this area.

The Illinois Central and Missouri Valley Railroads could serve the site from their tracks already in the vicinity. Electricity and gas would be available, and water and sewerage services would be provided by the city.

This area has inconvenient highway access, but with improvements, Mitchell Road, which passes through T. O. Fuller State Park, would be strategically located for buyers and sellers in the west and south parts of the city. Nonmarket traffic would probably not create a problem.

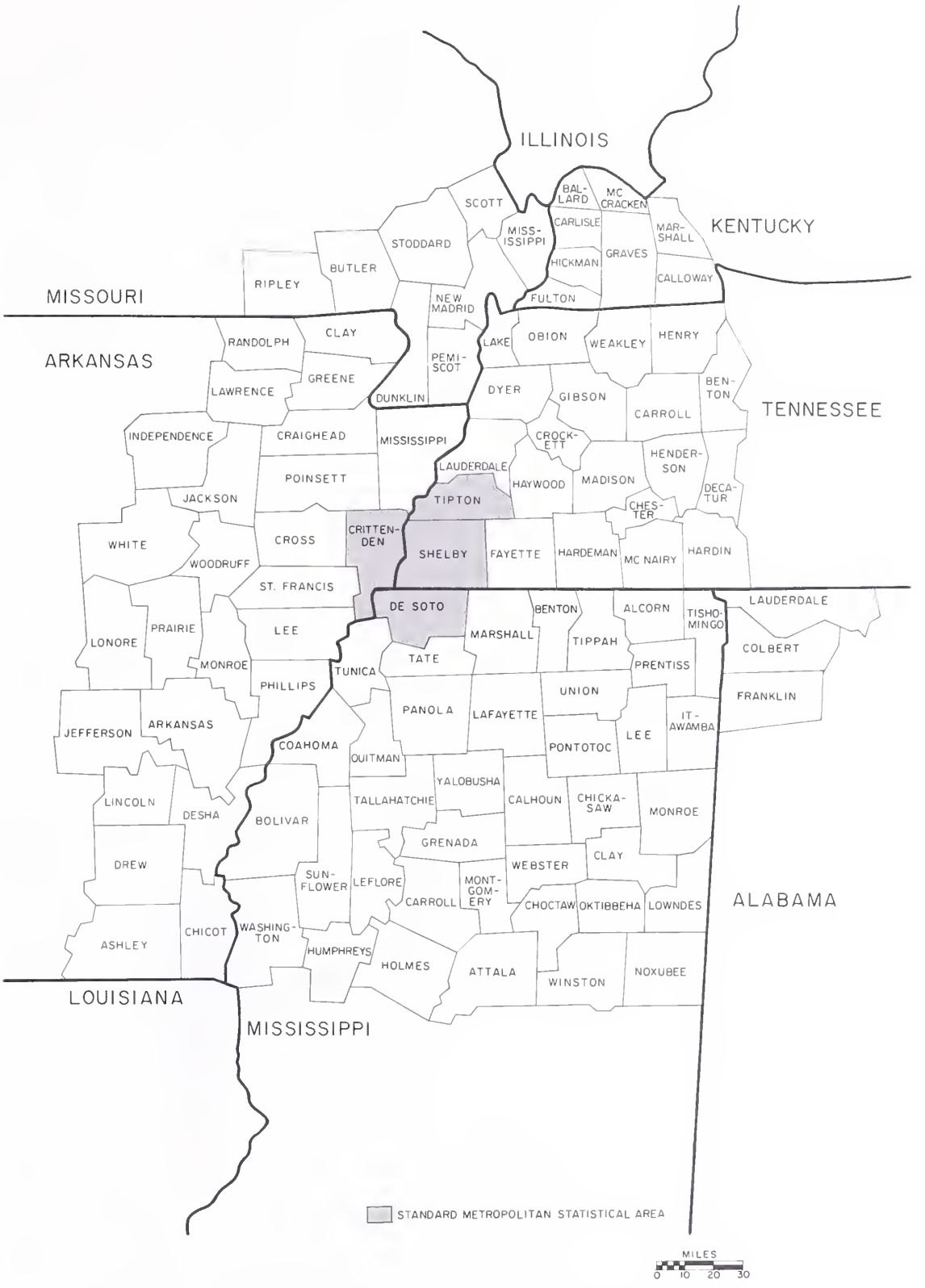


FIGURE 23.—Memphis trade area - 105 counties.

FIGURE 24.—Location of possible sites for a wholesale food distribution center.

TABLE 16.—*An appraisal of 4 possible sites for a wholesale food distribution center*

Site and boundaries	Acreage	Estimated acquisition cost per acre	Present land use	Description	Access to rail transportation	Access to highways
Frayser:						
North - Loosahatchie River	382	$4,000	Small business service status.	Heavily wooded, subject to flooding along river, low spots, rough and rolling.	Illinois Central Railroad.	Highway No. 51 N.
East - Illinois Central Railroad						
West - U.S. Highway No. 51 N						
South - Watkins Street						
Airport:						
North - Nonconnah Creek	300	30,000	Municipal storage	Fairly level with scattered trees, filled to 100-year flood level.	Extension of Frisco Line.	Via interchange with I-240.
East - Lamb Place						
West - Airways Boulevard						
South - Democrat Road						
Frank C. Pidgeon Industrial Park:						
North - Mitchell Road Extended	4,000	21,000	TVA power plant; waste-water treatment plant on site.	Flat open with some low sections protected by a levee.	Illinois Central and Missouri Valley Railroads.	Mitchell Road through T. O. Fuller State Park.
East - East Drainage Canal						
West - Mississippi River Levee						
South - North Horn Lake						
Mullins Station Road:						
North - Amberly Way	300	9,000	Some residential, mostly vacant.	Second-growth trees, knolls, and low places.	Louisville and Nashville Railroad.	Whitten Road to Interstate 40.
East - Raleigh-LaGrange Road						
West - Whitten Road						
South - Mullins Station Road						

This area is owned by the Memphis Port Authority. A lease arrangement to develop it might be possible. The acquisition price is estimated at $2.5 million.

Since this site is in a designated "Special Impact Area," it may be possible to acquire funding from the Economic Development Administration of the U.S. Department of Commerce under the Public Works and Economic Development Act of 1965 as amended. This act permits implementing essential improvements to selected areas of a city. Under this program, Memphis plans to make a concerted effort to preserve the area for commercial activity.

Mullins Station Road

This 300-acre site is in the general direction of population growth of the Memphis metropolitan area and is zoned R1A (residential), which requires a zoning reclassification if it is to be used as a food distribution center. Most areas to the west are developing as residential. The site is mostly flat with some second-growth trees.

Sewerage disposal and water already in the area would be adequate; other utilities for commercial use are not available.

The Louisville and Nashville Railroad runs along the south boundary and could provide rail service. Highway access is limited to Whitten Road, a two-lane highway about 2 miles from Interstate Highway 40 east and west. Access to this site could be difficult for buyers and sellers. Nonmarket traffic would not be a problem.

This site, which has only a few owners, could be acquired for about $1.10 million.

ESTIMATED FACILITY INVESTMENT COST

The initial investment in a wholesale food distribution center would include two major cost components—land and facilities. For the sites described, the actual land cost was estimated to vary between $4,000 and $30,000 per acre. Actual cost per acre of an individual site cannot be definitely established until actual purchase negotiations are completed. In this report, the cost for options on the acreage for future development has not been included. The estimated cost of about 120 acres for the initial development would vary between $4.8 thousand and $3.6 million.

These estimates are based on reviews of 1976 real estate transactions in Memphis and Shelby County, interviews with local real estate developers, and estimates by city officials familiar with land transactions. They do not include extending utilities, railroad tracks, and sewers or adding piling and related items where necessary.

The specific kind and amount of facilities planned for the initial project are based on the number of firms with an impending need to relocate and on their volume. The costs are based on indices of construction costs for Memphis.

The estimated costs for multiple- and single-occupancy facilities are for the shell building, including drainage, roughed-in plumbing, lighting, exterior and interior painting, and heating equipment. Costs for such items as mezzanines, coolers or freezers, and specialized equipment are not included. An estimate for coolers and freezers should be made at the time of preliminary planning so that provision can be made for installation in the floors.

Paving costs are for 6-inch gravel base and 3-inch asphaltic concrete. Where oil or gasoline drippings are commonplace, 6-inch concrete paving is recommended because of the detrimental effect of petroleum products on asphalt. Concrete paving is also needed in these areas to support disengaged trailers.

Costs for such items as common streets, railroad tracks, switches, storm and sanitary sewers, street lights, and fencing are prorated among all the firms in the center.

Service and loan fees, based on construction costs, are 5 percent for architects and engineering fees, 1 percent for soil-boring foundation analysis and survey, 12 percent for financing, legal, and administrative fees, and 10 percent for contingency allowance.

Construction costs are estimates and intended only to be used as a guide in planning facilities. They are not intended to replace estimates by local architects and contractors before initial construction commences.

TABLE 17.—*Investment required at 4 sites for proposed facilities of wholesale food firms with impending need to relocate, Memphis, Tenn.*

Type of facility	Facility costs	Land requirements	Land cost				Total investment [5]			
			Frayser [1]	Airport [2]	Frank Pidgeon [3]	Mullins Station Road [4]	Frayser	Airport	Frank Pidgeon	Mullins Station Road
		Acres								
Multiple occupancy	$3,192,068	33.31	$133,240	$999,300	$699,510	$299,790	$3,325,308	$4,191,368	$3,891,578	$3,491,858
Single occupancy	9,208,383	[6] 61.19	244,760	1,835,700	1,284,990	550,710	9,453,143	11,044,083	10,493,373	9,759,093
Farmers' market	388,715	11.68	46,720	350,400	245,280	105,120	435,435	739,115	633,995	493,835
Support	[7] 73,365	11.38	45,520	341,400	288,980	102,420	118,885	414,765	312,345	175,785
Total	12,862,531	117.56	470,240	3,526,800	2,468,760	1,058,040	13,332,771	16,389,331	15,331,291	13,920,571

[1] $4,000 per acre.
[2] $30,000 per acre.
[3] $21,000 per acre.
[4] $9,000 per acre.
[5] Includes land and facilities.
[6] Includes allocated share of common use land.
[7] Allocated share of site support costs.

Table 17 and the following tabular data are based on construction cost indices of February 1976. This table summarizes total anticipated investment in land and facilities.

Multiple-occupancy facilities:	
Buildings (4; 39 units, 30 by 100 ft, including restaurant, 30 by 100 ft)	$1,800,000
Other facilities:	
Paving and curbing	455,342
Railroad tracks and switches	138,430
Sewers (sanitary and storm)	93,996
Street lighting	6,075
Total facility costs	2,493,843
Other costs:	
Architectural and engineering fees [1]	124,642
Soil boring, foundation analyses, and surveys [2]	24,938
Financing, legal, and administrative fees [3]	299,261
Contingency allowance [4]	249,384
Total other costs	698,225
Total facility and other costs	3,192,068
Single-occupancy facilities:	
Buildings (2; 418,000 sq ft)	6,271,500
Other facilities:	
Paving and curbing	511,180
Railroad tracks and switches	205,815
Sewers (sanitary and storm)	200,379
Street lighting	5,175
Total facility costs	7,194,049
Other costs:	
Architectural and engineering fees [1]	359,703
Soil boring, foundation analyses, and surveys [2]	71,941
Financing, legal, and administrative fees [3]	863,286
Contingency allowance [4]	719,404
Total other costs	2,014,334
Total facility and other costs	9,208,383
Farmers' market facilities:	
Building (1 shed; 25,200 sq ft)	73,584
Other facilities:	
Paving and curbing	190,605
Sewers (sanitary and storm)	37,020
Street lighting	2,475
Total facility costs	303,684
Other costs:	
Architectural and engineering fees [1]	15,184
Soil boring, foundation analyses, and surveys [2]	3,037
Financing, legal, and administrative fees [3]	36,442
Contingency allowance [4]	30,368
Total other costs	85,031
Total facility and other costs	388,715

Support facilities:	
Building (none)	0
Other facilities:	
Paving	$25,006
Allocated share of railroad tracks and switches	6,930
Sewers (storm)	24,705
Street lighting	675
Total facility costs	57,316
Other costs:	
Architectural and engineering fees [1]	2,866
Soil boring, foundation analyses, and surveys [2]	$573
Financing, legal, and administrative fees [3]	6,878
Contingency allowance [4]	5,732
Total other costs	16,049
Total facility and other costs	73,365
Grand total facility and other costs	12,862,531

[1] 5 percent of total facility costs.
[2] 1 percent of total facility costs.
[3] 12 percent of total construction costs.
[4] 10 percent of total construction costs.

FINANCING A WHOLESALE FOOD DISTRIBUTION CENTER

The finest in overall market design and construction will not insure the success of a new food distribution center unless it is properly promoted and soundly managed.

Producers, processors, transportation companies, wholesalers, retailers, and consumers are concerned with the operation of the center. Investors, whether private or public, have a right to expect a reasonable rate of return on their investment and assurance that their interests will be protected. The center's governing body should be capable of looking after the interests of these groups.

Safeguards should be provided to prevent exploitation of the industry by the owners of the wholesale food distribution center because the market should function as a public facility. As the food center becomes a going concern, the reasons for precautions will become even more apparent.

Regardless of who may construct or finance the center, there should be definite assurances that—

(1) It will be properly located, designed, and equipped.

(2) Overbuilding will be prevented to assure maximum occupancy.

(3) Funds will be invested wisely to provide for real needs, so that increased efficiency will not be offset by high rent or ownership costs.

(4) Facilities will be used in the best interest of the industry and the public.

(5) It will be operated without discrimination against buyer, seller, mode of transportation, or origin of shipment.

There are several ways to finance and operate food distribution centers. Some of the more common methods are private corporations, public benefit corporations, direct public ownership, and various combinations of these methods.[8] In Memphis, two methods are proposed to develop the wholesale food distribution center—private and public corporations.

The wholesale food firms could apply for a charter as a private corporation. All common stock of such a corporation could be owned by the occupants of the facilities and be based on their investment. Such a corporation could encompass all food commodity groups. This corporation could act on its own or with a developer to buy or lease land and construct multiple- or single-occupancy facilities. By this method, the center would be owned and operated by the stockholders. The main problem with this type of development is that substantial financial equity would be required.

It would be possible to organize the center as a public nonprofit corporation. The city and/or county could participate jointly through an authority to act as the bond issuing authority. The authority could issue general obligation bonds to finance any publicly owned facilities at the center, while issuing tax exempt industrial revenue bonds for privately owned facilities.

The general obligation bonds[9] would require proof that the facilities were in the public interest and would be used functionally as public facilities. The State would have to pass an enabling act to make this phase of the development possible.

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[8] See Appendix I.

[9] These bonds would require using the full faith and credit of the city, county, or both and would present a full financial obligation of the city or county.

This would permit the authority to float bonds, condemn property, and have general operational power.

The city and/or county public authority would issue industrial revenue bonds to construct single-occupancy facilities in accordance with plans and specifications of a locating food industry and lease the facilities over a stated number of years. The annual lease payments would be an amount sufficient to cover debt service requirements of the bond issue. When all bonds are retired, the leasee could purchase the facilities at a previously agreed upon price and/or exercise lease renewal options specified in the lease agreement.[10]

ESTIMATED ANNUAL OPERATING COSTS AND REVENUE REQUIREMENTS

The annual revenue required to finance and operate the proposed initial facilities in the Memphis wholesale food distribution center will depend on the method of financing. For purposes of estimating revenue requirements, financing by a private and a public entity was assumed. This assumption is not intended to imply that either is the most desirable method but is used only as a basis for illustrating possible costs. The annual operating expenses and revenue requirements for actual facilities are discussed under various cost categories.

Debt Service

The initial wholesale food distribution center should be financed so that it will be self-sustaining. A major item that must be paid by a private corporation financing and operating such a center is debt service or mortgage payments. If the center is to be self-liquidating, the investment must be paid from food center revenue.

The proportion of the total investment that might be borrowed on a mortgage loan and the terms of the loan depend on the fluctuating money market and on the facilities to be financed. The facilities for the recommended initial development should be designed so that they will not become obsolete during the period of the loan and should be useful for a much longer period. The facilities proposed should be of durable construction and, with a few minor alterations, could be expanded or converted for use by several types of tenants.

Tables 18 and 19 show the debt service payments required for the proposed food distribution center, assuming either private or public financing. Regardless of the financing method, the debt service payments would include both amortization payment and a reserve. No equity capital participation was assumed in either method.

To calculate the amortization payment under private financing, an interest rate of 9½ percent annually over a 30-year period was assumed. It would be applied to the cost of both land and facilities.

Public financing required an amortization payment based on an interest rate of 5½ percent annually over a 30-year period applied only to the cost of the public facilities financed by general obligation bonds. Public facilities would include the multiple-occupancy buildings, the farmers' market, and the support facilities section. The land used for these public facilities would remain in the public domain.

A rate of 6½ percent annually would be applied to the individual privately owned single-occupancy facilities financed by industrial bonds. Land was assumed to remain under 6 percent annual charge based on initial cost and no recovery principle. The amortization payment for facilities and annual interest on the land would together comprise the total amortization payment by this method of financing.

If mortgage bonds are issued, purchasers might demand that annual income exceed annual expense and that a guarantee payment fund be created. The actual amount required would vary according to the money market, the financial rating of the issues, and the nature of the collateral offered. For this analysis, a reserve or contingency fund of 10 percent of the amortization payment per year was allowed. This fund might be discontinued after 1 full year's amortization payment has been accumulated.

The total debt service payment would vary depending on available financing. An annual debt service payment for private financing ranged from

[10] See Financing Industry in Memphis With Tax Exempt Bonds (Appendix I).

TABLE 18.—*Private financing annual debt service at 4 sites for proposed facilities required by wholesale food firms with impending need to relocate, Memphis, Tenn.*

Type of facility	Frayser			Airport			Frank Pidgeon			Mullins Station Road		
	Amortization payment [1]	Contingency [2]	Total	Amortization payment [1]	Contingency [2]	Total	Amortization payment [1]	Contingency [2]	Total	Amortization payment [1]	Contingency [2]	Total
Multiple occupancy	$338,117	$33,812	$371,929	$426,178	$42,618	$468,796	$395,696	$39,570	$435,266	$355,052	$35,505	$390,557
Single occupancy	961,196	96,119	1,057,315	1,122,962	112,295	1,235,257	1,066,965	106,696	1,173,661	992,304	99,230	1,091,534
Farmers' market	44,275	4,428	48,703	75,153	7,515	82,668	64,465	6,446	70,911	50,213	5,021	55,234
Support	12,088	1,209	13,297	42,173	4,217	46,390	31,759	3,176	34,935	17,874	1,787	19,661
Total	1,355,676	135,568	1,491,244	1,666,466	166,645	1,833,111	1,558,885	155,888	1,714,773	1,415,443	141,543	1,556,986

[1] Based on 9½ percent interest per year for 30 years and total investment in land and facilities (see table 17).

[2] 10 percent of amortization payment.

TABLE 19.—*Public financing annual debt service at 4 sites for proposed facilities required by wholesale food firms with impending need to relocate, Memphis, Tenn.*

Type of facility	Facilities [1]	Frayser			Airport			Frank Pidgeon			Mullins Station Road		
		Land [2]	Contingency [3]	Total	Land [2]	Contingency [3]	Total	Land [2]	Contingency [3]	Total	Land [2]	Contingency [3]	Total
Multiple occupancy	$219,646	0	$21,965	$241,611	0	$21,965	$241,611	0	$21,965	$241,611	0	$21,965	$241,611
Single occupancy	705,178	$15,909	72,109	793,196	$119,321	82,450	906,949	$83,525	78,870	867,573	$35,796	74,097	815,071
Farmers' market	26,747	0	2,675	29,422	0	2,675	29,422	0	2,675	29,422	0	2,675	29,422
Support	5,048	0	505	5,553	0	505	5,553	0	505	5,553	0	505	5,553
Total	956,619	15,909	97,254	1,069,782	119,321	107,595	1,183,535	83,525	104,015	1,144,159	35,796	99,242	1,091,657

[1] Amortization payments are based on interest at 5½ percent per year for multiuse section and 6½ percent per year for single-occupancy section for 30 years and total investment in facilities (see table 17). Amortization costs for facilities remain the same regardless of site.

[2] Based on an annual carrying charge of 6½ percent per year of total investment in land (see table 17). Carrying charges for land used by multiple occupancy, farmers' market, and support facilities anticipated to be borne by a public authority and not shown in this table.

[3] 10 percent of total annual cost for land and facilities.

about $1.49 million to $1.83 million and from about $1.07 million to $1.18 million for public financing of the center depending on the site selected for development (tables 18 and 19).

If the wholesale firms were to participate in the initial loan by providing equity capital, debt service payments could be reduced. To provide an estimate of the equity capital that could be made available, a study was made of the market value of the initial firms' present facilities. The indicated resale value of these facilities including land would be $1.50 million. If equity capital were provided by tenants in proportion to the relative cost of facilities, payments of dividends to stockholders might not be desirable because of tax liabilities.

Real Estate Taxes

One of the major expenses in operating the proposed wholesale food distribution center under private financing would be taxes on real property and improvements. In Memphis, the tax rate for 1976 was $30.06 per thousand of assessed valuation; in Shelby County, the rate was $40 per thousand of assessed valuation. The assessed valuation is based on 40 percent of the market value of land and facilities by State law. The long-range outlook is toward increased taxes through rate adjustment, upward revisions in valuation, or both. Therefore, a reserve or contingency allowance of 10 percent is included to allow for such increases. As may be seen in table 20, the estimated taxes to be paid annually by a private corporation for all property and improvements range from about $180,000 to $245,000.

The public financing methods used for developing a food distribution center for Memphis made no provision for payment of real estate taxes. However, a payment in lieu of taxes might be used. In this report, this avenue was not explored.

Management, Insurance, Maintenance, and Security

The operating expenses of the proposed center include expenditures for management, insurance, maintenance, and security of the multiple-occupancy buildings and the farmers' market. An additional expense would be required for insurance and maintenance for the entire center. Table 21

TABLE 20.—*Annual real estate taxes on 4 sites for proposed facilities required by wholesale food firms with impending need to relocate, Memphis, Tenn.* [1]

Type of facility	Frayser [2]			Airport [2]			Frank Pidgeon [2]			Mullins Station Road [3]		
	Tax	Contingency	Total	Tax	Contingency	Total	Tax	Contingency	Total	Tax	Contingency	Total
Multiple occupancy	$40,702	$4,070	$44,772	$51,302	$5,130	$56,432	$47,633	$4,763	$52,396	$55,870	$5,587	$61,457
Single occupancy	115,706	11,570	127,276	135,179	13,518	148,697	128,439	12,844	141,283	156,146	15,614	171,760
Farmers' market	5,330	533	5,863	9,047	905	9,952	7,760	776	8,536	7,901	790	8,691
Support	1,455	146	1,601	5,077	508	5,585	3,823	382	4,205	2,813	281	3,094
Total	163,193	16,319	179,512	200,605	20,061	220,666	187,655	18,765	206,420	222,730	22,272	245,002

[1] Assessed value is calculated at 40 percent of total investment (see table 17).
[2] Real estate tax is calculated at $30.06 per $100 of assessed value. Contingency is calculated at 10 percent of real estate tax.
[3] Real estate tax is calculated at $4 per $100 of assessed value. Contingency is calculated at 10 percent of real estate tax.

TABLE 21.—*Annual support costs for management, insurance, maintenance, and security of proposed facilities required by wholesale food firms with impending need to relocate, Memphis, Tenn.*

Type of facility	Management [1]	Insurance [2]	Maintenance and security [3]	Contingency [4]	Total
Multiple occupancy	$22,363	$6,084	$36,709	$6,516	$71,672
Single occupancy	[5] 0	21,198	105,896	12,710	139,804
Farmers' market	2,723	401	4,470	759	8,353
Support	514	0	844	136	1,494
Total	25,600	27,683	147,919	20,121	221,323

[1] Allocated on basis of facilities investment costs.

[2] See text for method of calculation. No insurance is allocated for support facilities as no buildings are immediately planned in this section of the market.

[3] Based on 1.15 percent of total facilities cost.

[4] 10 percent of total management, insurance, maintenance, and security costs.

[5] Single-occupancy facilities are assumed to be self-managing.

shows that the annual cost for these items would be about $221,323.

Management

The cost for management of the multiuse section was estimated as follows:

Manager	$10,000
Assistant manager	7,500
Secretary-clerk (part time)	4,000
Auditing and legal service	2,000
Office rental	1,200
Office supplies	400
Telephone and other communications	500
Total	25,600

The annual cost of $25,600 is prorated among the multiple-occupancy buildings and the farmers' market based on the square footage of facilities occupied. Management costs are flexible and depend on the need and services desired by the tenant firms. The single-occupancy section and the support facilities are assumed to be self-managing.

Insurance

The insurance rates were estimated by local underwriters of fire and liability insurance. The estimated fire insurance rates were based on the use of sprinkler systems, metal trash receptacles with metal lids, and central station supervision of the center or a watchman with an approved clock or an approved thermostat system. Fire and extended coverage are estimated to be $0.36 per $100 based on 80 percent of the value of the building. Liability insurance rates based on $300,000 bodily injury and $100,000 property damage would cost $0.75 per 100 square feet of building. The annual rate for this policy based on the number of square feet is approximately $27,700. These rates are not applicable to the property or contents of the individual tenants. They are for illustrative purposes only. Actual rates would be subject to negotiation when the center is insured.

Maintenance and Security

Maintenance costs included sanitation expenses such as street cleaning. Garbage and trash disposal would be the responsibility of the individual tenant. However, the center might wish to consider its own solid waste-disposal system as it reaches full development.

The annual cost of maintenance and security was calculated on the basis of 1.15 percent of the cost of buildings and facilities. This would provide for normal preventive maintenance, sanitation, and the cost of providing a private security agency for the entire center. These costs are estimated at about $147,919.

Total Annual Revenue Required

Tables 22 and 23 show the estimated total annual revenue needed assuming private and public financing at the various sites. Total annual revenue must cover debt service, real estate taxes (where applicable), and the cost of managing and maintaining the proposed initial food distribution

TABLE 22.—*Total annual revenue, assuming private financing, at 4 sites for proposed facilities required by wholesale food firms with impending need to relocate, Memphis, Tenn.* [1]

Type of facility	Frayser				Airport				Frank Pidgeon				Mullins Station Road			
	Debt service	Real estate taxes	Support costs	Total	Debt service	Real estate taxes	Support costs	Total	Debt service	Real estate taxes	Support costs	Total	Debt service	Real estate taxes	Support costs	Total
Multiple occupancy	$371,929	$44,772	$71,672	$488,373	$468,796	$56,432	$71,672	$596,900	$435,266	$52,396	$71,672	$559,334	$390,557	$61,457	$71,672	$523,686
Single occupancy	1,057,315	127,276	139,804	1,324,395	1,235,257	148,697	139,804	1,523,758	1,173,661	141,283	139,804	1,454,748	1,091,534	171,760	139,804	1,403,098
Farmers' market	48,703	5,863	8,353	62,919	82,668	9,952	8,353	100,973	70,911	8,536	8,353	87,800	55,234	8,691	8,353	72,278
Support	13,297	1,601	1,494	16,392	46,390	5,585	1,494	53,469	34,935	4,205	1,494	40,634	19,661	3,094	1,494	24,249
Total	1,491,244	179,512	221,323	1,892,079	1,833,111	220,666	221,323	2,275,100	1,714,773	206,420	221,323	2,142,516	1,556,986	245,002	221,323	2,023,311

[1] See tables 18, 20, and 21.

TABLE 23.—*Total annual revenue, assuming public financing, at 4 sites for proposed facilities required by wholesale food firms with impending need to relocate, Memphis, Tenn.* [1]

Type of facility	Frayser			Airport			Frank Pidgeon			Mullins Station Road		
	Debt service	Support costs	Total	Debt service	Support costs	Total	Debt service	Support costs	Total	Debt service	Support costs	Total
Multiple occupancy [2]	$241,611	$71,672	$313,283	$241,611	$71,672	$313,283	$241,611	$71,672	$313,283	$241,611	$71,672	$313,283
Single occupancy [2]	793,196	139,804	933,000	906,949	139,804	1,046,753	867,573	139,804	1,007,377	815,071	139,804	954,875
Farmers' market [2]	29,422	8,353	37,775	29,422	8,353	37,775	29,422	8,353	37,775	29,422	8,353	37,775
Support	5,553	1,494	7,047	5,553	1,494	7,047	5,553	1,494	7,047	5,553	1,494	7,047
Total	1,069,782	221,323	1,291,105	1,183,535	221,323	1,404,858	1,144,159	221,323	1,365,482	1,091,657	221,323	1,312,980

[1] See tables 19 and 21. No real estate taxes or payment in lieu of taxes are anticipated assuming public financing.

[2] Debt service charges are unaffected by site as it is assumed that land carrying charges would be borne by a public authority.

center. The total revenue required varies because of private or public financing. It ranges from about $1.29 million to $2.28 million depending on the site and method of financing.

The primary source of revenue for the proposed initial facilities, regardless of the financing method, would be from rents of all buildings. The rentals based on private financing and operation of the initial development could be considered as ownership costs and could be substantially reduced when the debt service for the facilities was completely paid. Assuming public financing, rentals would be expected to continue indefinitely at their present or higher levels.

SUMMARY OF BENEFITS

Implementation of the proposed wholesale food distribution center will solve many problems existing in the Memphis marketing system, such as inadequate facilities, lack of expansion space, traffic congestion, lack of adequate parking, and unsatisfactory accessibility to transportation arteries.

Other benefits could result. Producers, distributors, and consumers could expect less damage to products, which could be handled and maintained in the best possible manner. The amount of product handling could be reduced to a minimum by using modern handling equipment, and proper refrigeration could maintain product quality at a maximum level. Transportation companies could supply better service to a strategically located facility. A modern food distribution center could offer a desirable location for local food firms that are building new facilities and for new firms that move into the area. It could provide improved working conditions for employees and an improved environment for handling food. Such a center could be an efficient place for handling food in Memphis, both now and in the future.

APPENDIX I — DEVELOPING FOOD DISTRIBUTION CENTERS

Possible Financing Methods [1]

Private Corporation

The private corporation is a legal entity organized in conformity with State statutes and made up of individuals bound together for a common purpose or objective. The owners of this legal entity have complete control over operations, subject only to generalized legal restrictions.

A private corporation may be operated as either a profit-making or a nonprofit organization. When a private corporation is operated for profit, there are usually no restrictions on the sale of voting stock to any individual because of occupation or profession nor on the number of shares of voting stock that may be held by any one individual. Stockholders have one vote in corporate affairs for each share of voting stock held. A number of wholesale food markets are owned and operated by private corporations. In some, the principal stockholders in these corporations are the tenants. In others, the corporation is a railroad company or some other company organized for another type of business.

To form a private corporation, the incorporators formulate the articles of incorporation in compliance with State statutes and obtain State approval. This charter defines the powers of the corporation and of its officers and directors and states the corporation's purpose. It further specifies the stockholder's rights and how control shall be exercised.

Some of the characteristics of private corporations are as follows:

(1) The board of directors has power to make decisions quickly.

(2) State statutes place few restrictions on membership of a private corporation.

(3) Private corporations are usually financed by selling bonds and by issuing stock.

(4) The bylaws of a private corporation may be written so that the tenants who occupy the facilities while the investment is being amortized will

[1] CLOWES, H. G., ELLIOTT, W. H., and CROW, W. C. WHOLESALE FOOD MARKET FACILITIES, TYPES OF OWNERSHIP AND METHODS OF FINANCING. U.S. Dept. Agr. Mktg. Res. Rpt. 160, 96 pp., illus. 1957.

be able to recoup some of the rents and service charges paid during this period.

Wholesale food markets owned by private corporations tend to become so-called closed markets. Some have prohibited the delivery of food items brought in by truck, especially out-of-State trucks. Often private corporations do not provide space for expansion, either for increased volume of the occupants or for new food handlers and allied industries. The major problem of corporate ownership is that substantial financial equity is required. Private market sponsors have sometimes had more difficulty obtaining equity and preliminary organization funds than public market sponsors.

A nonprofit private corporation is not an agency of government, but it must be organized in conformity with existing State statutes. As a rule, State statutes place no limitations on participation in the corporation because of business or occupation. However, membership can usually be restricted or limited through bylaws. In a nonprofit private corporation, participation in corporate rights and activities is usually based either on a system of dues, which limits each member (stockholder) to one vote, or on bylaws, which restrict ownership of voting stock to one share per member. It is possible for those who are directly interested in the ownership and operation of a wholesale center to form a nonprofit private corporation to construct and operate the food center. An example of a nonprofit private corporation is the small business investment company set up under the U.S. Small Business Administration.

Congress in 1958 enacted the Small Business Investment Act, establishing a program to stimulate the flow of private equity capital and to permit long-term loans for the sound financing of the operations, growth, expansion, and modernization of small business concerns. Under this Act, the Small Business Administration is authorized to make loans to so-called State development companies or to local development companies, and to license, regulate, and give financial assistance to privately organized, privately financed companies called small business investment companies.

A development company is a profit or nonprofit enterprise incorporated under State law, with authority to promote and assist the growth and development of small businesses in specific areas. A State development company is a corporation organized under a special legislative act to operate statewide. A local development company is a corporation organized with a broad base of ownership under any applicable State laws to further the economic development of local communities.

The Small Business Administration is authorized to make loans to State and local development companies in exchange for obligations of the development company. It is also authorized to make loans for plant construction, conversion, or expansion and for the acquisition of land. Such loans may be made either directly or in cooperation with banks or other lending institutions. Certain rules and regulations have been set up defining eligible business categories and needed collateral.

Public Benefit Corporation

Public benefit corporations, sometimes called "market authorities," offer some desirable features not found in other types of ownership. They differ from nonprofit private corporations in that they are publicly owned.

A public benefit corporation is a nonprofit agency. Rentals and other charges do not exceed the amount needed to pay the costs of operation, amortize the original investment, and maintain a limited contingency fund. Under public ownership the revenues would be considered as public funds, and these funds could not be paid to lessees as dividends. However, there is a possibility that these funds might be appropriated for other public uses while bonds remain outstanding, unless such funds were specifically committed to redemption of bonds.

Public benefit corporations usually have the power of eminent domain, which can be useful in the acquisition of a site. Such corporations usually finance market improvements through the sale of revenue bonds. This type of financing normally is not a full obligation of a State or a political subdivision. These revenue bonds are often tax exempt; therefore, the interest cost is lower. A public agency, such as a market authority, is more likely than some types of private ownership to provide for future expansion and to work toward the establishment of a complete wholesale food distribution center. A market authority may or may not be required to pay taxes to the community in which it is located; the community may authorize a payment in lieu of taxes.

Market authorities have certain limitations, especially with respect to the financing and

management of facilities. They find that it is difficult to raise funds through revenue bonds unless considerable equity funds are provided in some way or the bonds are guaranteed by the city, county, or State. Some State or city governments have appropriated part of the funds needed for land acquisition and original construction. The continuity of management may depend on the continuance of a State or municipal government administration in office. As a whole, market authorities do not have as complete freedom of operation as is possible under private ownership.

Direct Public Ownership

Several wholesale food marketing facilities have been financed, constructed, and operated by States, counties, or municipalities. Several States and some municipalities have enabling legislation covering the improvement or establishment of markets.

Direct State ownership and operation usually can be differentiated from ownership and operation by a State market authority by the methods of financing used and the delegation of authority made by the State legislature. Although some States have appropriated funds and otherwise assisted market authorities with financial problems, they do not usually underwrite the total cost of a market constructed by an authority, nor have the States always assumed responsibility for the operation of these markets.

Under direct State ownership, a market facility is financed in whole or in part by an appropriation of State funds. If the financing is not entirely by this method, the State usually is obligated for the remainder unless this balance is obtained through grants or donations. Also, the State is responsible for maintenance and other expense involved in the operation of a State-owned market.

States may finance, construct, and operate wholesale food market facilities because legislative bodies believe that improved facilities will in themselves serve the public interest.

Municipal ownership of a wholesale food market is comparable in many of its basic aspects to direct State ownership. Some municipalities are authorized in their charters to construct and operate food markets. Some city councils or commissions are authorized to make appropriations from general funds in the city treasury for the construction of market facilities on a basis comparable to that of a State legislative body. Three methods are usually open to municipalities for financing a market program: (1) Issuance of municipal bonds, (2) issuance of revenue warrants, and (3) loans from public corporations. In most cities the issuance of bonds for such purposes must be approved by a majority of the qualified electorate voting in referendum.

Facilities constructed with municipal or county funds would not necessarily be owned by the county or municipality, and rent would have to be paid by the tenants indefinitely.

Examples of Food Distribution Center Development

Various combinations are possible for developing a complete wholesale food distribution center. Many that have been developed are not completely built either by public or private agencies. A review of the various combinations used for financing food distribution centers on the eastern seaboard megalopolis can best illustrate several possible methods.

The New England Produce Center, Inc., the Boston Market Terminal, Inc., and the Boston Food Center were constructed in the Boston metropolitan area by private corporations. The facilities are entirely owned and operated by the individual participating food firms. To finance these markets, equity funds were provided by the stockholders on the basis of individual participation. The major sources of financing were from local banks, insurance companies, and the Small Business Administration.

A food distribution center at Hunts Point, N.Y., is owned by the city and makes leases to the tenants in the fruit and vegetable section of the market and to operators in single-occupancy buildings. Other sections of the market have been built by the city but leased to corporations consisting of groups of merchants. The city manages and maintains the center, which was financed through general obligation bonds.

A food distribution center was built in Philadelphia by a nonprofit corporation on land owned and put into condition for building by the city. The city subordinated its interest in the land so that the land could be used as equity in borrowing money for building construction. Where the multiple-occupancy buildings were constructed, the development company leased the units to operating stock

companies formed by the prospective tenants. At the end of 30 years all buildings will become the property of the city except those built on the parcels of land sold by the developing company with city approval for construction of single-occupancy buildings.

The Maryland Food Distribution Center at Jessup, Md., represents still another method of developing a center. The State of Maryland created an authority that acquired the almost 400-acre site and placed it in condition to build. The acreage has subsequently been divided into various sized sites that have been purchased by individual firms. One site has been developed by the authority and the units in the multiple-occupancy buildings have been leased to the individual tenants. This section of the center is managed and operated by the authority. The entire center development was initially financed through funding provided by general obligation bonds.

Financing Industry in Memphis With Tax Exempt Bonds

Industrial Revenue Bonds

Industrial revenue bonds are securities issued by either a county or a city for the purpose of purchasing land and constructing and equipping manufacturing and/or distribution facilities for lease to responsible companies. Principal and interest on the bonds are paid solely from the lease rental payment of the lessee company. There is no profit to the issuing agency. The rentals are the exact amounts necessary to pay debt service on the bonds. It is necessary that the lessee has sufficient financial standing to assure prompt payment of rentals over the life of the bond issue.

Tax-Free Industrial Revenue Financing for Industry in Tennessee

Tax-free industrial bond financing provides 100 percent financing of land, building, and equipment, as well as the development and financing costs of the project. The cost of this capital is less than if other financing methods are used because the interest received from industrial revenue bonds is exempt from Federal and State of Tennessee taxes. This form of financing normally will not conflict with restrictions on any outstanding corporate debt agreements. It can be accomplished without disturbing the national market for traditional corporate debt issued or to be issued by the company.

The repayment schedule for these bonds may be tailored to suit the needs of the lessee company. It may be level debt service or some variation, including balloon, serial, and term bonds. Generally the shorter the maturity schedule the lower the total interest cost. A 20-year maturity is considered standard in this form of financing. This method of financing involves no Federal regulatory agencies and usually can be accomplished in approximately 60 days with minimum staff commitment by the lessee company.

The lessee company may take normal depreciation, expense, interest, and applicable investment tax credit.

The land, building, machinery, and equipment comprising the project are exempt from ad valorem taxes as long as title remains with the issuing agency.

Size of Project

Two Federal statutes place limits on the issuance of industrial revenue bonds. These are usually referred to as the "One Million Dollar Act" and "Five Million Dollar Act."

Under the "One Million Dollar Act," industrial revenue bonds may be issued for any one lessee company in any one city or county in an amount not to exceed $1 million. The lessee company must not be the principal user of any other facility within the political subdivision that was financed with industrial bonds subsequent to May 1, 1968.

Bonds may also be issued under the "Five Million Dollar Act" with certain restrictions. The basic difference between the two acts is the 6-year capital expenditure test applicable to the "Five Million Dollar Act." The 6-year period is divided into a period of 3 years prior to the conclusion of the bond issue and 3 years after the conclusion of the bond issue. Total capital expenditures under the Act are limited to $5 million by any one company during the 6-year period mentioned in the legislation. All capital expenditures that are made for facilities of a depreciable nature and principally used by the lessee company are considered in determining the $5 million limit. When a violation occurs, the bonds become taxable as of the date of the violation. Since the lessee company has sole control over these capital expenditures, the under-

lying documents must contain automatic mandatory redemption provisions in the event of a violation.

Exemption From Registration With Securities and Exchange Commission

Industrial revenue bonds are exempt from the Securities Acts of 1933 and 1934, and the 1939 Trust Indenture Act. Therefore, the usually costly registration with the SEC is not necessary. No registration or approval is required from any State of Tennessee agency.

Repayment of the Loan

The repayment schedule may be tailored to fit the company's financial structure. A 20-year repayment schedule is something of an industry standard. Generally the bonds are not callable for the first 10 years, except in the case of damage or destruction of the property or condemnation. Provisions for such events are written into the lease, as is the price at which the bond issue may be redeemed after the expiration of the noncallable period.

Procedures

The following are the steps to be taken in the issuance of the bonds: (1) Execution of an interim agreement of intent if money is to be spent on the project before the bonds are underwritten; (2) execution of the underwriting agreement between the issuing agency and investment banker, with the concurrence of the lessee company; (3) preparation and approval by all parties of the lease agreement and the mortgage and trust indenture; (4) approving resolutions by the issuing body and by the lessee company; and (5) execution of all documents incident to the transaction and the delivery of bonds with payment by the investment banker.

Interest Rates and Bond Prices

Pricing of the issue involves the determination of an interest rate acceptable in the market and to the lessee company. Factors affecting the rate include the credit standing of the lessee, the supply of tax-free industrial bonds presently on the market, the prevailing money market conditions, and the length and type of maturity schedule. When the lessee company and the underwriter have agreed on the purchase price and coupon rate, the bonds are then underwritten by contract between the investment banker and the issuing body.

Official Statement

The underwriter prepares an official statement to be distributed to prospective bond purchasers. The official statement will describe the bond issue in detail, including the project, purpose, legal authority, redemption provisions, security, rental payments, application of the bond proceeds, and various highlights of the lease and trust indenture. The official statement will set forth the financial statement of the lessee company and make other disclosures concerning the business of the lessee.

APPENDIX II — METHODOLOGY FOR 2000 A.D. PROJECTIONS

Population Considerations

The Memphis Standard Metropolitan Statistical Area (SMSA) in 1973 was defined by the U.S. Bureau of the Census to include Shelby and Tipton Counties in Tennessee, Crittenden County, Ark., and De Soto County, Miss. Eighty-six percent of the SMSA population resided in Shelby County in 1973. Therefore, the projections regarding future food volumes handled by Memphis wholesalers were based on the estimated population growth of Shelby County.

Three projections of the future population of Shelby County are presented in figure 25. The lower projection (*A*) estimated the Shelby County population at 801,147 in 1980 and 911,782 in 1990 and the higher projection (*B*) at 842,000 in 1980 and 947,000 in 1990.

Both projections were extended to the year 2000 by assuming an 11.4-percent growth rate over the 10-year period, an intentionally conservative specification when compared with the 13.8-percent (*A*) and 15.7-percent (*B*) increase projected for the previous 10 years, as shown in figure 25. Based on this assumed growth rate, projection *A* would equal 1,015,725 and projection *B* 1,085,036 in 2000.

In the projections of future food volumes handled by Memphis wholesalers, the population com-

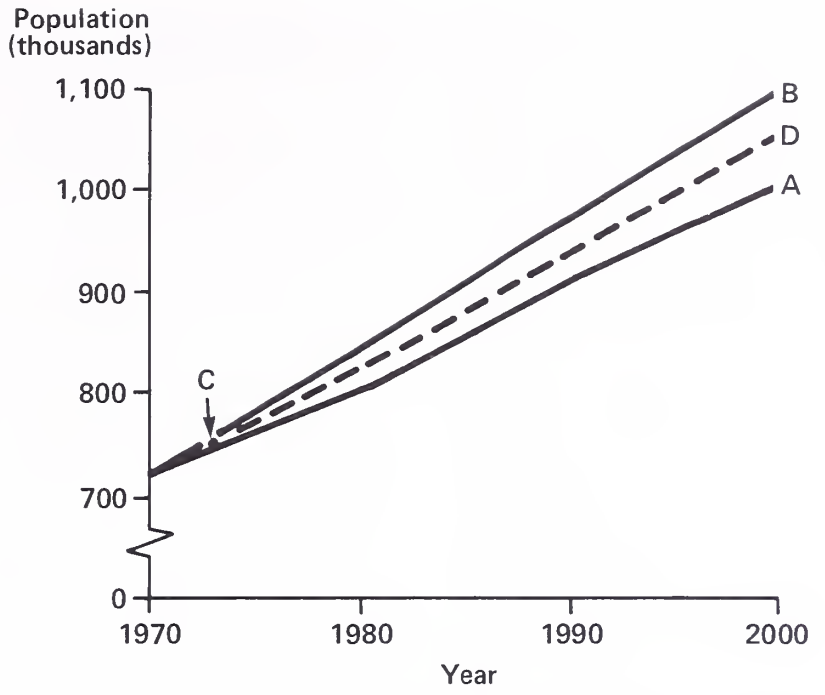

FIGURE 25.—Population projections of Shelby County, Tenn.: *A*, Projection to 1990 from Engels, Richard, and Moore, Annie, "Tennessee Migration, Population, Families, Income, and Manpower Demand Projections to 1990 for Development Districts and Counties," Tenn. State Planning Off., Nashville, July 1974; *B*, projection to 1990 from Bur. of Econ. Res., Memphis State Univ., "The Economic Base of the Mississippi-Arkansas-Tennessee Council of Governments/Memphis Delta Development District Area," Miss.-Ark.-Tenn. Council Govts., Memphis, Tenn., July 1974; *C*, Shelby County population in 1973, according to U.S. Bureau of the Census; *D*, average growth rate. (Note: Population growth from 1990 to 2000 specified at 11.4 percent for both projections.)

ponent used in these estimates was specified as the average of these two projections. Thus, the 1980, 1990, and 2000 population projections for Shelby County used in this study were 821,574, 942,891, and 1,050,381 respectively. This average growth rate was represented by the broken line in figure 25. The 1973 population of Shelby County was 750,314 (fig. 25, *C*).

Wholesale Food Firm Expansion Considerations

The business expansion of each food wholesale firm will depend substantially on its managerial ability and the adequacy of its physical plant. Naturally numerous other factors affect each firm's competitive position such as long-run trends (1) in wholesaling activity in each food category, (2) in cost and location of production, and (3) in consumer demand for particular foods, as well as competition from other wholesale firms. However, the emphasis here centers around the firm's operation cost and the effect it can have on its competitive position and, hence, expansion capabilities. If a firm can reduce its operating cost, then its competitive position will be enhanced and it will be in a better position to increase the volume of food products handled. Thus, the future volume of food to be handled by Memphis wholesale food firms is partially dependent on operational efficiency as well as population growth.

Food Demand Considerations

The consumption of particular food items in the American diet is continually changing. Although total annual consumption of all foods on a per capita retail-weight basis has remained fairly stable—1,450 pounds in 1959 and 1,435 pounds in 1973—the per capita consumption of certain food groups has changed substantially. These changes have significantly affected the demand for selected

food groups since 1959 and have correspondingly affected food wholesaling.

Food commodities were arranged in six categories in this report (fresh fruits and vegetables, grocery and frozen foods, meat and meat products, poultry and eggs, dairy products, and other food and food-related products). In order to enter the demand component into the long-range projection of food commodity wholesaling in Memphis, it was necessary to estimate the long-run trend in per capita consumption of these six food categories by using regression analysis.

Indices of per capita consumption in the United States of major food groups from 1959 through 1973 were regressed on a single variable time.[2] The resulting linear trend lines are shown in table 24. Here time was used as a proxy variable for consumption, habits, tastes, preferences, education, and nutrition, which were all inherently included in the time variable. In other words, all the economic and social-psychological factors conceived as affecting the demand for particular food groups over the long run were adequately represented by these secular trends based on statistical index numbers. This is a fairly strong assumption but one that is defensible considering the level of aggregation.

Since the 6 food categories (poultry and eggs combined) as specified in this study do not exactly match the 12 food groups for which consumption data were available, it was necessary to develop a procedure for combining food groups into the 7 major food categories as shown in table 24. This aggregation was accomplished by calculating an adjustment factor for each food group (table 24) equal to its percentage of the total retail weight equivalent of the appropriate food category. As an example, the 1973 retail weight equivalent of fresh fruits equals 24 percent of the sum of the retail weight equivalents of the food groups fresh fruits, fresh vegetables, and potatoes comprising the category fresh fruits and vegetables.

Projected indices calculated for 1980, 1990, and 2000 are shown in table 25. Each trend line value of a food group was multiplied by its adjustment factor (table 24), and the sum of the products is shown in table 25 as the projected index for the approximate food category.

Present (1973) and projected (1980, 1990, and 2000) annual volumes of the Memphis food wholesalers included in this study are shown in table 14. Projected volumes were calculated by multiplying a ratio of the projected and the 1973 Shelby County population (fig. 25), a ratio of the projected and actual index of consumption (table 25), and the 1973 volume.

Overall, food consumption in Memphis is expected to increase over 60 percent between 1973 and 2000. Increases in volume for different types of firms were affected by their particular mix of individual products and ranged from a low of 19 percent for dairy firms to a high of 113 percent for poultry and egg firms.

Four of the twelve food groups in table 24 exhibited a negative or declining consumption trend over the time period analyzed. Fresh fruits and fresh vegetables both had declining per capita consumption during the recent past, whereas processed fruit and vegetable consumption increased. However, the projected weighted indices for fresh fruits and vegetables (table 25), which contain fresh fruit and vegetable consumption, resulted in a moderate index increase from 1.027 in 1973 to 1.167 in 2000. This slight increase was caused by the increasing per capita consumption trend of potatoes, the third food item in the fresh fruit and vegetable category.

Eggs and dairy products were the only categories that resulted in a declining per capita demand projection. For dairy products in 1973 the per capita retail weight equivalent was 354 pounds. If the trend evident since 1959 continues through 2000, the index will be 0.833 (table 25) and per capita consumption will be 296 pounds.

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[2] U.S. DEPARTMENT OF AGRICULTURE. AGRICULTURAL STATISTICS 1974. 619 pp. Washington, D.C. 1974.

TABLE 24.—*Coefficients of linear trend lines and adjustment factors used to project future demand for selected food groups in the United States*
[1967 = 100]

Food category and group (dependent variable) [1]	Intercept [2]	Time coefficient	r^2	Adjustment factor [3]
				Percent
Fresh fruits and vegetables:				
Fresh fruits	1.091	-0.0102	0.50	24
Fresh vegetables	1.048	-.0052	.69	44
Potatoes	.721	.0307	.97	32
				100
Grocery and frozen foods:				
Processed fruits	.871	.0117	.56	6
Processed vegetables	.800	.0208	.98	7
Crop products	.941	.0068	.88	87
				100
Meat and meat products:				
Meat	.902	.0099	.71	91
Fish	.944	.0104	.62	9
				100
Poultry:				
Poultry	.707	.0288	.96	100
Eggs:				
Eggs	1.049	-.0075	.67	100
Dairy products:				
Dairy products	1.068	-.0056	.91	100
Other food and food-related products:				
All foods	.945	.0060	.88	100

[1] Food *category*, or main stub entry, as specified in this study, except poultry and eggs combined; food *group*, or subentry, as reported in U.S. Dept. Agr., "Agricultural Statistics 1974," p. 561.

[2] 1959 is year 1 and 1973 year 15; intercept equivalent to index at year 0.

[3] Proportions of total retail weight equivalent of food group in approximate category. Based on 1973 per capita consumption ("Agricultural Statistics 1974," p. 562).

TABLE 25.—*Projected indices of future consumption of 7 specified food categories* [1]
[1967 = 100]

Food category	Actual weighted index for 1973	Predicted weighted index for—			
		1973	1980	1990	2000
Fresh fruits and vegetables	1.027	1.030	1.066	1.117	1.167
Grocery and frozen foods	1.059	1.048	1.105	1.187	1.266
Meat and meat products	.995	1.055	1.125	1.224	1.323
Poultry	1.091	1.139	1.341	1.629	1.917
Eggs	.905	.937	.884	.809	.734
Dairy products	.997	.984	.945	.889	.833
Other food and food-related products	1.020	1.035	1.077	1.137	1.197

[1] From U.S. Dept. Agr., "Agricultural Statistics 1974."

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