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Number 1140

# Improved Food Distribution Facilities for Central North Carolina





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# Improved Food Distribution Facilities for Central North Carolina



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# Improved Food Distribution Facilities for Central North Carolina

By Richard K. Overheim, James N. Morris, Jr., John F. Freshwater, Errol R. Bragg, Clarence E. Harris, H. Ronald Smalley, and Charles F. Stewart <sup>1</sup>

## Summary

This study identifies numbers and kinds of new wholesale food distribution and farmers' market facilities required to promote efficient distribution of food in central North Carolina. Attention is directed to an 11-county wholesale food distribution study area and a 24-county farmers' market study area.

A wide variety of wholesale food firms presently handle the food distributed within central North Carolina. A total of 175 wholesale food firms move their products through facilities totaling almost 5 million square feet. These firms are grouped into nine food groups, (1) fruits and vegetables, (2) meat and related products, (3) poultry and eggs, (4) groceries, (5) bakery products, (6) dairy products, (7) beverages, (8) grain mill products, and (9) other foods.

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<sup>1</sup> Richard K. Overheim, project leader, farmers' market, fruit and vegetables; James N. Morris, Jr., industrial engineer, grocery, bakery, and engineering services; John F. Freshwater, industrial engineer, engineering services; Errol R. Bragg, marketing specialist, farmers' market, beverages, grain mill products, and other foods; Clarence E. Harris, marketing specialist, poultry and eggs; H. Ronald Smalley, marketing specialist, meat and related products; and Charles F. Stewart, marketing specialist, dairy products. Edmond S. Covey and Thomas W. Weber, Jr., MFB, assisted in the collection and processing of the data in this study. All are with the Agricultural Marketing Service, U.S. Department of Agriculture.

Substantial quantities of food products move through wholesale facilities included in this study. About 2½ million tons of food valued at \$2 billion is handled each year at identified wholesale facilities in central North Carolina.

Two farmers' market facilities, the Raleigh State Farmer's Market and the Old City Market in Raleigh, also service the central North Carolina area. Of the two markets, the Raleigh State Farmer's Market is the dominant center with over 138,000 square feet of first-floor operating space. The Old City Market, once a significant center of retail and wholesale activity, is now of relatively minor importance in the marketing of food when compared with the Raleigh State Farmer's Market and is declining still further in significance.

The Raleigh State Farmer's Market handles more than 15,000 tons of in-State and out-of-State produce annually, of which approximately 28 percent is locally produced. Nearly 17,000 vehicles per week enter the market during the peak of the harvest season. Of these users, 98 percent reside within the State. A fourth of the total weekly traffic enters the market on Saturday. Wake and Johnston Counties are the origin of approximately 50 percent of the market users. More than a third of the consumers spend \$5 to \$9.99 per visit to the market.

There is an immediate need for new wholesale and farmers' market facilities to serve central North Carolina. Twenty-nine wholesale food firms, or 17 percent of the total number of such firms included within the scope of this study, need new facilities. Many of these firms presently are operating in antiquated, inefficient facilities. Other firms expressed a need for new facilities because they are dissatisfied with their present location or because they do not have sufficient opportunities for expansion. Of the two farmers' markets included in the scope of this study, the Raleigh State Farmer's Market would benefit from relocation due to the age, location, and design of that market's existing facilities. The small size and limited scope of operation at the Old City Market limit potential benefits from relocating this second farmers' market.

A new wholesale food distribution center and farmers' market would alleviate many of the problems being experienced in the central North Carolina area and provide expansion opportunities to meet the food distribu-



## Introduction

tion needs of the area for many years to come. A center has been designed that would provide an initial 198,000 square feet of wholesale space with provision for future expansion to over 265,000 square feet. This center, when fully developed, will include two multiple-occupancy buildings and seven single-occupancy buildings. It would contain three farmers' market buildings, a truckers' buildings, a retail building, and a garden center. The farmers' market buildings are designed to provide an initial 38,000 square feet which would be expandable in later stages of the food center development to more than 57,000 square feet. In addition, an initial 16,200 square feet of support facilities are incorporated into the new center. These facilities also are designed for expansion to over 20,000 square feet. A total site of approximately 75 acres, including land for imminent market expansion, would be required for the complete development of the initial center. Still additional land also would be required to accommodate more new firms locating on the center in future years.

Total revenue requirements to support the project would vary from a low of \$1.8 million annually, assuming a Nash County location and public financing, to a high of \$2.7 million, assuming a Wake County location and private financing.

Location has a major impact on the relative levels of potential benefits of the proposed center. A comparative analysis of present costs of wholesale firms and equivalent estimated costs of the same firms operating on the proposed center indicates such costs on a new center would be lower, assuming various financing alternatives, at a site in Wake County. Costs in new facilities are higher, assuming the center is located on sites in Harnett, Johnston, or Nash Counties.

Other benefits may accrue from the construction and use of the proposed wholesale food distribution center and farmers' market for central North Carolina. Growers in the region would benefit from expanded demand for their products. Wholesale firms would have additional incentive not only to improve their efficiency of operation but also to improve the quality and variety of products moving through a new facility. Most important, the consuming public would benefit through improved performance of the local wholesaling industry in terms of the quality, price, and availability of foods that can be expected to move through the new facilities.

This study was undertaken at the request of the North Carolina State Department of Agriculture, the Raleigh Produce Dealers Association, and food industry representatives. The request stemmed from or reflected a realization that improvements are required in existing distribution facilities for the wholesale food firms located in the counties surrounding Raleigh and for farmers, wholesalers, and other allied firms now located on the Raleigh State Farmer's Market.

The study includes both the wholesale food distribution system serving central North Carolina and the growers and users of the Raleigh State Farmer's Market. An 11-county study area is defined for the wholesale food distribution portion of the study. This portion covers 175 wholesale food firms located throughout the study area. The study area defined for the farmers' market includes approximately 1,700 farmers in 24 counties. Both wholesale and grower study areas are shown in figure 1.

The objectives of this report are to:

- Analyze the wholesale food and farmers' market operations in central North Carolina and identify facilities that should be replaced.
- Determine the kinds and numbers of facilities required and the amount of land needed to provide for the development of a wholesale food distribution center and farmers' market to serve the region.
- Estimate the costs and potential benefits associated with the construction of a wholesale food distribution center and farmers' market.

Information in this report is based on material from mail surveys and interviews. Farmers' market data is summarized from a survey of growers and identified users of the Raleigh State Farmer's Market during a 3-year sample period. Customer information concerning the farmers' market reflects a random selection and subsequent interview. All information obtained from wholesalers was through personal interviews with company management and associated personnel.

## Marketing Facilities in Central North Carolina

The two types of facilities included in the scope of this report, wholesale buildings and farmers' markets, share some common features but also exhibit many differences in design and patterns of use. Both types of facilities are designed for the storage and distribution of food products. Wholesale facilities are commonly located on separate sites. These facilities serve retail outlets where food is subsequently sold to the public or provide specialized processing and storage functions. Wholesale facilities are used to handle and process a wide range of different commodities. Farmers' markets, in contrast, serve many sellers from a single location. They also serve as a retail outlet where food, mainly fresh fruits and vegetables, is sold directly to the public.

For the purposes of this report, wholesale facilities and farmers' markets are treated separately. In instances where wholesale firms are located on a farmers' market, the firms are included in the discussion of wholesale facilities. Of the two types of marketing facilities, wholesale facilities are the most numerous and are scattered throughout the central portion of the State.

### Wholesale Food Distribution Facilities

A wide variety of wholesale food firms are located in central North Carolina. These firms are housed in many different kinds of facilities, some that may have been specially designed to meet particular needs and others

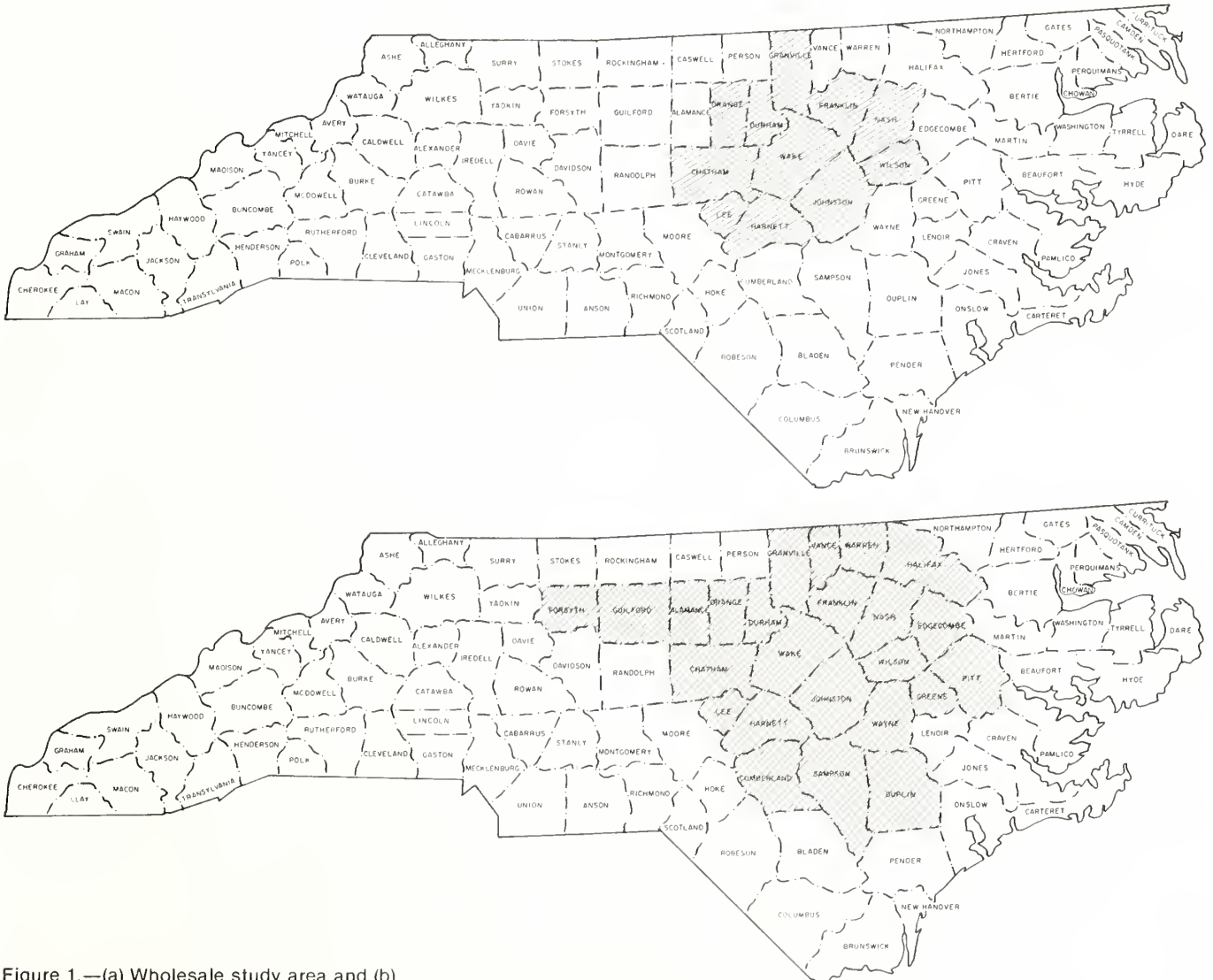


Figure 1.—(a) Wholesale study area and (b) grower study area.

that have been adapted from other initial uses. Product movement through the study area reflects both customer location and source of supplies. These wholesale firms also are a major employer to the region, reflecting one direct contribution to the region's economy.

**Number and Kind of Wholesale Firms**—A total of 175 wholesale food distribution and processing firms maintain facilities in the 11-county study area surrounding Raleigh. The number, type, and location of these firms is shown in table 1. Wake County, the population center of the study area, serves as the location for approximately 30 percent of the total. Only 2 percent of the wholesale firms are located in Durham County, and no wholesale firms are reported to be currently located in Granville and Orange Counties. In contrast to the overall totals, approximately 32 percent of the fruit and vegetable firms are located in Johnston County and 24 percent of the meat firms are located in Durham County.

In addition to the 175 wholesale firms noted in table 1, five refrigerated warehouses operate within the area. Four of these refrigerated warehouses are located in Wake County and the remaining warehouse in Wilson County. In addition, one fruit and vegetable firm engages

in specialized wholesale and retail activity beyond the scope of this report and therefore is not included in the total number of firms summarized in table 1.

As shown in table 1, the wholesale firms are broken into nine main categories. These categories are (1) fruits and vegetables, (2) meat and related products, (3) poultry and eggs, (4) groceries, (5) bakery products, (6) dairy products, (7) beverages, (8) grain mill products, and (9) other foods. Wholesale firms are categorized based on the single major product comprising the majority of the firms' annual sales volumes.

Within each major grouping of firms, companies fall within subgroupings reflecting specialized operations conducted with similar product lines (table 2).

*Fruits and vegetables.*—There are a total of 47 fruit and vegetable wholesale firms located in the study area. These firms occupy a wide range of wholesale facilities. Some companies are located on or adjacent to farmers' market facilities in buildings shared by a number of individual firms. These firms are using the front platform of the building as a display, order assembly, storage, loading, and unloading area.

Table 1.—Number, type, and location of wholesale food firms in central North Carolina

Type of firm	Location by county											Total
	Chatham	Durham	Franklin	Granville	Harnett	Johnston	Lee	Nash	Orange	Wake	Wilson	
	<i>Number</i>											
Fruits and vegetables . . . . .	—	—	—	—	8	15	1	4	—	12 <sup>1</sup>	7	47
Meat and related products . .	2	8	1	—	3	4	3	3	—	5	4	33
Poultry and eggs . . . . .	4	3	1	—	—	—	—	1	—	3	1	13
Groceries <sup>2</sup> . . . . .	—	1	—	—	2	1	1	3	—	9	1	18
Bakery products . . . . .	—	2	—	—	1	—	1	2	—	7	—	13
Dairy products . . . . .	1	3	1	—	1	1	2	4	—	5	3	21
Beverages . . . . .	—	5	—	—	—	—	2	3	—	2	2	14
Grain mill products . . . . .	—	—	—	—	1	1	—	1	—	—	—	3
Other foods . . . . .	—	—	—	—	1	3	—	—	—	9	—	13
Total <sup>3</sup> . . . . .	7	22	3	—	17	25	10	21	—	52	18	175

<sup>1</sup>Does not include one fruit and vegetable wholesaler engaged in commercial activities beyond the scope of this study.

<sup>2</sup>Includes three chainstore warehouses.

<sup>3</sup>A total of five refrigerated warehouses are located in the study area: four refrigerated warehouses in Wake County and one refrigerated warehouse in Wilson County.



**Table 2.—Breakdown of central North Carolina wholesale food firms by type and subgroup**

Type of firm and subgroup	Number
<b>Fruits and vegetables:</b>	
Wholesalers .....	15
Processor .....	1
Wholesale jobber .....	1
Grower-shippers .....	30
Total .....	47
<b>Meat and related products:</b>	
Wholesalers .....	2
Processors .....	25
Full-line distributors .....	5
Portion-control manufacturer .....	1
Total .....	33
<b>Poultry and eggs:</b>	
Wholesalers .....	4
Processors .....	9
Total .....	13
<b>Groceries:</b>	
Wholesalers .....	8
Full-line distributors .....	4
Food chains .....	3
Institutional .....	1
Cash and carry .....	2
Total .....	18
<b>Bakery products:</b>	
Wholesalers .....	5
Processors .....	7
Food product manufacturer .....	1
Total .....	13
<b>Dairy products:</b>	
Processor-distributors .....	4
Wholesaler-distributors .....	17
Total .....	21
<b>Beverages:</b>	
Distribution warehouses .....	4
Bottlers .....	10
Total .....	14
<b>Grain mill products:</b>	
Food product manufacturers .....	3
Total .....	3
<b>Other foods:</b>	
Wholesalers .....	2
Processors .....	3
Full-line distributor .....	1
Broker .....	1
Food product wholesalers .....	5
Packer .....	1
Total .....	13
Grand Total .....	175

Other fruit and vegetable wholesalers operate in conjunction with specialized single-product growing operations. An example of this type of facility is a modern grower-shipper warehouse used for the temporary storage and distribution of sweet potatoes. Also, some grower-shipper warehouse facilities are designed to handle more than one product and support extensive processing operations.

*Meat and related products.*—Of the 33 wholesale meat and related product firms included in the study, 25 are classified as processors while the rest function primarily as wholesale distributors. Firms slaughtering live animals as their primary function are excluded from this study, since these firms would not be considered as candidates for location in a food distribution center. Other types of meat processing firms are included in the scope of the study.

The majority of meat processors in the study area specialize in processing country hams and bacon or fully-cooked barbecue products. Other meat and related product firms tend to specialize in either air-dried meats or country sausage or a combination of these products, along with the manufacture of frankfurters and luncheon meats. Few firms deal exclusively with the manufacture of portion-controlled red meats. All seven firms classified as wholesale distributors handle a full line of meat products including fresh boxed beef, pork, and lamb as well as frozen portion-controlled items and processed luncheon meats, frankfurters, sausages, hams, and bacon. All of these firms supply their products to a variety of retail outlets, other wholesale firms, and restaurants.

*Poultry and eggs.*—There are 13 wholesale poultry and egg firms included in this study. The primary activity of four of these firms is wholesale distribution. The other nine firms deal in processing. Processing functions range from grading and packing operation to multiple processing operations which change the product form for added value.

In the past, the main commodities handled by poultry and egg firms were ice packed ready-to-cook (RTC) broilers and cartoned eggs. Now, poultry and egg wholesalers are distributing products such as chicken patties, turkey rolls, frankfurters, bologna, smoked turkey, and egg products. Three of the nine processors ship at least 25 percent of their products to markets outside the 11-county study area, while the other firms

distribute almost exclusively within the study area. All 13 firms deal primarily in wholesale lots, supplying customers such as stores, institutions, restaurants, food service establishments, and caterers.

*Groceries.*—Eighteen grocery firms are included in this study. Among these firms are companies using facilities ranging from large multiproduct distribution facilities covering large industrial sites to warehouses serving small wholesalers with speciality lines.

Some grocery firms included in the study are located on individual sites away from downtown areas and service retail stores or large institutional accounts. Deliveries are made from these facilities on trucks owned or controlled by the wholesale firms.

Other grocery companies are located in urban areas. Such firms often sell directly to customers representing small grocery stores and restaurants. Customers come to these facilities, place orders, and take immediate possession of their purchases.

*Bakery products.*—There are 13 bakery firms located within the 11-county study area. Among the bakery firms, some redistribute goods from associated processors located outside the study area. Other bakery firms sell retail and process pastries and similar products in the same buildings. Still other firms process specialized bakery products for subsequent distribution to retail outlets and food wholesalers.

Firms redistributing products are housed in buildings designed to facilitate efficient transfer of products. These facilities are usually on ground level with a truck parking area adjacent to the building. Some of these buildings feature special receiving areas where tractor-trailers can be unloaded and products stored for short periods. Salespeoples' trucks are backed directly into the building, and products already loaded on racks are moved directly into the waiting vehicles. Some of the buildings used for redistributing bakery products also feature truck washing and repair facilities and limited employee welfare areas. A retail outlet may be attached to the main structure.

Buildings for bakery firms combining retail sales and processing at the same facility are specially designed for this particular type of operation. These facilities

feature both considerable retail space in the building and extensive adjacent customer parking. Loading and receiving operations are more limited at these buildings, often occurring directly in the street. Great importance is attached to locating the facility adjacent to retail or shopping areas for the convenience of the firm's retail customers.

In contrast, processing firms in the study area are more concerned with the manufacturing process. Ceiling and building arrangements affect the product flow. Considerable importance is attached to rail access for bulk receipt of products. Excellent access to major highways also is important as outgoing products are often shipped long distances by tractor-trailers. Building sites feature extensive parking for trucks and employee vehicles, maneuvering areas, and other specialized support facilities.

*Dairy products.*—There are 21 dairy products firms in the 11-county area. They are involved in processing, handling, or distributing various dairy products and related foods. Of these firms, two are large-volume fluid milk plants, two are ice cream and frozen dessert plants, while the others are distribution outlets for finished products.

The two fluid milk plants are highly mechanized and process a broad range of dairy products, including fluid milk, fruit drinks and juices, ice cream and frozen desserts, and other miscellaneous items. They also receive and distribute such items as butter, margarine, eggs, and hard cheeses. They are the major suppliers for the Raleigh-Durham area, and also own and operate many of the distribution outlets throughout the region. The plants process and handle approximately 75 percent of the total annual volume distributed in the area. These plants are modern, well-designed multistory facilities, with sufficient space for expansion and properly located to serve their respective distribution areas.

The two ice cream and frozen dessert plants are multistory facilities that are structurally sound and in good physical condition with sufficient space for future growth. They are located on the fringe of the 11-county area and were planned specifically to serve consumer needs in their respective territories. One of the plants serves as a distribution outlet for the parent company located outside the 11-county area and also processes novelties, while the other, which is a local independent plant, concentrates its efforts on processing and packaging bulk ice cream and other frozen desserts.

Most of the 17 distribution outlets operating within the 11-county area have been built in recent years. The two fluid milk plants are the primary source of finished products for most of the distribution outlets, while the others are served by plants located outside the 11-county area. Distribution outlets have proved to be the most efficient method of distributing products in those widely scattered areas not served directly by a processing plant.

*Beverages.*—There are 14 beverage firms in the study area. Sales areas are defined by territories set by the parent companies. Accordingly, the expansion opportunity for each of the beverage companies is limited to the population within those defined areas. Some firms, wishing to expand their activities, sell not only to customers within their territories but also to bottling firms located elsewhere. In addition, other beverage firms do not maintain sufficient production capacity to meet their needs but depend on products provided by other plants.

Building design is strongly affected by the type of beverage operation. Firms supplementing their production must provide for additional receiving and temporary storage areas. Space is provided in such facilities for breaking down incoming loads for subsequent shipment to retail outlets. Such space is arranged to complement product storage from the bottling lines. Beverage firms serving both company product requirements and other plants will provide for specialized labeling, storage, and loading facilities for larger trucks.

All of the bottling companies use facilities with many common design features. Processing areas are usually located on one floor. Ceiling heights in the processing areas are adjusted to accommodate bottling line equipment. Storage areas are arranged for palletized storage without racks. Forklift trucks are used for finished product movement, retrieving supplies, and truck loading and unloading.

*Grain mill products.*—There are three grain mill product firms located in the study area. A fourth firm was destroyed by fire during the data collection period. All of the firms manufacture products for human consumption; one manufactures flour and the other two cornmeal.

All of the grain mill product facilities share a number of common features. The buildings are several stories high with various processing operations conducted on each floor. Extensive airpowered systems move the processed products through the facility with the incoming grain or

corn moving to the upper floors and passing through various grinding and finishing steps before reaching ground level again. Endless belts with attached footrests and handholds or elevators move personnel to other floors. Silos for bulk raw product storage are usually located adjacent to the main buildings. Incoming loads of corn and grain are dumped into pits for movement by conveyor to the top of storage silos. Offices are located at ground level adjacent to the milling operation.

Two of the facilities are using water turbine engines to provide part of the power for the internal machinery. The structures are well maintained with considerable attention paid to housekeeping to minimize the possibility of a fire or an explosion. There is limited production expansion potential within the existing facility. Land is available at some of the plants for expansion.

*Other foods.*—Thirteen other food firms are identified in the study area. Included in the other foods category are sandwich vendors, vegetable canneries, and companies handling chips, snack foods, and health foods. Also included in this category is a seafood wholesaler.

A number of different operational procedures reflect the diversify of different types of firms within this general category. Various processing operations require specialized equipment unique to a single company.

There are similarities in building design in use by firms in the other foods category. These firms anticipate future limited product expansion because of established territories set forth by some parent companies. Firms that wish to expand their market area must increase sales within a defined area or purchase the territorial rights of another firm. Other food companies typically did not plan to expand their facilities in order to supply products for companies in other territories.

Many of the chip and snack food firms do not produce any of the products sold from the facility. The space required for buildings housing these firms include space for receiving incoming products and temporary storage. Space for breaking down incoming loads into small quantities for subsequent distribution to retail outlets also is featured in building arrangements. Receiving and loading out often is assigned to the same doors but scheduled at different times of the day. Buildings are designed to facilitate the use of mechanized handling equipment such as forklift trucks, pallet jacks, and small tractors.



Layouts for firms manufacturing and distributing snack foods include large receiving and storage areas for ingredients and supplies as well as processing and storage areas for finished products. Some of the firms use facilities that are designed to serve both as a manufacturing center and a distribution point to other smaller warehouse buildings that, in turn, serve as a distribution point to retail and similar outlets. Firms manufacturing and distributing snack foods also package products for shipment within their territory but also may distribute some of their output to companies outside these defined markets.

**Wholesale Space**—Wholesale facilities included in this study represent a wide range of different types of buildings. Some of these buildings are adapted from other uses while other buildings are almost new and reflect designs appropriate for present functions. Some buildings are on sites ample for the structure with additional room for parking, maneuvering areas, loading and unloading, and future expansion. Access to transportation also varies with some firms located near major highways and with direct rail receiving facilities; other firms must use team tracks or cartage firms to accommodate rail receipts.

Space used for storing and processing wholesale food products is a major segment of the region's commercial facilities. A total of 4,252,922 square feet of enclosed-floor space is currently occupied by independent wholesale food firms. This space is supplemented by an additional 900,000 square feet which is occupied by chainstores maintaining warehousing operations in central North Carolina.

All further references to space will refer to facilities occupied by the independent food wholesalers, processors, and chainstores maintaining operations in the 11-county study area. Table 3 summarizes the total space occupied by these firms. Primary space is defined as the major place of business maintained by each firm. Secondary space is defined as space that is located away from the primary facilities.

The type of legal control exercised by wholesale firms over the facilities used in the business is an important measure of tax laws, stability of the industry, potential for equity money for new facilities, and practices common to a particular segment of the food industry.

**Table 3.—Summary of primary and secondary space used by type of firm, central North Carolina**

Type of firm	Primary space	Secondary space	Total
<i>Square feet</i>			
Fruits and vegetables . . . . .	1,016,414	23,250	1,039,664
Meat and related products . . . . .	550,857	15,288	566,145
Poultry and eggs . . . . .	224,025	23,500	247,525
Groceries <sup>1</sup> . . . . .	1,365,000	25,000	1,390,000
Bakery products . . . . .	280,948	24,000	304,948
Dairy products . . . . .	297,583	13,300	310,883
Beverages . . . . .	968,394	18,600	986,994
Grain mill products . . . . .	24,200	11,000	35,200
Other foods . . . . .	271,563	0	271,563
Total . . . . .	4,998,984	153,938	5,152,922

<sup>1</sup>Includes chainstore wholesale facilities.

Of the total number of wholesale firms, 22 percent lease, 5 percent rent, and 73 percent own their primary facilities. Firms leasing space have a contractual arrangement with the owners of the buildings for the use of the facilities for some defined period, usually more than 1 year. Firms renting their facilities are purchasing the use of the facilities on a month-to-month basis. Ownership ranges from a high of 100 percent for grain mill products to a low of 38 percent for other food firms.

The types of wholesale firms in a specific category affect differences in company ownership. Grain mill products, meat and related products, and firms in the other food category are generally independent companies with a significant degree of centralized ownership. Some firms find advantages in leasing remote distribution facilities in lieu of direct ownership. In some instances, facilities are owned by holding companies which in turn rent the buildings to the food firm. Table 4 summarizes the number of primary facilities leased, owned, and rented by type of firm.

Of the total secondary facilities used by wholesale firms, 18 percent are leased; 70 percent are owned; and 12 percent are rented. These percentages correspond closely to equivalent percentages of ownership and lease plus rent statistics for primary facilities. Such close comparisons indicate a consistent policy by area wholesalers toward management of both primary and secondary facilities. Secondary facilities are usually rented on a short-time basis rather than entering into formal lease agreements. Table 5 summarizes the tenure status of secondary facilities by type of firm. Of the

**Table 4.—Tenure status of primary facilities, by type of firm, central North Carolina**

Type of firm	Leased	Owned	Rented	Total
<i>Number</i>				
Fruits and vegetables . . . . .	13	34	—	47
Meat and related products . . . . .	2	31	—	33
Poultry and eggs . . . . .	2	11	—	13
Groceries . . . . .	7	9	2	18
Bakery products . . . . .	3	9	1	13
Dairy products . . . . .	4	13	4	21
Beverages . . . . .	2	12	—	14
Grain mill products . . . . .	—	3	—	3
Other foods . . . . .	6	5	2	13
Total . . . . .	39	127	9	175

**Table 5.—Tenure status of secondary facility, by type of firm, central North Carolina**

Type of firm	Leased	Owned	Rented	Total
<i>Number</i>				
Fruits and vegetables . . . . .	1	1	1	3
Meat and related products . . . . .	—	2	—	2
Poultry and eggs . . . . .	—	3	—	3
Groceries . . . . .	1	—	1	2
Bakery products . . . . .	1	—	—	1
Dairy products . . . . .	—	2	—	2
Beverages . . . . .	—	2	—	2
Grain mill products . . . . .	—	2	—	2
Total . . . . .	3	12	2	17

total 175 wholesale firms included in this survey, 158 companies do not maintain secondary facilities.

Dairy products, meat and related products, and poultry and egg firms require extensive other space to support various types of processing operations. Of the total space occupied by these three types of firms, 44, 41, and 63 percent, respectively, is classified as other space. In contrast, grocery and fruit and vegetable wholesalers with active storage operations use most of their space to store products prior to sale. Of the total primary space utilized by grocery firms, 86 percent is unrefrigerated storage, which indicates that the majority of the products handled by these firms are nonperishable. The perishable nature of products handled by fruit and vegetable firms is reflected in the amount of space used for refrigerated storage.

Since it is often difficult to move products between floors, most new buildings feature main operational areas on a single level. The physical arrangement of existing wholesale facilities is an important measure of potential to make or maintain improvements in storage and processing operations. Most wholesale space in the study area is on the first floor; only dairy products and bakery firms maintain substantial space, 18 percent and 13 percent, respectively, on other floors. Both dairy and bakery firms engage in substantial processing operations that may be efficiently carried out on a series of different levels. Overall, about 5 percent of the total floorspace is located on other than the first floor. Table 6 summarizes the use and location of the floorspace used by the wholesale firms included in this study.

Most secondary space is located from 1 to 5 miles from the primary facilities. For purposes of this report, all buildings located on the same site are treated as primary facilities.

Table 7 shows space use and floor location by type of firm in each county. Wake County has the largest concentration of wholesale space and reflects overall space use by the wholesale firms included in this study. Of the total square feet of wholesale space available in Wake County, 2 percent is basement, 93 percent is located at first-floor level, 5 percent is on the second floor, and no space is reported on other floors. All secondary space in Wake County is located at first-floor level. The location of existing wholesale space and the existing arrangement of such space is both a potential measure of existing patterns of distribution and the potential efficiency of that space in its internal use for the storage and handling of food products.

**Wholesale Volume Movement**—Almost 2½ million tons of wholesale food products, valued at approximately \$1.9 billion, are moved annually through central North Carolina. Table 8 summarizes the total volume and value of the products handled by wholesale firms. Of the nine types of firms, grocery firms sell approximately 53 percent of the total tonnage and comprise about 43 percent of the total annual sales of the food firms. Grain mill product firms account for the smallest percentage by tonnage and value of all of the different types of food firms. Fruit and vegetable firms handle 17 percent of the total volume and approximately 4 percent of sales. Dairy product firms account for 25 percent of total dollar sales and about 7 percent of total tonnage.

Table 6.—Total space by type of firm, central North Carolina

Type of firm and floorspace location	Non-refrigerated	Refrigerated		Office	Other	Total
		Cooler	Freezer			
<i>Square feet</i>						
Fruits and vegetables:						
Basement .....	0	0	0	0	0	0
First floor .....	884,782	30,395	3,000	15,050	93,135	1,026,362
Second floor .....	9,322	0	0	3,980	0	13,302
Other .....	0	0	0	0	0	0
Subtotal .....	894,104	30,395	3,000	19,030	93,135	1,039,664
Meat and related products:						
Basement .....	14,600	1,440	480	0	2,000	18,520
First floor .....	52,342	146,983	94,409	24,725	228,166	546,625
Second floor .....	0	0	0	0	1,000	1,000
Other .....	0	0	0	0	0	0
Subtotal .....	66,942	148,423	94,889	24,725	231,166	566,145
Poultry and eggs:						
Basement .....	0	0	0	0	0	0
First floor .....	33,842	39,538	8,800	9,710	155,635	247,525
Second floor .....	0	0	0	0	0	0
Other .....	0	0	0	0	0	0
Subtotal .....	33,842	39,538	8,800	9,710	155,635	247,525
Groceries:						
Basement .....	3,000	0	0	0	0	3,000
First floor .....	1,131,525	74,875	58,600	16,400	19,350	1,300,750
Second floor .....	65,000	0	0	18,000	3,250	86,250
Other .....	0	0	0	0	0	0
Subtotal .....	1,199,525	74,875	58,600	34,400	22,600	1,390,000
Bakery products:						
Basement .....	28,656	0	0	3,582	3,582	35,820
First floor .....	94,362	500	300	15,246	153,720	264,128
Second floor .....	0	0	0	5,000	0	5,000
Other .....	0	0	0	0	0	0
Subtotal .....	123,018	500	300	23,828	157,302	304,948

Continued



Table 6.—Total space by type of firm, central North Carolina —Continued

Type of firm and floorspace location	Non-refrigerated	Refrigerated		Office	Other	Total
		Cooler	Freezer			
<i>Square feet</i>						
Dairy products:						
Basement .....	0	0	0	6,000	0	6,000
First floor .....	49,150	31,371	35,005	31,689	109,100	256,315
Second floor .....	11,400	0	3,200	7,200	26,768	48,568
Other .....	0	0	0	0	0	0
Subtotal .....	60,550	31,371	38,205	44,889	135,868	310,883
Beverages:						
Basement .....	0	0	0	0	0	0
First floor .....	603,222	2,100	0	136,895	216,927	959,144
Second floor .....	24,650	0	0	0	3,200	27,850
Other .....	0	0	0	0	0	0
Subtotal .....	627,872	2,100	0	136,895	220,127	986,994
Grain mill products:						
Basement .....	0	0	0	0	0	0
First floor .....	16,700	0	0	800	8,800	26,300
Second floor .....	1,400	0	0	0	3,600	5,000
Other .....	3,900	0	0	0	0	3,900
Subtotal .....	22,000	0	0	800	12,400	35,200
Other foods:						
Basement .....	0	0	0	0	500	500
First floor .....	165,019	4,396	11,628	13,040	76,980	271,063
Second floor .....	0	0	0	0	0	0
Other .....	0	0	0	0	0	0
Subtotal .....	165,019	4,396	11,628	13,040	77,480	271,563
Total basement .....	46,256	1,440	480	9,582	6,082	63,840
Total first floor .....	3,030,944	330,158	211,742	263,555	1,061,813	4,898,212
Total second floor .....	111,772	0	3,200	34,180	37,818	186,970
Total other .....	3,900	0	0	0	0	3,900
Total .....	3,192,872	331,598	215,422	307,317	1,105,713	5,152,922

Table 7.—Total space by county, central North Carolina<sup>1</sup>

County and space type	Non-refrigerated	Refrigerated		Office	Other	Total
		Cooler	Freezer			
<i>Square feet</i>						
Chatham:						
Primary .....	28,100	33,375	7,250	6,865	81,935	157,525
Secondary .....	1,500	3,750	1,500	750	21,500	29,000
Subtotal .....	29,600	37,125	8,750	7,615	103,435	186,525
Durham:						
Primary .....	156,782	30,560	14,978	32,139	124,174	358,633
Secondary .....	3,500	1,296	192	0	2,400	7,388
Subtotal .....	160,282	31,856	15,170	32,139	126,574	366,021
Franklin:						
Primary .....	6,976	4,780	120	1,750	18,302	31,928
Secondary .....	0	0	0	0	0	0
Subtotal .....	6,976	4,780	120	1,750	18,302	31,928
Harnett:						
Primary .....	290,202	47,984	20,400	9,874	85,560	454,020
Secondary .....	3,800	7,650	1,350	1,000	0	13,800
Subtotal .....	294,002	55,634	21,750	10,874	85,560	467,820
Johnston:						
Primary .....	321,847	16,486	2,840	10,239	65,638	417,050
Secondary .....	23,700	0	0	0	0	23,700
Subtotal .....	345,547	16,486	2,840	10,239	65,638	440,750
Lee:						
Primary .....	140,495	8,186	9,726	13,680	29,140	201,227
Secondary .....	0	0	0	0	0	0
Subtotal .....	140,495	8,186	9,726	13,680	29,140	201,227
Nash:						
Primary .....	317,657	17,165	28,212	26,767	114,244	504,045
Secondary .....	23,400	0	0	600	6,000	30,000
Subtotal .....	341,057	17,165	28,212	27,367	120,244	534,045
Wake:						
Primary .....	1,573,494	141,335	106,192	191,198	485,144	2,497,363
Secondary .....	24,000	0	10,300	0	6,000	40,300
Subtotal .....	1,597,494	141,335	116,492	191,198	491,144	2,537,663
Wilson:						
Primary .....	274,374	19,031	12,407	11,705	59,676	377,193
Secondary .....	3,000	0	0	750	6,000	9,750
Subtotal .....	277,374	19,031	12,407	12,455	65,676	386,943
Total primary .....	3,109,927	318,902	202,125	304,217	1,063,813	4,998,984
Total secondary .....	82,900	12,696	13,342	3,100	41,900	153,938
Total space .....	3,192,827	331,598	215,467	307,317	1,105,713	5,152,922

<sup>1</sup>No primary space reported in Granville and Orange Counties.

Chainstore warehouses are an important factor in the wholesale distribution of food in central North Carolina. These firms accounted for 79 percent of total sales by grocery firms and 34 percent of total food sales by all types of firms.

Processor-distributors dominate the wholesale distribution of dairy products. This type of firm accounts for 69 percent of dairy products sales and approximately 17 percent of the total value of food products distributed within the study area.

Table 9 summarizes the amount of products handled, by weight, by all firms included in the study in descending order, by commodity. Groceries account for about 36 percent of the total volume handled and is the major commodity included in this study. Processed fruits, grain mill products, fish and shellfish, health, beauty aids, general merchandise, health foods, specialty products, frozen eggs, and candy and confectionery products each account for less than 1 percent of the total volume. Products handled and actually warehoused by food brokers are considered separately. Such products are varied, usually handled in small quantities, and therefore specific products are not identified. Food products handled by brokers accounted for less than 1 percent of the total 2.5 million tons of food moving through the study area.

Further consideration of the following nine commodity groups is limited to summary discussions in the remainder of this report. These groups of firms are, again, (1) fruits and vegetables, (2) meat and related products, (3) poultry and eggs, (4) groceries, (5) bakery products, (6) dairy products, (7) beverages, (8) grain mill products, and (9) other foods. Firm types and commodity groups are defined in the appendix.

*Receipts.*—Wholesale receipts are divided into two categories, direct receipts and interdealer transfers. Direct receipts are defined as the total volume of products wholesale firms received directly from manufacturers, processors, distributors, and others serving as sales agents of brokers for the producer. Interdealer transfers are defined as sales between local wholesalers. The sum of direct receipts and interdealer transfers represents the total volume handled by wholesale firms. Table 10 summarizes direct receipts, interdealer transfers, and the total volume handled for the nine wholesale food firm types included in this study.

**Table 8.—Volume and value of products handled, by type of firm, central North Carolina**

Type of firm	Volume handled	Annual sales
	Tons	Dollars
<b>Fruits and vegetables:</b>		
Wholesalers .....	184,221	37,521,203
Processors .....	76,500	13,770,000
Wholesale jobbers .....	3,046	600,000
Growers-shippers .....	151,861	28,595,646
Subtotal .....	415,628	80,486,849
<b>Meat and related products:</b>		
Wholesalers .....	2,413	7,200,000
Processors .....	57,553	183,241,140
Full-line distributors .....	17,871	40,140,000
Portion-control manufacturers ..	3,688	17,500,000
Subtotal .....	81,525	248,081,140
<b>Poultry and eggs:</b>		
Wholesalers .....	10,120	8,620,000
Processors .....	148,807	140,862,760
Subtotal .....	158,927	149,482,760
<b>Groceries:</b>		
Wholesalers .....	99,244	96,866,800
Full-line distributors .....	50,433	31,500,000
Chainstores .....	1,081,645	669,364,000
Institutional .....	70,068	45,000,000
Cash and carry .....	2,969	2,380,000
Subtotal .....	1,304,359	845,110,800
<b>Bakery products:</b>		
Wholesalers .....	6,710	5,314,600
Processors .....	48,917	41,656,156
Food product manufacturers ...	702	1,872,000
Subtotal .....	56,329	48,842,756
<b>Dairy products:</b>		
Wholesale distributors .....	52,184	156,346,722
Processor-distributors .....	115,411	345,773,966
Subtotal .....	167,595	502,120,688
<b>Beverages:</b>		
Distribution warehouses .....	15,905	4,376,360
Bottlers .....	215,325	61,311,831
Subtotal .....	231,230	65,688,191
<b>Grain mill products:</b>		
Food product wholesalers .....	2,411	3,865,000
<b>Other foods:</b>		
Wholesalers .....	223	234,750
Processors .....	11,888	16,420,000
Full-line distributors .....	720	1,200,000
Brokers .....	12,976	10,894,800
Food product wholesalers .....	6,556	7,500,000
Packers .....	470	1,175,000
Subtotal .....	32,833	37,424,550
<b>Total .....</b>	<b>2,450,837</b>	<b>1,981,102,734</b>



Types of firms differ in the ratio of direct receipts and interdealer transfers handled. Four types of wholesale firms, dairy products, beverages, grain mill products, and other foods do not utilize interdealer transfers in the operations. Firms within these four groupings depend on manufacturers associated with the company for supplies or they themselves manufacture these products. Less than 1 percent of the total volume handled by bakery firms is interdealer transfers. This small volume of specialized products is uneconomical for bakery firms to produce.

The need to provide full service to customers strongly influences the amount of interdealer transfers within a commodity grouping. Over 7 percent of the total volume handled by grocery firms is interdealer transfers. General line produce firms, requiring specialty or filler items in order to provide full service to customers, buy more than 6 percent of their total volume from other local wholesalers. Meat and related product firms also buy specialty products from local firms.

Interdealer transfers, while important to some firms, is not a major factor in wholesale trade in central North Carolina. Of the total volume received by area wholesalers, less than 6 percent re-enters the wholesale distribution channels.

The amount of interdealer transfers, by county, is affected by the type of firms located within each county. Johnston County records 14 percent of total receipts as interdealer transfers, the single largest percentage, of all the counties in the study area. No interdealer transfers were reported in Franklin County. The largest amount of interdealer transfers, 97,925 tons annually, occurs in Wake County, but only accounts for 6 percent of the total volume moving through the county. Table 11 summarizes direct receipts, interdealer transfers, and total volume by county.

Of the total volume handled, 65 percent moves through Wake County. This large percentage reflects population concentrations and number of wholesale firms located in the area. Almost 9 percent of the total wholesale volume handled in the study area is handled through Nash County. In contrast, less than 1 percent of the total volume is handled through firms maintaining warehousing or processing facilities in Franklin County.

**Table 9.—Total volume of commodities handled, in descending order, central North Carolina<sup>1</sup>**

Commodity	Volume
	Tons
Groceries .....	890,500
Fruits and vegetables .....	657,101
Beverages .....	231,230
Fluid milk products .....	167,240
Poultry .....	140,273
Meat and related products .....	95,059
Frozen foods .....	87,803
Bakery products .....	56,329
Dairy products .....	49,170
Shell eggs .....	40,047
Paper products .....	10,381
Processed fruits .....	10,019
Brokers <sup>2</sup> .....	8,476
Grain mill products .....	2,411
Fish and shellfish .....	2,003
Health, beauty aids, and general merchandise .....	1,038
Health foods .....	720
Specialty foods .....	470
Frozen eggs .....	380
Candy and confectioneries .....	187
Total .....	2,450,837

<sup>1</sup>No wholesale food volume reported in Orange and Greenville Counties.

<sup>2</sup>Varied products without specific commodity identification.

**Table 10.—Summary of direct receipts, interdealer transfers, and total volume handled, by type of firm, central North Carolina**

Type of firm	Direct receipts	Interdealer transfer	Total
			Tons
Fruits and vegetables .....	388,495	27,133	415,628
Meat and related products .....	77,097	4,428	81,525
Poultry and eggs .....	158,017	910	158,927
Groceries .....	1,207,814	96,545	1,304,359
Bakery products ...	55,911	418	56,329
Dairy products .....	167,595	—	167,595
Beverages .....	231,230	—	231,230
Grain mill products .	2,411	—	2,411
Other foods .....	32,833	—	32,833
Total .....	2,321,403	129,434	2,450,837

Different transportation methods are used to bring products to wholesalers in central North Carolina. Table 12 summarizes receipts by method of transportation and type of firm. Of the total amount of direct receipts, 16 percent is received by rail, 82 percent by truck, and less than 1 percent by boat and air.<sup>2</sup> The small quantity of products received by rail reflects the method of shipment preferred by manufacturers as well as the inability of many firms to receive rail shipments directly at the wholesale facilities because such service is not available.

<sup>2</sup>Receipts by boat and air are trucked to wholesale facilities from the nearest port or airport.

**Table 11.—Summary of direct receipts, interdealer transfers, and total volume by county, central North Carolina**

County	Direct receipts	Interdealer transfer	Total
Chatham . . . . .	78,500	162	78,662
Durham . . . . .	152,427	3,898	156,325
Franklin . . . . .	24,372	—	24,372
Harnett . . . . .	51,939	1,263	53,202
Johnston . . . . .	67,916	1,300	69,216
Lee . . . . .	78,144	449	78,593
Nash . . . . .	195,394	23,642	219,036
Wake . . . . .	1,501,910	97,925	1,599,835
Wilson . . . . .	170,801	795	171,596
Total . . . . .	2,321,403	129,434	2,450,837

Grocery firms account for over 94 percent of total rail receipts. This heavy concentration reflects the large quantities of products that major canners, paper good manufacturers, and other producers handling grocery products ship by rail.

Firms handling perishables receive their products by truck. More than 97 percent of the produce moving to fruit and vegetable wholesalers arrives by truck, and 71 percent of the meat and related products arrive by truck.

Other types of wholesalers prefer trucks because of the nature of their business. Local manufacturers or growers provide most of the supplies for dairy product firms, beverage companies, grain mill product companies, and poultry and egg wholesalers.

Some companies receive raw materials for processing by rail. Bakery firms receive bulk shipments by rail but the largest portion of incoming receipts arrives by truck. Other food companies receive limited amounts of raw material by rail from distant manufacturing companies.

A small amount of product is received by boat. Imported meat for hamburger and speciality products for resale account for the majority of boat and air receipts.

Rail receipts are affected by company locations and availability of house tracks at wholesale facilities within each county. Of the total volume of such direct receipts by rail, over 93 percent occurs in Wake County with the remainder in Lee, Nash, and Wilson Counties. A small amount of rail traffic to local food wholesalers occurs in Harnett County. Table 13 summarizes method of receipt by county.

**Table 12.—Volume of direct receipts and methods of transportation, by type of firm, central North Carolina**

Type of firm	Volume of direct receipts by method of transportation				
	Rail	Truck	Boat	Air	Total
	<i>Tons</i>				
Fruits and vegetables . . . . .	10,485	378,010	—	—	388,495
Meat and related products . . . . .	2,208	55,036	19,853	—	77,097
Poultry and eggs . . . . .	—	158,017	—	—	158,017
Groceries . . . . .	362,000	845,814	—	—	1,207,814
Dairy products . . . . .	—	167,595	—	—	167,595
Bakery products . . . . .	8,099	47,812	—	—	55,911
Beverages . . . . .	—	231,230	—	—	231,230
Grain mill products . . . . .	—	2,411	—	—	2,411
Other foods . . . . .	910	31,909	—	14	32,833
Total . . . . .	383,702	1,917,834	19,853	14	2,321,403

Table 13.—Volume of direct receipts and method of transportation, by county, central North Carolina

County	Volume of direct receipts by method of transportation				
	Rail	Truck	Boat	Air	Total
	Tons				
Chatham	—	78.500	—	—	78.500
Durham	—	152.427	—	—	152.427
Franklin	—	24.372	—	—	24.372
Harnett	876	51,063	—	—	51,939
Johnston	—	67,916	—	—	67,916
Lee	8,444	69,700	—	—	78,144
Nash	6,743	168,798	19,353	—	195,394
Wake	359,168	1,142,728	—	14	1,501,910
Wilson	8,471	162,330	—	—	170,801
Total	383,702	1,917,834	19,353	14	2,321,403

Area wholesale firms receive products in a number of different forms. Table 14 illustrates how different types of wholesale firms receive incoming merchandise. The form of receipt depends upon the facility structure, the handling method utilized by the wholesaler, the nature of the operation within the facility, and the commodity handled by the firm. As illustrated, receipts on pallets are concentrated in beverage and grocery companies; these companies receive 59 and 73 percent of their incoming products on pallets, respectively. A wide range of products are received on pallets by grocery companies including canned goods, paper, and related non-food commodities. Pallet loads of empty cans and bottles account for a large portion of incoming products received by beverage firms. Wholesale meat and grocery firms account for all reported receipts of carcass and primal cuts of meat. Meat firms receive 23 percent of their incoming goods in bulk, 28 percent boxed and stacked on pallets, 43 percent boxed but stacked on the floor of incoming trucks, 2 percent as carcasses, and 1 percent as primal cuts. In contrast, grocery firms handling meat products report a 9-to-1 ratio between carcass and primal cut receipts. Grain mill product firms receive all incoming merchandise in bulk. Bakery firms receive 67 percent of incoming products, principally sugar and flour, in bulk.

The form in which products arrive at the wholesale facilities illustrates the composition of the wholesale trade in central North Carolina. Of the total volume received, 13 percent arrives in bulk, 37 percent in packages stacked on pallets, 38 percent in packages stacked on the floor of incoming trucks or railcars, less

than 1 percent as carcasses, 2 percent as primal cuts, and 9 percent in other forms.

Table 15 illustrates the form in which products are received, by county, at the facilities of the wholesale food firms included in this study. Firms in Harnett, Johnston, and Lee Counties received over half of their total volume in packages stacked on pallets. Reflecting the grain mill companies located in Wilson County, more than half of the wholesale volume moving into that location is received in bulk at wholesale facilities.

*Source of supply.*—The commodity identification of a wholesale firm strongly affects the choice of the source of supply of incoming products. Grocery firms obtain over 90 percent of incoming products from manufacturers nationwide. In contrast, more than half of the products obtained by fruit and vegetable, dairy products, and poultry and egg wholesalers are purchased within the 11-county study area.

Some products are shipped to central North Carolina and warehoused within the area pending distribution to local wholesale firms. Grain mill and other food companies purchase many products locally that are manufactured elsewhere. A significant portion of the 58 and 32 percent of incoming products noted as purchased within the study area by these companies are drawn from broker accounts or manufacturers' storage space maintained at public warehouses.

Important food manufacturing facilities are located adjacent to the 11-county study area. Beverage, grocery, and other food companies purchase from these manufacturing facilities.



Table 16 summarizes the source of supply by type of firms. Of the total 2,450,837 tons of direct receipts, 22 percent originate within the study area, 12 percent within North Carolina but outside the study area, and 66 percent originate outside North Carolina.

The firms within each county determine the origin of products moving through wholesale channels. Franklin County has the largest percentage (over 91 percent) of local products moving into wholesale facilities. Within Wake County only 8 percent of products of local origin are distributed by the large concentration of wholesale grocery firms. Table 17 summarizes the source of supply to the area's wholesale food firms' facilities listed by the county location of these facilities.

*Types of customers.*—The different kinds of customers served by central North Carolina wholesale firms are classified into (1) institutions, restaurants, and retailers, (2) full-line distribution warehouses, (3) wholesalers, and (4) other. Table 18 summarizes the volumes moving to the different types of customers, by type of firm.

Different types of wholesalers serve different kinds of customers. Grocery firms in central North Carolina move almost all of their volume to retail stores with the remainder moving to cash-and-carry outlets and some restaurants. Sales to full-line distribution warehouses and other wholesalers reflect sales of speciality or occasional purchases of out-of-stock items. Almost half

**Table 14.—Summary by type of firm and by form in which commodities are received, central North Carolina<sup>1</sup>**

Type of firm	Bulk	Pallet load	Packages	Carcass	Primal cuts	Other	Total
<i>Tons</i>							
Fruits and vegetables	134,862	168,160	112,606	0	0	0	415,628
Meat and related products	18,957	22,483	35,170	1,575	712	2,628	81,525
Poultry and eggs	0	10,230	520	0	0	148,177	158,927
Groceries	0	479,970	773,773	4,984	44,352	1,280	1,304,359
Bakery products	37,969	7,965	3,685	0	0	6,710	56,329
Dairy products	53,498	38,416	6,773	0	0	68,908	167,595
Beverages	62,408	167,947	875	0	0	0	231,230
Grain mill products	2,411	0	0	0	0	0	2,411
Other foods	12,125	18,547	2,161	0	0	0	32,833
Total	322,230	913,718	935,563	6,559	45,064	227,703	2,450,837

<sup>1</sup>Includes interdealer transfer.

**Table 15.—Summary by county and by form in which commodities are received, central North Carolina<sup>1</sup>**

County	Bulk	Pallet load	Packages	Carcass	Primal cuts	Other	Total
<i>Tons</i>							
Chatham	3,243	3,482	0	0	0	71,937	78,662
Durham	55,169	55,001	945	1,565	58	43,587	156,325
Franklin	0	413	46	0	0	23,913	24,372
Harnett	17,911	28,407	1,137	0	0	5,747	53,202
Johnston	15,780	37,119	13,131	0	0	3,186	69,216
Lee	13	48,517	26,971	0	0	3,092	78,593
Nash	46,318	81,720	80,781	0	0	10,217	219,036
Wake	95,666	606,950	782,921	4,984	44,902	64,412	1,599,835
Wilson	88,130	52,109	29,631	10	104	1,612	171,596
Total	322,230	913,718	935,563	6,559	45,064	227,703	2,450,837

<sup>1</sup>Includes interdealer transfer. No wholesale firms are reported in Granville and Orange Counties.

of the total volume of fruit and vegetable wholesalers moves to full-line distribution warehouses, and an additional 22 percent moves to other wholesalers.

With such a large percentage of the total volume of fruit and vegetable wholesalers moving into the wholesale trade, this type of firm enjoys a significant advantage as a reliable supplier of speciality and general line produce. Direct sales to restaurants and retail outlets are also a significant part of the overall business of fruit and vegetable wholesalers. Ninety-one percent of the total volume of beverage firms moves

directly to retail outlets, which indicates many wholesale firms obtain beverage supplies directly from manufacturers or wholesaler-processors outside the study area. Approximately 2 percent of the total volume noted as "other" moves through cash-and-carry outlets.

*Method of distribution.*—Wholesalers in central North Carolina use three methods to move their products from primary and secondary facilities to customers. These methods are (1) delivered by wholesalers, (2) picked up by customers, and (3) delivered by for-hire firms. For the purposes of this report, the term "delivered by whole-

Table 16.—Source of supply, by type of firm, central North Carolina

Type of firm	Within study area		Outside study area (within State)		Outside State						Total Tons
					North		South		West		
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	
Fruits and vegetables . . .	214,636	52	48,354	11	23,676	6	481,947	15	66,820	16	415,628
Meat and related products . . . . .	5,904	7	5,621	7	26,692	33	6,299	8	37,009	45	81,525
Poultry and eggs . . . . .	100,632	63	58,065	37	—	—	—	—	230	1	158,927
Groceries . . . . .	49,762	4	56,190	4	332,348	26	303,611	23	562,448	43	1,304,359
Bakery products . . . . .	6,154	11	33,943	60	4,642	8	2,050	4	9,540	17	56,329
Dairy products . . . . .	130,858	78	35,702	22	777	1	216	1	42	1	167,595
Beverages . . . . .	10,089	4	58,847	25	47,963	21	100,944	44	13,387	6	231,230
Grain mill products . . . . .	1,405	58	1,000	42	—	—	6	1	—	—	2,411
Other foods . . . . .	10,522	32	3,972	12	6,106	19	6,679	20	5,554	17	32,833
Total . . . . .	529,962	22	301,694	12	442,204	18	481,947	20	695,030	28	2,450,837

<sup>1</sup>Less than 1 percent.

Table 17.—Source of supply to facility locations in counties within the wholesale study area, central North Carolina<sup>1</sup>

County	Within study area		Outside study area (within State)		Outside State						Total Tons
					North		South		West		
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	
Chatham . . . . .	31,339	40	41,308	53	1,856	2	974	1	3,185	4	78,662
Durham . . . . .	95,872	61	33,396	21	7,889	5	17,093	11	2,075	2	156,325
Franklin . . . . .	22,195	91	1,833	8	92	2	22	2	230	1	24,372
Harnett . . . . .	42,715	80	3,805	7	1,750	3	4,032	8	900	2	53,202
Johnston . . . . .	49,853	72	16,031	23	453	1	752	1	2,127	3	69,216
Lee . . . . .	10,017	13	14,333	18	16,079	20	8,597	11	29,567	38	78,593
Nash . . . . .	51,160	23	42,181	19	32,688	15	38,858	18	54,149	25	219,036
Wake . . . . .	128,479	8	104,837	7	376,629	23	401,508	25	588,382	37	1,599,835
Wilson . . . . .	98,332	57	43,970	26	4,768	3	10,111	6	14,415	8	171,596
Total . . . . .	529,962	22	301,694	12	442,204	18	481,947	20	695,030	28	2,450,837

<sup>1</sup>Includes interdealer transfer.

<sup>2</sup>Less than 1 percent.

salers” is defined as the wholesalers’ products moving on trucks owned or leased by them. “Picked up by customers” is defined as products purchased and transported on vehicles owned by customers. Some companies hire others to deliver their products. The term “delivered by for-hire firms” refers to the arrangement whereby wholesale food firms place their products on vehicles hired by the food wholesale company and driven by employees of the transportation company. Table 19 outlines the method of delivery the wholesalers utilized to move products to their customers.

Most products moving from area wholesale facilities are delivered by the wholesalers. Of the total volume handled, only fruit and vegetable wholesalers deliver less than half of their total volume on their own trucks. Meat and related product, dairy product, bakery product, beverage, and grain mill product wholesalers deliver over 90 percent of their total volume on their own trucks.

Significant use is made in central North Carolina of commercial carriers to deliver wholesale products. Of

**Table 18.—Volume of food products handled, by type of firm and customer, central North Carolina<sup>1</sup>**

Type of firm	Institutions, restaurants, and retailers		Full-line distribution warehouses		Wholesalers		Other		Total Tons
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	
Fruits and vegetables .....	85,007	20	205,053	49	89,523	22	36,045	9	415,628
Meat and related products .....	23,607	29	17,435	21	31,161	38	9,322	12	81,525
Poultry and eggs .....	39,149	25	78,263	49	40,365	25	1,150	1	158,927
Groceries .....	1,303,645	100	208	2	269	2	237	2	1,304,359
Bakery products .....	38,809	69	5,558	10	11,962	21	—	—	56,329
Dairy products .....	156,979	94	1,064	1	1,831	1	7,721	4	167,595
Beverages .....	220,639	95	10,500	5	91	2	—	—	231,230
Grain mill products .....	2,330	96	—	—	81	4	—	—	2,411
Other foods .....	11,112	34	20,067	61	1,654	5	—	—	32,833
Total .....	1,881,277	77	338,148	14	176,937	7	54,475	2	2,450,837

<sup>1</sup>Includes interdealer transfer.

<sup>2</sup>Less than 1 percent.

**Table 19.—Volume of food products handled, by method of delivery, central North Carolina<sup>1</sup>**

Type of firm	Delivered by wholesaler		Picked up by customers		Delivered by for-hire firms		Total Tons
	Tons	Percent	Tons	Percent	Tons	Percent	
Fruits and vegetables .....	137,686	33	52,584	13	225,358	54	415,628
Meat and related products .....	73,338	90	3,855	5	4,332	5	81,525
Poultry and eggs .....	104,167	66	460	2	54,300	34	158,927
Groceries .....	1,094,277	84	8,819	1	201,263	15	1,304,359
Bakery products .....	51,177	91	352	2	4,800	8	56,329
Dairy products .....	156,593	93	11,002	7	3	3	167,595
Beverages .....	224,930	97	6,300	3	3	9	231,230
Grain mill products .....	2,411	100	3	3	3	3	2,411
Other foods .....	16,897	51	13,046	40	2,890	9	32,833
Total .....	1,861,476	70	96,418	4	492,943	20	2,450,837

<sup>1</sup>Includes interdealer transfers.

<sup>2</sup>Less than 1 percent.

<sup>3</sup>None reported.



the firms included in this study, fruit and vegetable wholesalers make the most extensive use of this type of delivery service. Over half of the total volume handled by this type of firm, 54 percent, is delivered to customers by "for-hire" trucking firms. Other companies use commercial carriers to supplement trucks owned or leased by the food company during periods of high activity or in special circumstances.

Customers often are discouraged from picking up their purchases at the wholesale facility. Modern food handling, processing, and warehousing facilities are not well designed to accommodate large numbers of outside vehicles and visitors. In contrast, some food and grocery firms have specialized operations to accommodate small purchases by restaurant and small retail store operations on a cash-and-carry basis.

*Destination of products.*—Each different type of wholesale firm included in this study showed different patterns of product movement. As shown in table 20, of the nine kinds of wholesale food firms, beverage firms have the largest percentage of total volume (85 percent) remaining within the 11-county region surrounding Raleigh. This large percentage of locally consumed beverages is a direct result of highly defined sales regions established by contract and agreement with the parent organizations. The remaining volume of beverages moving outside the study area is being sold to other beverage processing firms for later redistribution to retail outlets. In contrast, most of the poultry and egg wholesale volume (80 percent) moves outside the study area and outside the State. Poultry and egg

wholesalers represent a substantial source of supply within North Carolina while the largest percentage of the volume moves to customers outside the State.

Grain mill product firms only serve customers within North Carolina. These firms receive raw material grown elsewhere, process the material, and sell these products to local consumers. Similar firms elsewhere serve only local customers. For such firms, customer location tends to influence the location of the processing operation.

Other types of wholesale food firms serve both local consumers and more distant wholesale and retail outlets. Fruit and vegetable wholesalers sell about half of their total volume in North Carolina and the remainder to distant markets throughout the United States.

Table 21 summarizes the destination of products from the various firms located in each jurisdiction. Counties differ in the percentages of total volumes moving to various locations. Lee and Durham Counties send the largest percentages of total food products that are sold to wholesalers within the study area, 62 and 67 percent, respectively.

Wake County, with the largest concentration of wholesale firms, serves both local and out-of-State markets. Of the total volume, 47 percent remains within the study area, 34 percent is distributed outside the study area but within the State, and 19 percent is distributed outside the State.

Table 20.—Destination of food products handled, by type of firm, central North Carolina<sup>1</sup>

Type of firm	Within study area		Outside study area		Outside State						Total Tons
	Tons	Percent	Tons	Percent	North		South		West		
Fruits and vegetables . . . .	112,457	28	62,518	15	108,972	26	47,534	11	84,147	20	415,628
Meat and related products . . . . .	30,663	37	17,144	21	11,280	14	14,667	18	7,771	10	81,525
Poultry and eggs . . . . .	31,467	20	32,274	20	91,216	57	2,820	2	1,150	1	158,927
Groceries . . . . .	528,322	40	519,915	40	247,207	19	8,915	1	0	0	1,304,359
Bakery products . . . . .	19,740	36	15,984	28	17,605	31	0	0	3,000	5	56,329
Dairy products . . . . .	124,469	74	40,313	24	2,813	2	0	0	0	0	167,595
Beverages . . . . .	196,247	85	34,983	15	0	0	0	0	0	0	231,230
Grain mill products . . . . .	1,194	50	1,217	50	0	0	0	0	0	0	2,411
Other foods . . . . .	18,789	58	4,079	12	5,072	16	2,431	7	2,462	7	32,833
Total . . . . .	1,063,348	43	728,427	30	484,165	20	76,367	3	98,530	4	2,450,837

<sup>1</sup>Includes interdealer transfer.

**Employment**—The wholesale food firms included in this study employ over 8,900 people. Of the total, 17 percent are classified as administrative and sales personnel, 12 percent as handlers, 43 percent as processors, 15 percent as truck drivers, 1 percent as truck helpers, and 12 percent as other. Of the total wholesale food industry employment, 13 percent are employed by fruit and vegetable firms, 13 percent by meat and related product firms, 8 percent by dairy product firms, 18 percent by poultry and egg firms, 19 percent by grocery firms, 11 percent by bakery firms, 9 percent by beverage firms, 8 percent by other food firms, and less than 1 percent by grain mill product firms. Table 22 summarizes employment, by type of firm.

The nature of the activities associated with different types of wholesale firms is reflected in the relative

numbers of various kinds of employees. Processing firms employ large numbers of personnel in their specific operations. Meat and related product and poultry and egg firms identify approximately 58 and 82 percent of their employees as processors, respectively. In contrast, less than 3 percent of the employees of grocery firms are classified as processors but over 43 percent of the employees of such firms are classified as handlers.

Employment classification differs by types of wholesale firms in each county. Employment by county ranged from a little more than 1 percent in Franklin to more than 46 percent of the total wholesale food industry employment in Wake County. Table 23 summarizes employee classification by county for central North Carolina.

**Table 21.—Destination of food products handled, by county, central North Carolina<sup>1</sup>**

County	Within study area		Outside study area		Outside State						Total
					North		South		West		
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons
Chatham	6,417	8	16,161	21	53,252	67	2,832	4	0	0	78,662
Durham	97,384	62	25,860	17	33,081	21	0	0	0	0	156,325
Franklin	9,217	38	8,255	34	3,450	14	2,300	9	1,150	5	24,372
Harnett	8,928	17	11,496	22	20,064	37	7,600	14	5,114	10	53,202
Johnston	15,756	23	904	1	23,363	34	5,216	8	23,977	34	69,216
Lee	52,094	67	25,426	32	112	0	864	1	97	0	78,593
Nash	78,578	35	71,271	33	25,068	11	23,047	11	21,072	10	219,036
Wake	756,624	47	545,975	34	281,402	18	9,263	1	6,571	0	1,599,835
Wilson	38,350	22	23,079	13	44,373	26	25,245	15	40,549	24	171,596
Total	1,063,348	43	728,427	30	484,165	20	76,367	3	98,530	4	2,450,837

<sup>1</sup>Includes interdealer transfer.

**Table 22.—Employee classification, by type of firm, central North Carolina**

Type of firm	Administrative and sales	Handlers	Processors	Truck drivers	Truck helpers	Other	Total
	Number						
Fruits and vegetables	105	95	445	81	7	464	1,197
Meat and related products	244	67	695	99	16	69	1,190
Poultry and eggs	74	9	1,344	75	4	136	1,642
Groceries	448	679	55	240	—	168	1,590
Bakery products	225	34	468	216	9	65	1,017
Dairy products	150	20	235	261	—	23	689
Beverages	183	110	195	247	18	86	839
Grain mill products	5	—	11	6	1	—	23
Other foods	112	48	441	108	—	37	746
Total	1,546	1,062	3,889	1,333	55	1,048	8,933

Table 23.—Employee classification, by county, central North Carolina

County	Administrative and sales	Handlers	Processors	Truck drivers	Truck helpers	Other	Total
Chatham .....	58	3	878	48	11	27	1,025
Durham .....	137	44	533	151	2	122	989
Franklin .....	12	0	50	15	0	4	81
Harnett .....	59	27	262	39	0	471	858
Johnston .....	62	15	148	31	0	29	285
Lee .....	64	70	25	73	0	17	249
Nash .....	134	142	328	298	10	16	928
Wake .....	934	735	1,452	611	14	350	4,096
Wilson .....	86	26	213	67	18	12	422
Total .....	1,546	1,062	3,889	1,333	55	1,048	8,933

### Farmers' Markets

There are two major farmers' markets in central North Carolina. These markets are the Raleigh State Farmer's Market and the Old City Market. Of the two markets, the Raleigh State Farmer's Market is the major facility that represents an active and successful center for distributing fresh fruits and vegetables as well as a limited amount of related products. The Old City Market, once an important center of both wholesale and retail activity, has substantially declined in importance as a major factor in marketing food in the study area. The decline of the Old City Market to a position of relative minor significance in the marketing of food, when compared with the Raleigh State Farmer's Market, offers an opportunity to illustrate the importance of facility-related problems in or near this once thriving market.

**The Raleigh State Farmer's Market**—The Raleigh State Farmer's Market is located on a triangular tract of land in Raleigh, N.C., 3 miles north of the central business district, adjacent to highway U.S. 1 North. This center serves wholesale firms, growers, retailers, and others associated with the food industry. The market is currently owned and operated by the State after initial construction by a private developer in 1955.

*Facilities.*—Buildings, totaling 137,900 square feet, are located on the market and serve different groups using the market. Table 24 lists each building and identifies its size and use (fig. 2). An aerial view of the Raleigh State Farmer's Market is shown in figure 3.

Table 24.—Buildings by designation, name, and size on the Raleigh State Farmer's Market, Raleigh, N.C.<sup>1</sup>

Facility	First floor Square feet
28-unit warehouse, wholesale building 1 .....	63,000
8-unit warehouse, wholesale building 2 .....	18,000
Garden supply center and nursery .....	14,200
Grocery warehouse .....	10,800
Trucker's shed 1 .....	6,000
Truckers' shed 2 .....	8,000
Retail market building .....	14,400
Restaurant .....	2,000
Office .....	1,000
Total .....	137,900

<sup>1</sup>See figures 11 and 12.

The farmers' market site covers approximately 17 acres. Property lines for the site are bounded on two sides by Crabtree Creek. Hodges Street serves as the remaining boundary of the triangular site. The main access from the market to highway U.S. 1 North is by way of Hodges Street.

The various buildings on the market are grouped into six major categories: (1) warehouse buildings 1 and 2, (2) garden supply center and nursery, (3) grocery warehouse, (4) truckers' shed 3, (5) retail market building 1, and (6) truckers' shed 2. Each category grouping reflects the different activities taking place on the market as well as differences in types of structures.



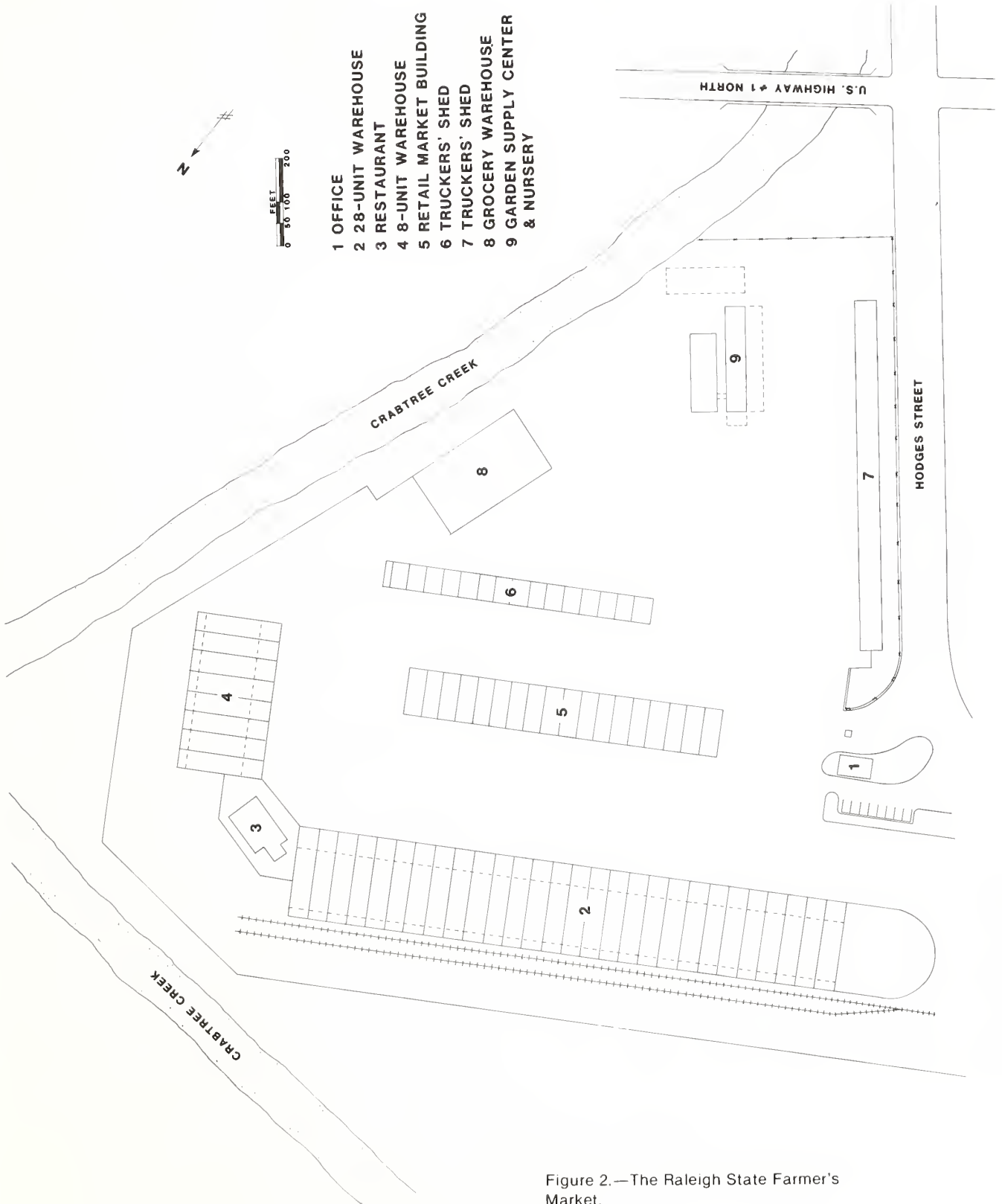


Figure 2.—The Raleigh State Farmer's Market.

Wholesale buildings 1 and 2 — There are 10 wholesalers occupying space in two buildings. There is a total of 36 units; 28 in building 1, which is serviced by double house tracks, and 8 in building 2, which is not served by rail. Each unit is 22 1/2 feet wide by 100 feet deep, which includes a 24-foot-wide open-front platform and a 10-foot-wide open-rear platform. The distribution of units among the wholesalers was as follows: two had six units, two had five units, three had three units, two had two units, and one had one unit. Building 1 has a total of 63,000 square feet of first-floor space. This is comprised of 41,580 square feet of enclosed first-floor space, 15,120 square feet of open-front platform space, and 6,300 square feet of open-rear platform space. Building 2 has a total of 18,000 square feet of first-floor space, which is comprised of 11,880 square feet of enclosed first-floor space, 4,320 square feet of open-front platform, and 1,800 square feet of open-rear platform.

The combined total of first-floor space in the two buildings is 81,000 square feet of which 53,460 is enclosed first-floor space, 19,440 square feet is open-front platform space, and 8,100 square feet is open-rear platform space. The open-front platform has a varied height due to repaving over the years. Almost all trucks must be hand loaded and unloaded because of the uneven platform height. Cooling systems are controlled by individual firms. Most systems are antiquated but are utilized because of the high capital investment needed to replace them. The majority of second-floor space is utilized as offices or storage. Some second-floor space has been removed by wholesalers in order to utilize pallet racks.

Garden supply center and nursery — The garden supply center is located in the old retail market building, which was moved from its original location in front of the truckers' shed to its present location in the southeast corner of the market facing Hodges Street. The building is 50 by 125 feet. A 30- by 90-foot greenhouse has been constructed at the rear of the facility. A canopied holding area 30 by 90 feet for evergreens, shrubs, and hanging baskets is located adjacent to Crabtree Creek and U.S. 1 North. An open canopied sales area, measuring 20 by 90 feet, faces Hodges Street and a smaller open canopied sales area, 15 by 50 feet, faces the market manager's office. The garden supply center occupies a total of 14,200 square feet, of which 8,950 is enclosed space and 5,250 is canopied open space.

Grocery warehouse — A cash-and-carry grocery warehouse, 80 by 135 feet, is located on the western boundary of the market. This metal-clad building contains 10,800 square feet of space and is constructed on a cement slab at ground level (see building 8, fig. 11).

Truckers' shed 2 — This shed was completed in 1978 and is the newest addition to the market. It is an open building 400 feet long and 20 feet wide and is divided into 20 stalls each with a 20-foot width. Sales in this building are either wholesale or retail (see building 7, fig. 11).

Retail market building — The retail market building consists of an open shed 360 feet long and 40 feet wide with a 7-foot roof overhang on each side. Nine units (20 by 40 feet) contain 7,200 square feet of space which is utilized for retail sales. A center aisle runs the length of this area. Sellers are set up on each side of the aisle. Two units (20 by 40 feet) contain 1,600 square feet and are utilized by two small wholesale truckers who have enclosed the units they occupy to meet their individual warehousing needs. A portion of this space is refrigerated (see building 5, fig. 11).

Truckers' shed 1 — This truckers' shed is an open building 300 feet long and 20 feet wide. It is divided into 15 stalls, 20 feet wide. Sales in this building are restricted to wholesale only, that is, produce must be sold by the bushel, basket, or carton (see building 6, fig. 11).

Two additional buildings also are located on the market and are used to support general market operations. The managers of the market maintain an office on the market and a restaurant is provided for the use of market employees and customers visiting the facility.

*Market product movement.*—Product movement through the Raleigh State Farmer's Market includes receipts, source of supply, and a profile of the customer use of the center.

Receipts — A survey of the growers using the Raleigh State Farmer's Market revealed that approximately 50 different commodities are sold on the market. The majority (80 percent) of these commodities are fresh fruits and vegetables while the remainder includes such items as eggs, meat, crafts, flowers, plants, and so forth. The commodities generating the largest cash revenues for growers were watermelons, cantaloupes, corn, tomatoes, sweet potatoes, butter beans, cabbage, snap beans, squash, and cucumbers.



Figure 3.—Overhead view of the Raleigh State Farmer's Market.

The total volume of commodities handled by both in-State and out-of-State growers selling on the market in 1979 was approximately 4,200 tons. This figure represents the volume handled primarily by North Carolina growers selling under the grower shed and in pickup truckload quantity. The value of these commodities was estimated at nearly \$1.5 million.

The total annual volume of in-State and out-of-State farm products that moved through the market exceeded

15,000 tons. The tractor-trailer loads of seasonal out-of-State produce sold by truckers account for the difference between the in-State and out-of-State tonnage.

Growers make maximum use of the market during the months of May to October, which is the peak growing season in the State. The total volume of commodities brought to the market by both local and out-of-State sellers in these months is approximately 3,800 tons, more than 90 percent of the annual volume. The months



of July and August generated nearly 25 percent each of the total annual volume and, together, approximately 45 percent of the total annual value of incoming products sold by growers on the market.

The large variety of fresh fruits and vegetables found on the market typically comes from growers specializing in a few commodities. Approximately 80 percent of the growers brought less than five commodities per trip to the market. In addition, up to 90 percent of the growers brought commodities with a value of less than \$2,000 annually.

Source of supply — Results of the study indicate that approximately 479 growers used this market annually, of which 98 percent resided in North Carolina (table 25). More than 40 percent of the counties in the State had

**Table 25.—Total annual volume, sales, and number of growers using the farmers' market, by county in 1979**

County	Growers	Volume	Sales
	Number	Tons	Dollars
Wake .....	126	1,152	339,356
Johnston .....	112	1,000	321,374
Sampson .....	50	552	157,339
Harnett .....	42	300	121,865
Halifax .....	12	78	62,409
Cumberland .....	11	104	51,565
Duplin .....	5	96	50,461
Wayne .....	20	152	41,816
Robeson .....	11	70	38,678
Vance .....	7	52	35,983
Watauga .....	1	48	33,435
Moore .....	12	52	27,204
Ashe .....	1	22	15,652
Pamlico .....	1	22	15,652
Nash .....	9	48	12,082
Richmond .....	4	26	11,730
Montgomery .....	2	35	11,552
Durham .....	6	4	9,261
Pender .....	3	13	8,956
Chowan .....	2	9	7,826
Others <sup>1</sup> .....	32	109	38,691
Out-of-State .....	10	252	67,930
<b>Total .....</b>	<b>479</b>	<b>4,196</b>	<b>1,480,817</b>

<sup>1</sup>Includes Brunswick, Chatham, Columbus, Edgecombe, Franklin, Granville, Lee, Northampton, Onslow, Perquimans, Person, Surry, Warren, and Wilson Counties.

growers who used the market. Growers in Wake, Johnston, Sampson, Harnett, Cumberland, Moore, Duplin, Robeson, Wayne, and Halifax Counties comprised 82 percent of the total growers using the market. Wake and Johnston Counties alone accounted for approximately half of the total market users.

Wake and Johnston Counties generated approximately the same tonnage and together accounted for about half of the total volume. However, the dollar value of commodities brought to the market from these counties was less than 45 percent of the total.

Although the majority of fresh fruit and vegetable growers that sell on the market are located in North Carolina, the amount of out-of-State produce sold exceeds that from in-State sources. Market records show that more than 9,000 tons of produce comes from out-of-State sources annually. Produce originating from local sources may be of smaller quantities but a significantly larger variety is available. The principal commodities grown in areas outside of the State and trucked to the market are apples, peaches, citrus, tomatoes, cabbage, watermelon, and cantaloupes.

Customers — The increasing number of vehicles and customers that come to the market during peak periods of the season has surpassed the capacity of the market. Traffic congestion occurs at the entrance gate and customers must be watchful of moving vehicles while shopping on the market. The large volume of vehicle and customer traffic, while beneficial for the vendors, has created an unsafe environment for shoppers.

The results of a 1-week traffic survey conducted during the peak of the 1980 growing season indicated that nearly 17,000 vehicles entered the market during that time. Of this total, approximately 74 percent were automobiles, 21 percent pickup trucks, and 5 percent other vehicles (straight trucks, tractor-trailers, and motorcycles).

The largest volume of traffic occurred on Saturday when more than 4,100 vehicles, or 25 percent of the weekly total, entered the market (table 26). Vehicle traffic was evenly dispersed during the remainder of the week with 13 percent of the weekly total arriving on Monday, 14 percent on Tuesday, 14 percent on Wednesday, 15 percent on Thursday, and 19 percent on Friday.

The amount of money consumers spent on an average visit to the market depended largely on the frequency of their visits and the distance they had to travel. These results were taken from a consumer survey which indicated that about 9 percent of the consumers spent less

than \$5 per visit (table 27). Thirty-five percent of the consumers spent \$5 to \$9.99 and 31 percent spent \$10 to \$14.99 per visit. Up to 75 percent of the consumers interviewed spent less than \$15 and nearly 85 percent spent less than \$20 per visit.

Although the primary consumer attraction to the market is the variety of fresh fruit and vegetables, almost half of the customers interviewed also purchased flowers or potted plants. In addition, 23 percent of the total number of people participating in the study also purchased craft items on the day they were interviewed at the market.

More than one-third of the customers surveyed said they were getting fresher and better quality produce at the Raleigh State Farmer's Market than at their local food store. Another 18 percent said the prices were cheaper and 16 percent said that the farmers' market offered a larger variety of produce than local food stores.

**Old City Market**—The old city market building, illustrated in figure 4, was designed in Spanish Mission style by architect James Mathew Kennedy and its construction dates from 1914. One of the most striking features of the building is the red tile roof with a wide overhang.

**Table 26.—Number of vehicles entering the farmers' market for each day of the week**

Day	Vehicles	Percent
Monday	2,187	13
Tuesday	2,360	14
Wednesday	2,328	14
Thursday	2,466	15
Friday	3,303	19
Saturday	4,160	25
Total	16,804	100

Although the building is designed as a market, this function is presently carried on to a limited degree. The present market operates only under the eaves on either side of the building. The inside of the building houses a furniture and appliance store. Most farmers who still bring goods to the 67-year old market do so only on Fridays and Saturdays.

Most of the market activity revolves around retail trade serving the needs of the immediate neighborhood. A majority of food presently sold at the market caters to the ethnic preferences of local customers. The current activity during a busy day at the old city market is shown in figure 5.



**Figure 4.—Exterior of the old city market, Raleigh, N.C.**

**Table 27.—Average consumer expenditure per trip to the farmers' market**

Cost of Purchase	Number of trips						Total	Percent
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday		
Less than \$5	2	—	4	3	3	3	15	9
\$5 to \$9.99	6	9	6	3	6	30	60	35
\$10 to \$14.99	4	7	4	4	8	27	54	31
\$15 to \$19.99	1	3	2	1	1	8	16	9
\$20 to \$24.99	1	1	2	4	1	2	11	6
\$25 or more	1	2	4	2	3	5	17	10
Total	15	22	22	17	22	75	173	100

At one time the old city market was the center of both retail and wholesale trade in the Raleigh area. During this period, the market faced many of the problems that are evident today around facilities used by both farmers' markets and wholesale facilities. Congestion, poorly designed buildings not originally intended for handling food products, and narrow streets all contributed to a growing demand for new facilities. Figure 6 shows the market as it appeared during the 1920's with farmers' and merchants' wagons waiting for space at the then busy center. Wholesale firms also were located adjacent and utilized buildings adapted to food wholesaling as shown in figure 7. Narrow streets around the market are illustrated in figure 8.

The decline of this once important center of food trade was imminent with the construction of what would become the Raleigh State Farmer's Market. Due to the present limited importance of the old city market, activities on the market are not included in the general scope of this report.



Figure 5.—Activity during a busy day at the old city market.



Figure 6.—The old city market as it looked in the 1920's.



## Need for New Facilities

There is a need for both new wholesale food distribution and farmers' market facilities to serve central North Carolina.

### Wholesale Food Firms

Although there are differing reasons for finding existing warehouses unsuitable, several wholesale food firms were identified as needing new facilities. Some of the firms are in buildings that were not designed to handle food products. Changes in handling, storage, and processing technology cannot be accommodated in the facilities in order for these companies to remain competitive. Other companies are in well-designed buildings, but are located on sites that do not provide sufficient space to expand storage and processing space to accommodate actual or planned growth. A few companies are in areas where other construction projects may force them to relocate. In other instances, lease or renting arrangements are being terminated, requiring relocation of the company facilities. A limited number of firms plan completely new operations to supplement existing wholesale or processing activity.

Twenty-nine wholesale food firms, or 17 percent of the firms included in this study, need new facilities. Firms in six categories — fruits and vegetables, meat and related products, poultry and eggs, groceries, bakery products, and other foods — are included among the group identified as candidates for relocation to new facilities.

The group of food firms needing new facilities are an important segment of the total food industry serving central North Carolina. This group of firms handled 18 percent of the total volume of food products moving through the 11-county area. Companies identified as needing new facilities occupied over 345,000 square feet of floorspace in primary and secondary facilities, including about 77,000 square feet of refrigerated storage space. Of the firms needing new facilities, 20 are located in Wake County and 9 in other counties within the study area.

Table 28 summarizes the major characteristics of the wholesale food firms identified as needing new facilities. These firms are grouped into four separate categories, identifying the specific groups of firms needing new facilities and combining some groups to avoid revealing confidential information. These groups are: (1) Fruits and vegetables, (2) meat, poultry, and eggs, (3) groceries, and (4) bakery and other foods. This commodity identification is retained throughout the remainder of this report.



Figure 7.—Wholesale facilities formerly located adjacent to the old city market.



Figure 8.—Narrow streets between former wholesale facilities previously adjacent to the old city market.

### Farmers' Market Facilities

Facilities located on the Raleigh State Farmer's Market also need replacement in order to promote overall efficient marketing of food products in central North Carolina. The existing buildings located on the market cannot be economically or practically modernized on the present site.

Several conditions currently hamper the effective use

of the Raleigh State Farmer's Market. Many of the facilities on the market are approaching the end of their useful life. While buildings are kept in good repair, the advanced age of the facilities makes such repairs more costly. In addition, the limited space available on the site restricts possible expansion. The market also is subject to periodic flooding which causes extensive damage to wholesale buildings and inventory (fig. 9). Paving and buildings also are damaged periodically by high water on the site (fig. 10).

Table 28.—Number, volume, and space of firms needing new facilities, central North Carolina

Type of firm	Number of firms	Percentage of total firms	Volume	Present space			Refrigerated space		Total refrigerated space
				Primary	Secondary	Total	Cooler	Freezer	
	<i>Number</i>	<i>Percent</i>	<i>Tons</i>	<i>Square feet</i>					
Fruits and vegetables . . . . .	13	28	168,299	130,622	0	130,622	26,761	0	26,761
Meat, poultry, and eggs . . . . .	4	31	9,352	65,100	0	82,000	19,650	6,150	25,800
Groceries . . . . .	4	22	106,150	96,000	17,500	96,000	4,000	10,700	14,700
Bakery and other foods . . . . .	8	61	148,915	36,095	0	36,095	96	0	9,396
Total <sup>1</sup> . . . . .	29	17	432,716	327,817	17,500	345,317	50,507	9,300	76,657

<sup>1</sup>Two firms are not included in cost analysis because they are new operations with no data on present costs available.



Figure 9.—Flood-damaged inventory and buildings on the Raleigh State Farmer's Market.



Figure 10.—Heavy flood damage on the Raleigh State Farmer's Market.



## Improving Marketing Facilities

A new wholesale food distribution center would provide central North Carolina with a modern, efficient facility that would accommodate the 29 wholesale food firms needing new facilities and the expansion needs of the State farmers' market at Raleigh (fig. 11).

The plan for the center provides for:

1. Buildings that encourage efficiency of handling and distribution.
2. Space for expansion.
3. Wide streets on which traffic can flow freely into, within, and from the food center.
4. Direct rail service.
5. Adequate loading, unloading, and parking areas.

This center would be located on a site of approximately 75 acres, including land of imminent market expansion with still additional land needed for future development and further expansion. It includes 12 buildings with approximately 250,000 square feet of initial space plus 100,000 square feet for projected expansion. The floor-space, land, and projected expansion of this center are summarized in table 29.

The methodology for estimating building expansion requirements is based on present consumption trends of the various food products handled by central North Carolina food wholesalers needing new facilities. Information available concerning certain products is insufficient to develop fully credible estimates of future consumption. Changing consumption patterns for other foods precludes full reliability concerning these estimates. The projections shown in this report are for illustrative purposes and should not be substituted for estimates prepared in actual facility planning near the time when a new center would be actually constructed to serve central North Carolina.

To meet the need for new facilities, the proposed center would have three main sections—(1) a wholesale market to serve food firms that need new buildings, (2) a farmers' market to house firms relocating from the Raleigh State Farmer's Market, and (3) market support facilities (gatehouse, offices, restaurants, etc.) to provide specialized services to others on the center.



Figure 11.—Wholesale food distribution center and farmers' market for central North Carolina.



Table 29. — Building and land requirements for the proposed wholesale food distribution center and farmers' market for central North Carolina

Type of firm and/or facility	Initial development						Projected development <sup>1</sup>							
	Firms needing new facilities			Multiple-occupancy buildings			Multiple-occupancy buildings			Single-occupancy buildings				
	Number	Sq ft	Number	Sq ft	Number	Sq ft	Units	Space	Buildings	Number	Space	Buildings	Space	Land
<b>Wholesale market:</b>														
Fruits and vegetables .....	13	60,000	0	0	60,000	0	18.5	55,500	2	24,200	2	24,200	79,700	10.54
Meat, poultry, and eggs .....	4	15,000	1 <sup>2</sup>	14,125	29,125	3.0	3.0	9,000	2	29,600	2	29,600	38,600	5.10
Groceries .....	4	9,000	2	82,000	91,000	4.0	4.0	12,000	2	102,000	2	102,000	114,000	15.08
Bakery and other foods .....	8	18,000	0	0	18,000	7.0	7.0	21,000	1 <sup>3</sup>	12,100	1 <sup>3</sup>	12,100	33,100	4.38
Total .....	29	102,000	3	96,125	198,125	32.5	32.5	97,500	7	167,900	7	167,900	265,400	35.10
<b>Farmers' market:</b>														
Truckers' building .....	—	0	1	16,000	16,000	0	0	0	1	28,800	1	28,800	28,800	10.83
Retail building .....	—	0	1	12,000	12,000	0	0	0	1	21,600	1	21,600	21,600	8.12
Garden center .....	1	0	1	14,300	14,300	0	0	0	1	14,300	1	14,300	14,300	5.38
Total .....	1	0	3	42,300	42,300	0	0	0	3	64,700	3	64,700	64,700	24.33
<b>Market support:</b>														
Office building .....	—	0	1	13,000	13,000	0	0	0	1	13,000	1	13,000	13,000	2.34
Gatehouse .....	—	0	1	200	200	0	0	0	1	200	1	200	200	.04
Restaurant .....	1	3,000	0	0	3,000	2.5 <sup>4</sup>	2.5 <sup>4</sup>	7,500	0	0	0	0	7,500	1.35
Total .....	1	3,000	2	13,200	16,200	2.5	2.5	7,500	2	13,200	2	13,200	20,700	3.73
Developed center total .....	31	105,000	8	151,625	256,625	35.0	35.0	105,000	12	245,800	12	245,800	350,800	63.16
Undeveloped site .....	—	—	—	—	—	—	—	—	—	—	—	—	—	341.59 <sup>5</sup>
Center total .....	31	105,000	8	151,625	256,625	35.0	35.0	105,000	12	245,800	12	245,800	350,800	404.75

<sup>1</sup>Estimates of projected development space are based on the assumption that the new firms will locate on the center after the initial stage of development has been completed, except where noted in the table and text.

<sup>2</sup>New operation.

<sup>3</sup>One firm is anticipated to construct new warehousing facilities after the initial stage of center development has been completed. For planning purposes, one 12,100-square-foot building has been included in the projected development space to reflect this anticipated new operations.

<sup>4</sup>Expansion of nonfood facilities or new firms on the market is anticipated, for planning purposes to occupy space in the multiple-occupancy building vacated by food firms relocating to new single-occupancy buildings constructed on the center in later stages of development.

<sup>5</sup>Initial planning anticipates a site of approximately 75 acres with 11.84 acres needed for imminent market expansion in early stages of development.

## Wholesale Market

The wholesale market has two basic types of buildings, each designed to serve the needs of particular kinds and sizes of food firms. These two types of wholesale market buildings are multiple-occupancy and single-occupancy.

Multiple-occupancy buildings are designed to facilitate modern food handling and storage and to allow smaller wholesalers to share a single building and related facilities. These buildings would house more than one firm. Units are 30 feet wide by 100 feet deep and would be separated by removable, floor-to-ceiling waterproof

walls. The total size of a multiple-occupancy building can vary, depending upon the number of units required by the individual firms occupying the building. Each unit is accessible through a large doorway at both the front and the rear. A ceiling at least 21 feet high is recommended to allow for high stacking of palletized products. Because no open platforms are included in the design, interior floorspace is maximized and the greatest protection is provided for perishable products. A mezzanine across the front of the unit provides space for offices and restrooms and for light storage. A wholesaler can occupy any number of units needed. Figure 12 illustrates a section view and an artist's conception of a multiple-occupancy building.

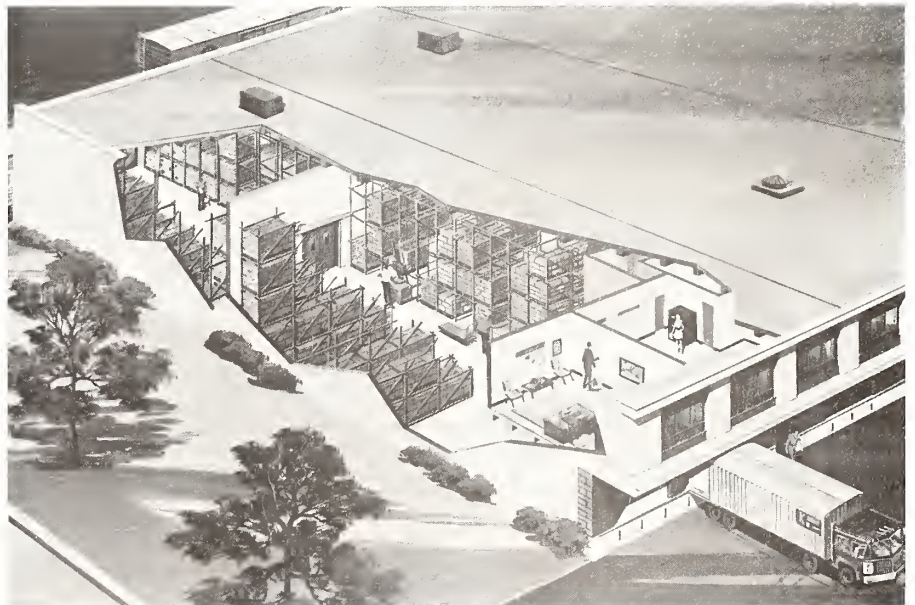
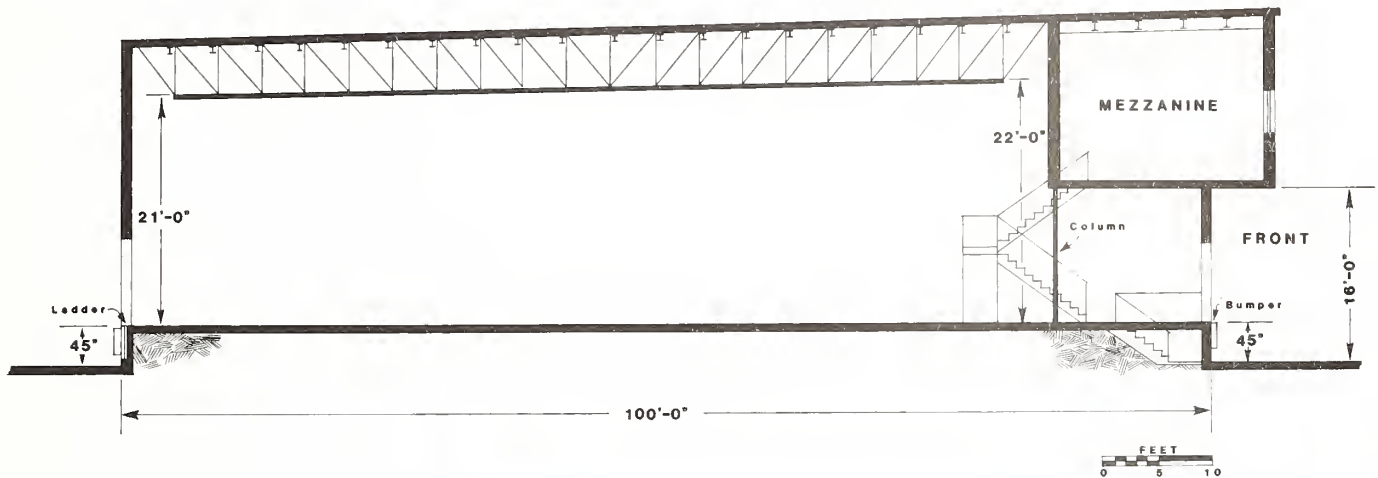


Figure 12.—(a) Section view and (b) artist's conception of a multiple-occupancy building.



Single-occupancy buildings are specialized facilities designed to serve the needs of individual firms. This type of building serves companies that handle a large volume of products or need an extensive amount of floorspace which cannot be accommodated in multiple-occupancy buildings. Figure 13 shows the exterior and interior of a single-occupancy building recommended for a food wholesaler.

### Farmers' Market

The farmers' market portion of the center is designed to serve growers selling and customers buying local produce. This section of the center contains a truckers' shed, retail building, and garden center.

The design of each building on the farmers' market is

Figure 13.—Artist's conception (a) exterior and (b) interior of a single-occupancy building.

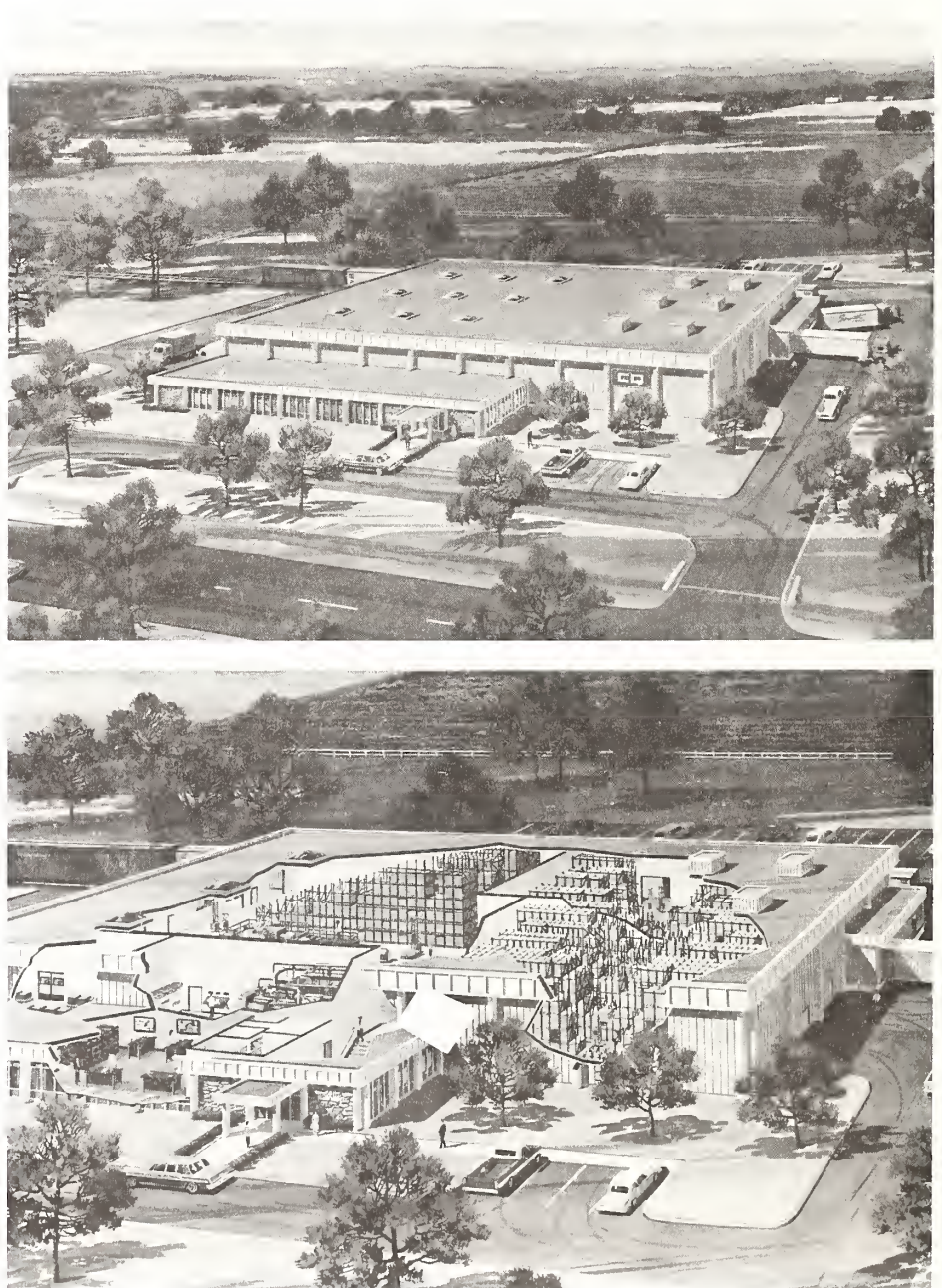






Figure 14.—Artist's conception of (a) truckers' shed, (b) retail building, and (c) garden supply center.

specialized to best serve the particular needs of the users while placing the customer as the focal point (fig. 14). The plan for the truckers' building provides space for growers' trucks, buyers' vehicles, and other incoming vehicles to park at the facility. The plan for the retail building provides space for extensive displays, a central customer aisle, and parking for both farmers and customers. The garden supply center building is a single-occupancy type designed for the efficient handling of garden supplies.

### Market Support

Some facilities on the proposed center are intended to provide necessary services to the food and related firms located on the center. These include a restaurant located in one unit of a multiple-occupancy building, an office building for brokers or other market related functions, and a gatehouse used for collecting gate fees (fig. 15).

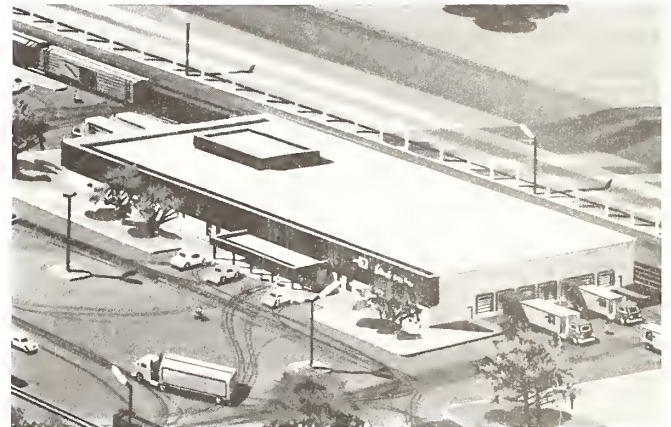


Figure 15.—Artist's conceptions of support facilities for a wholesale food distribution center and farmers' market.

## Recommended Facilities

### Wholesale Market Facilities Requirements

A total of 198,125 square feet of floorspace is recommended for the wholesale market portion of the center (table 29). This space is grouped into three single-occupancy buildings and two multiple-occupancy buildings.

Specialized facilities are included in center plans for each wholesale food firm group anticipated to relocate to the new development. Layouts included in this portion of the report illustrate how each kind of facility may be used by the relocated wholesale firms. These layouts shown are for illustrative purposes and do not represent facility recommendations for specific firms.

**Fruits and Vegetables**—The 13 fruit and vegetable firms locating on the initial center will be housed in multiple-occupancy building units. These firms require a total of 60,000 square feet of first-floor space in 20 units. In later stages of development, expanded operations of the initial fruit and vegetable firms will require two additional single-occupancy buildings totaling 24,200 square feet of first-floor space.

An example of a layout for a fruit and vegetable unit in a multiple-occupancy building is shown in figure 16. The general storage area shown in this layout is intended for nonrefrigerated items and the cooler area is for produce requiring low temperature refrigeration. A door at the rear of the facility provides access for direct rail receipts.

Product movement through this layout would depend on the method of initial receipt. Rail shipments move directly through the facility from the rail receiving area at the rear of the unit to the truck doors at the front. Truck receipts, in contrast, follow a “U” flow, with receiving and shipping operations taking place at different times of the day.

Space for support facilities is required. Pallets for stacking incoming loads are placed adjacent to the rail and truck receiving and shipping areas. A battery charging area for the materials-handling equipment is located adjacent to the stairs where the equipment can be protected from damage.

Offices are located above the receiving and shipping area. Access to these offices is by way of stairs from the first floor. The stairs to the mezzanine offices do not permit access to the interior storage area for safety and security reasons.

Space requirements for fruit and vegetable firms will differ as their operations expand. In some instances, fruit and vegetable firms will move from units in the multiple-occupancy buildings to specialized single-occupancy buildings. Figure 17 illustrates a possible layout for a fruit and vegetable firm in a single-occupancy building.

The layout shown is designed to serve a large fruit and vegetable firm handling a varied line of fresh produce. All areas of the warehouse are arranged to promote efficient use of modern-handling equipment. This arrangement allows flexibility in order selection and permits a U-shaped product flow for truck receiving and shipping. The interior arrangement promotes a straight through movement for incoming rail products. The refrigerated storage areas are arranged to allow common walls.

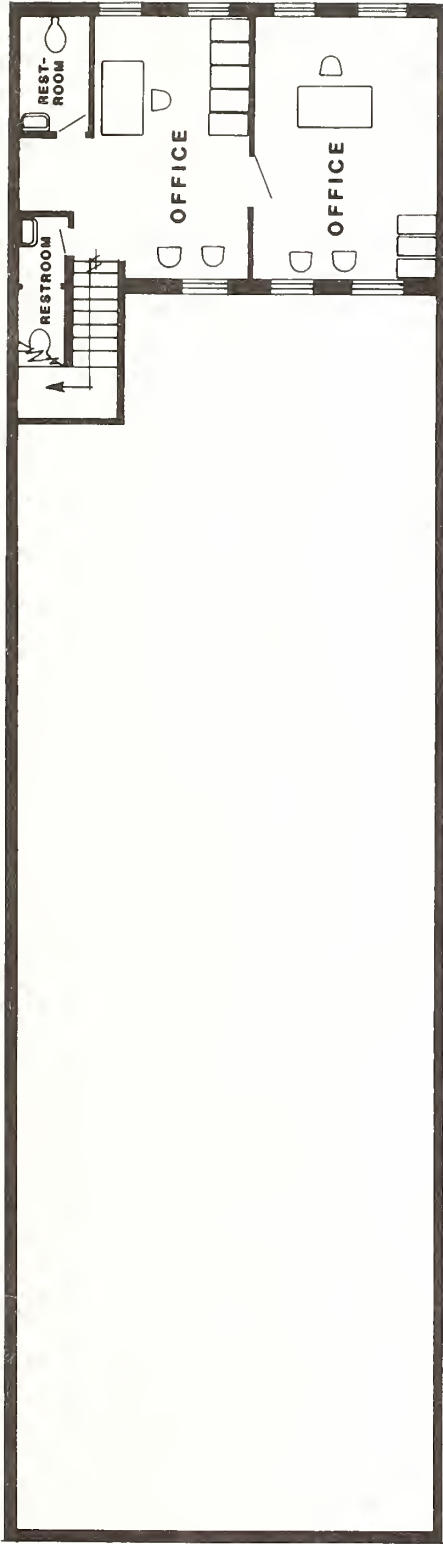
All processing and storage areas of the warehouse are on the first floor. Support facilities are on the mezzanine over the truck receiving and shipping area at the front of the warehouse. The interior storage areas provide a minimum of 21 feet clear stacking height. A height of 9 feet under the mezzanine permits forklift trucks to pass with masts completely retracted.

The warehouse is designed for pallet rack storage of products. Extensive use of drive-in racks promotes efficient use of cubic space and minimizes the amount of aisle space required. Adequate selection space is available in this layout which reduces rehandling of products placed in storage.

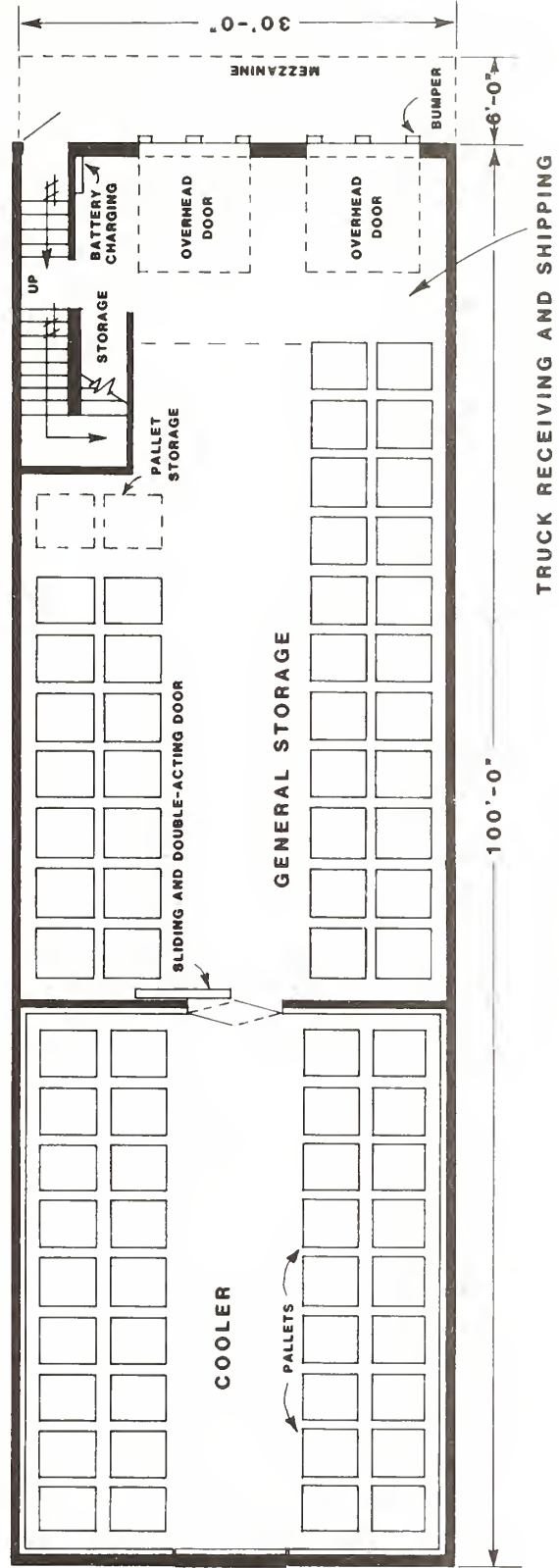
Portions of the facility are used for support activities. A truck receiving and shipping area accommodates unloading operations, temporary storage of incoming merchandise, assembly of outgoing orders, truck loading, pallet storage, and forklift battery charging. A restroom, equipment room, and office are also located on the first floor. Access to the mezzanine is by stairs leading from the first floor of the warehouse. Offices, restroom, and an employee lunchroom are located on the mezzanine.

**Meat, Poultry, and Eggs**—Four meat, poultry, and egg firms need new facilities on the proposed center. Five units in multiple-occupancy buildings and one single-





**MEZZANINE**



**FIRST FLOOR**

TRUCK RECEIVING AND SHIPPING



Figure 16.—Layout for a fruit and vegetable firm in a multiple-occupancy building.



Figure 17.—Layout of a fruit and vegetable firm in a single-occupancy building.



occupancy building, totaling 29,125 square feet of first-floor space, have been planned to accommodate these firms. In later stages of the development of the center three units in a multiple-occupancy building and two single-occupancy buildings are required for a total of 38,600 square feet of first-floor space.

Figure 18 shows a possible layout for a meat firm housed in a single-occupancy building. Past research indicates that firms requiring at least 15,000 square feet of space are provided greater expansion flexibility by being housed in single-occupancy facilities.

This layout is designed to provide a U-shaped product flow for both fresh and boxed meats. It provides maximum inventory flexibility and product movement free of bottlenecks and excessive labor handling. Each product storage area has been organized within the overall plan for effective use of labor and materials-handling equipment. This helps lower operating costs and improve job performance efficiency. All work areas are incorporated into the first floor of the building to further improve product handling efficiency.

Equipment installations for the boxed meat cooler and freezer storage areas include three-tiered drive-in pallet racks as well as conventional racks in the cooler and the freezer. Both the drive-in and conventional pallet racks are arranged to minimize the distances employees will travel when selecting customers' orders. Live storage racks (special pallet racks with rollers supporting stored merchandise) and a separate loading aisle are provided for low-volume items in the boxed meat cooler. Mobile platform scales are also shown in the cooler room.

Typically, fresh and smoked pork items as well as all processed meats, such as coldcuts and frankfurters, are handled exclusively in boxed form. Most frozen meat supplies consist of boneless boxed beef, used in the manufacturing of hamburger and boxed variety meats.

An enclosed access entrance to the receiving and shipping area at the front of the facility is provided with a stair well that opens onto an enclosed dock located at truck-bed height 45 inches above the street. This stairway extends to offices, restrooms, and a lunchroom located on a second-floor level directly above the receiving and shipping platform at the front of the building. The overall interior ceiling height in the coolers is 21 feet high to provide sufficient room for three-tiered pallet-stacking operations and adequate

space for cold air circulation. Recommended ceiling heights for platform docks are 12 feet. Ceilings for offices, restrooms, welfare areas, and workshop are recommended to be 8 feet high.

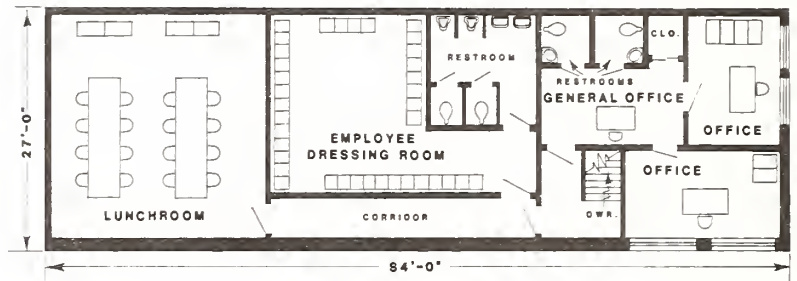
Vertical rubber bumpers are attached along the front edge of the dock at the first-floor level to prevent damage by trucks. Cooler doors with inner double-acting doors are provided in refrigerated areas to minimize interior refrigeration loss and maximize uniform product storage temperatures which will reduce spoilage. All first-floor walls, ceilings, and floors are insulated. Floor insulation must be installed during building construction, along with necessary concrete reinforcements. In addition, refrigeration equipment will be needed to support and maintain temperatures of -10°F for the freezer, 30°F to 32°F for the cooler, and 38°F for the enclosed receiving and shipping area. The refrigeration blower systems must be suspended from ceilings to maximize the amount of clear floor areas within each cold storage room.

Facility interiors are well lighted with a central control panel available for all utilities, including light. Well-distributed artificial lighting is required where adequate natural light is either not available or insufficient. The overall intensity of artificial illumination in the order staging areas should be not less than 20 foot-candles.

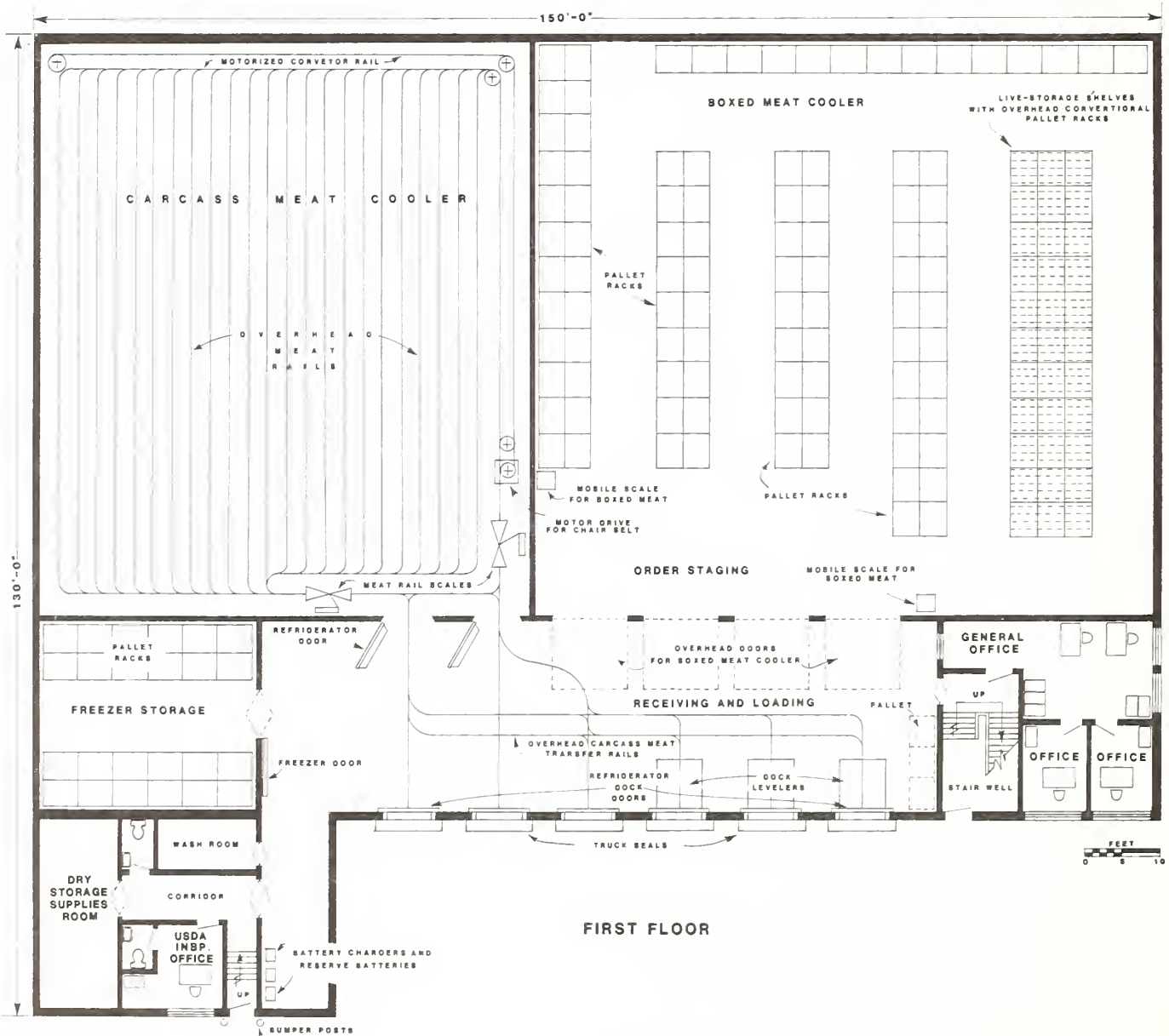
The foundation and basic building shell of this facility should be engineered to meet both the building's structural needs and all anticipated equipment and weight stress forces created by product storage loads. The facilities should be architecturally designed and constructed according to acceptable standards and methods approved by the local municipal authority having jurisdiction over such building codes. Generally speaking, all work floor and traffic areas should be designed for a live load of at least 350 to 400 pounds per square foot. Second-floor areas should be designed to support at least 200 to 250 pounds per square foot.

Safety features also must be incorporated into the facility layout design for employee protection. For example, floors must be surfaced with skidproof finishes to help prevent accidents. Also, the type of construction materials selected must be able to absorb sound to minimize the noise level and comply with other employee protection standards.<sup>3</sup>

<sup>3</sup>Occupational Safety and Health Administration of the U.S. Department of Labor, Volume 36, No. 105 (effective May 1971).



MEZZANINE



FIRST FLOOR

Figure 18.—Layout for a meat product firm in a single-occupancy building.



Special construction features are needed for the poultry unit. In each room where products are handled or stored, floors are sloped to drains which provide adequate and fast runoff of water. Floor drains have deep seal traps which are vented to the outside of the building. Restroom soil lines are to be separated from the floor drainage system to a point outside the building. Surfaces of the walls in all rooms where product is handled and stored should be impervious to moisture at a height of at least 6 feet above the floors. The ceiling must have a smooth finish with no falling particles and be readily washable. Poultry facilities must comply with the facility requirements of U.S. Department of Agriculture regulations for the inspection of poultry and poultry products. Similar construction features are required when open egg products are handled. Although such requirements are not specified for buildings where shell eggs are handled, these features are desirable.

The mezzanine illustrated in figure 19 provides space for the offices, welfare areas, and packaging material storage. The cooler and freezer should provide clear stacking heights to at least 12 feet above the floor to accommodate more product storage. All floors on the lower level should be 45 inches above the ground at the truck loading and unloading area.

An example of a facility layout for an egg processor-wholesaler housed in a single-occupancy building is shown in figure 20. The heating and refrigeration equipment room, product receiving, shipping, and cooler area, and the empty pallet storage area are located at one end of the building to facilitate cross utilization of storage space, receiving and shipping area, forklifts and pallet transporters, and refrigeration equipment. Additionally, the layout is designed so that products to be received or shipped can be brought to a central area controlled by the shipping office. The ceilings in the coolers and the packaging material storage room should be at least 12 feet high to provide more storage capacity. A 12-foot-high ceiling in the egg grading and packing room provides space for overhead conveyors and air movement.

**Groceries**—A total of 91,000 square feet of first-floor space is provided for four grocery firms included in the proposed center. The total amount of space includes three units in a multiple-occupancy building and two single-occupancy buildings. At later stages in the development of the food center, four units in a multiple-occupancy building are required in addition to 102,000 square feet of space in two single-occupancy buildings.

Figure 21 illustrates the interior arrangement of a grocery firm in a multiple-occupancy building. This arrange-

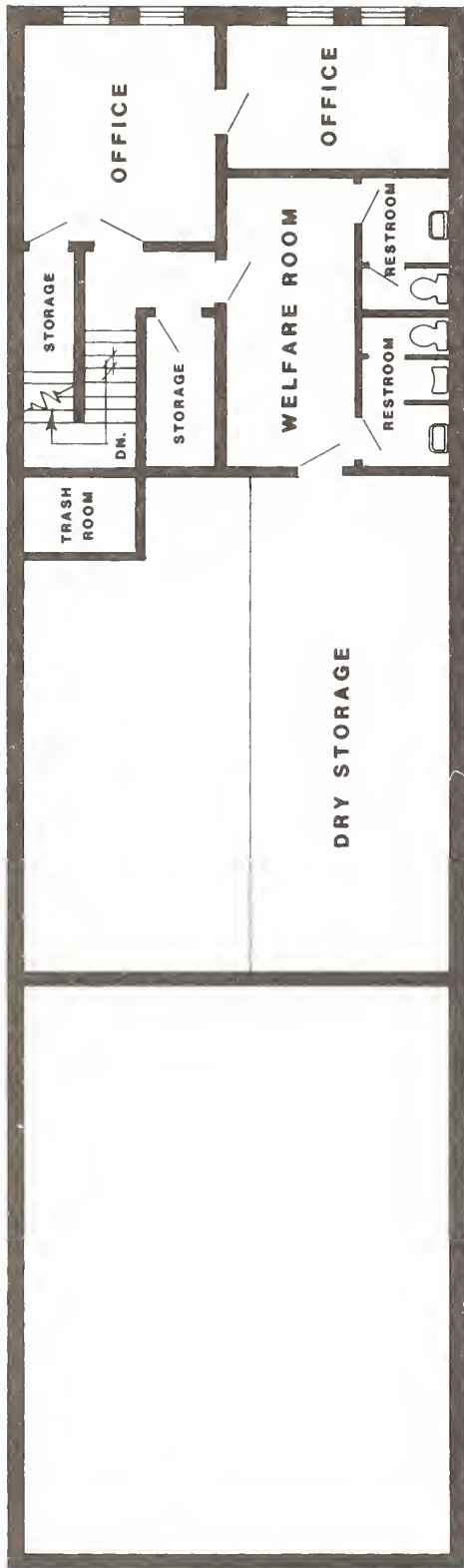
ment is designed for both rail and truck receiving. The doors at the front of the unit are intended for truck receiving and shipping. Some modifications are made to conventional pallet racks in order to handle products sold in limited quantities. Institutional size (32- by 40-inch) pallets are used to store some items. Other products are stacked on plywood that is used to convert rack slots into shelves. Additional full pallet reserve storage is located on the upper tiers of the racks or on pallets stacked from floor to ceiling. The overall interior arrangement is intended to promote a "U" product flow to maximize selection opportunity and product storage density. Offices are located on the mezzanine. Repack rooms can be located in this area if required.

Two grocery firms require single-occupancy buildings. Figure 22 illustrates a layout of a grocery firm in a single-occupancy building designed for a company handling a complete line of grocery products in addition to fresh produce and frozen foods.

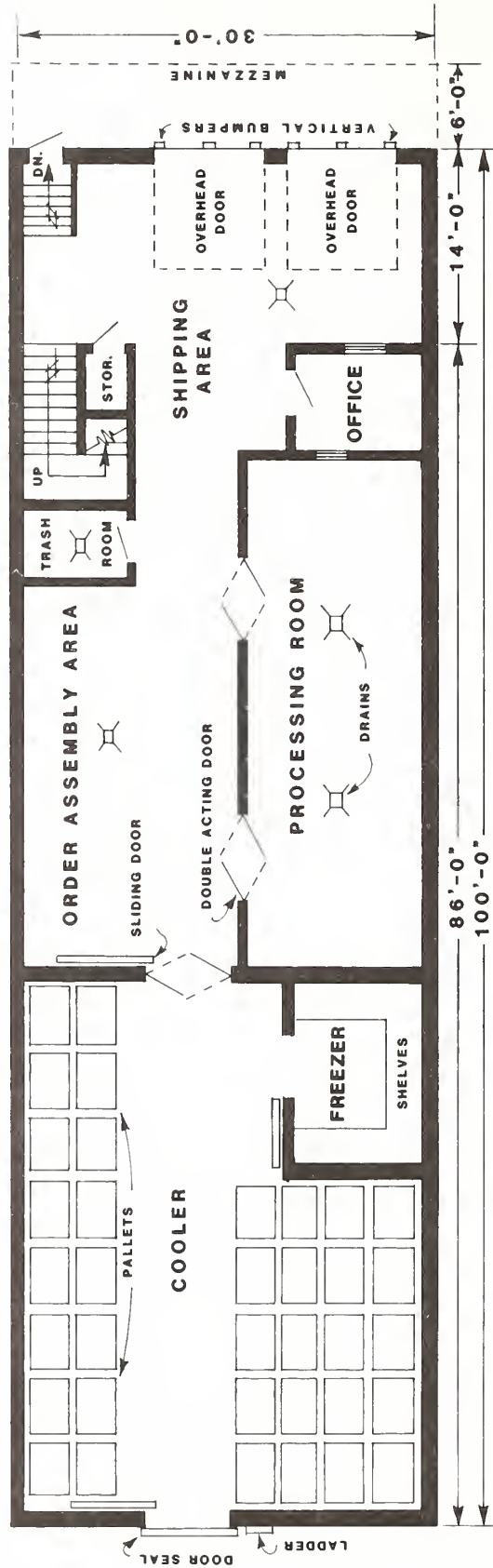
Each portion of the building layout is arranged to promote a smooth and efficient flow of products from receipt, through storage, order assembly, and truck loading. Perishable product storage areas are designed to allow the produce cooler to be used as a vestibule to the freezer. The freezer and cooler are located so perishable products stored in these areas can be scheduled for selection and placement in delivery trucks' bulkhead compartments. Various sections of the warehouse are arranged to minimize the length of the selection line and locate fast-moving items near the truck loading dock.

Most of the warehouse is intended to be used for handling and storing grocery products. Fast-moving items (products sold in large amounts) are stacked on the floor with selection directly from pallet loads of merchandise located adjacent to the aisle. Aisles are designed to accommodate mechanized selection equipment and forklift trucks.

Refrigerated storage space within the warehouse is designed to meet the specialized requirements of produce and frozen food products. Large pallets (40 by 48 inches) in rack storage hold the produce sold by the company. Drive-in pallet racks are used in the produce cooler to maximize storage density for the limited line anticipated for this operation. In contrast, the freezer is arranged to facilitate the selection of a large number of frozen food items.



**MEZZANINE**



**FIRST FLOOR**



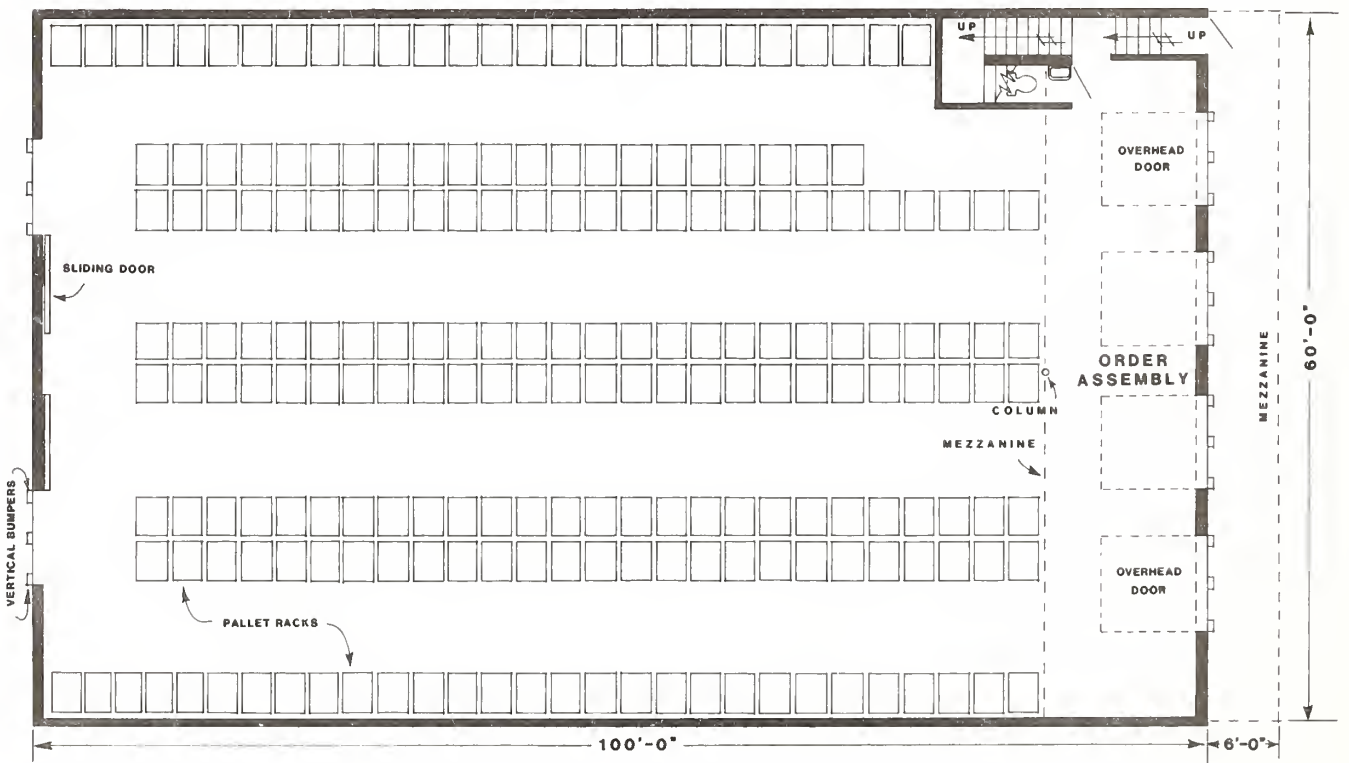
Figure 19.—Layout of a poultry firm in a multiple-occupancy building.







**MEZZANINE**



**FIRST FLOOR**

Figure 21.—Layout of a grocery firm in two units of a multiple-occupancy building.

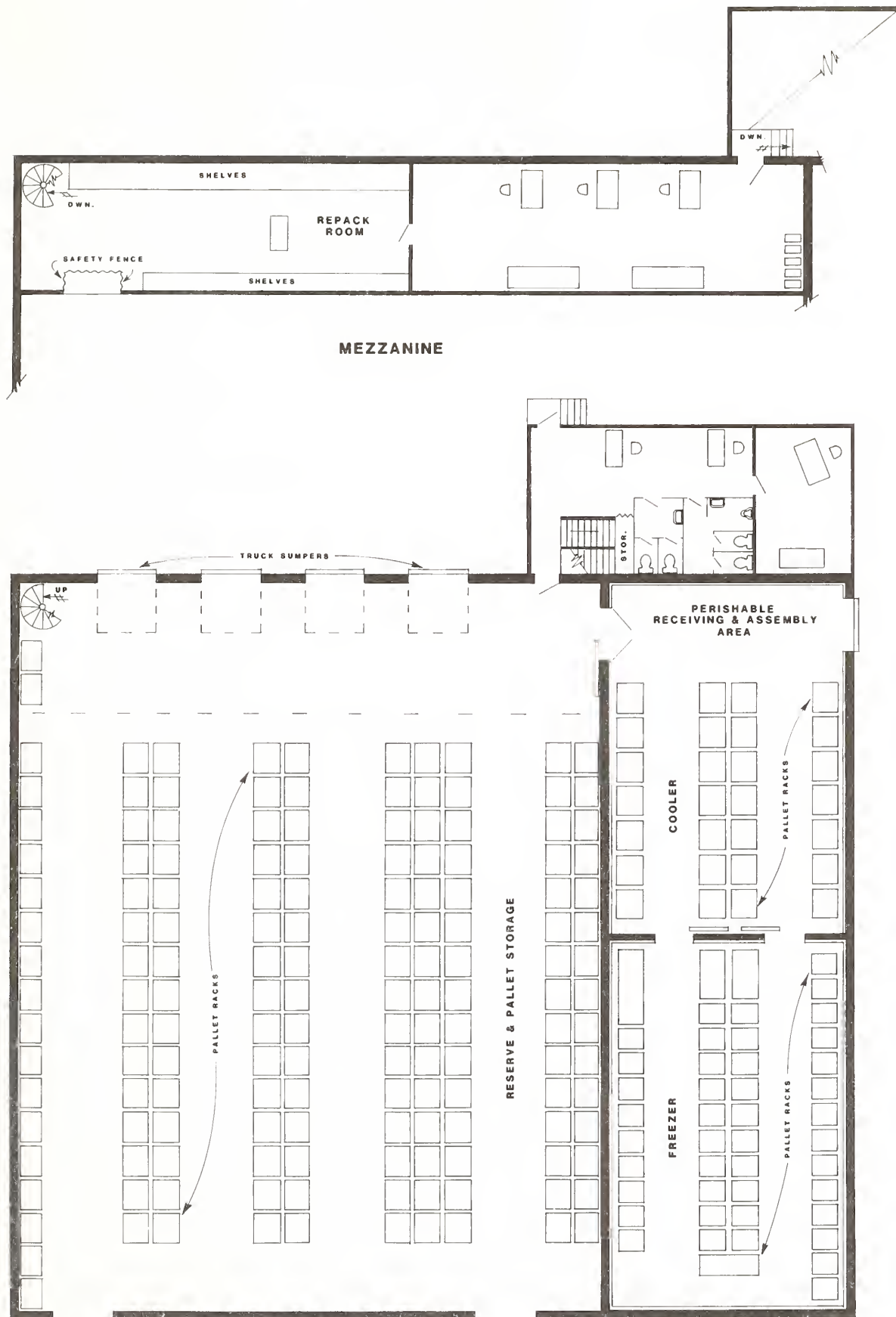


Figure 22.—Layout of a grocery firm in a single-occupancy building.

FIRST FLOOR



Offices and other support facilities are located on the mezzanine over the truck receiving and loading area. This arrangement allows the overhead space in this portion of the facility to be put to efficient use because truck receiving does not require high ceilings. Access to the mezzanine is by stairs leading from the first floor of the warehouse. Supervisors' offices and restrooms are located on the main warehouse floor.

**Bakery and Other Foods**—Eight bakery and other food firms are included in new facility plans. These firms require six units in a multiple-occupancy building; some firms may share a single unit. Bakery and other food firms include bakery, snack food, and fish and shellfish firms. Figure 23 illustrates the interior arrangement of a bakery firm in one unit of a multiple-occupancy building. Specialized bakery operations are located at the front of the facility while product ingredient items are stored at the rear. No rail receipts are anticipated for this size of firm. Delivery trucks are loaded at the front of the unit. Offices and light storage areas are located in the mezzanine.

Snack food firms require space for storage and order assembly. This specialized requirement is shown in the layout of a snack food firm in one unit of a multiple-occupancy building (fig. 24). This layout features extensive use of live-storage rack (angle conveyors) sections to facilitate efficient order selection of the many items handled in this type of operation. These live-storage racks are loaded from the back and selected from the front.

Fish and shellfish firms require space combining both processing and storage operations. Figure 25 shows an interior arrangement of a fish and shellfish wholesaler in two units of a multiple-occupancy building. This layout is designed so product storage areas are adjacent to receiving, shipping, and processing areas, and also provides processing areas to be isolated when necessary. This arrangement minimizes the distances products must be moved during receiving, order assembly, and processing. Pallets and forklift trucks are used extensively to move products on the first floor of the fish and shellfish facility. Pallet racks are used in the coolers to make maximum use of available cubic space.

The mezzanine serving fish and shellfish operations is used for offices, employee welfare functions, light storage, and a lunchroom. Supplies are moved to the mezzanine by forklift truck or portable elevator. Pedestrian access is by stairs from the first floor.

## Farmers' Market

The new farmers' market requires 42,300 square feet of space in three buildings—a truckers' building, a retail building, and a garden supply center to meet existing needs. Expansion to more than 64,700 square feet as the center is fully developed is incorporated into the design (table 29).

The design of each building on the farmers' market is specialized to best serve the particular needs of the users while making the customer the focal point.

**Truckers' Building**—One truckers' building is provided on the market. This building will contain 16,000 square feet initially and is designed to be expanded to 28,800 square feet in later stages of development. The truckers' building is designed with a drive-through aisle in the center of the building for direct transfer of products from the grower to the consumer's vehicle without intermediate parking. Figure 26 illustrates the interior arrangement for the building. Incoming growers' trucks are parked on both sides of the building in 12-foot-wide marked-off stalls and would be backed in as far as the line of supporting columns. A display area is provided behind each vehicle. Growers would position their vehicles in the stalls and set up displays facing the aisle. Most of their produce could be left on the truck as reserve stock and only a small quantity used as samples.

Heights and other dimensions of the building are determined by the vehicles parking at the structure. Eaves should be at least 16 feet high to allow larger vehicles to park under shelter. The one-way drive-through aisle is 36 feet wide to permit efficient movement of buyers' cars and trucks. The entire building is at ground level.

**Retail Building**—A retail building is provided on the center with an initial size of 12,000 square feet. This building is designed to be expanded to a total of 21,600 square feet in future market development.

The interior could be divided into three open areas, each 20 feet wide, extending the length of the building. Two of the areas, one along each side of the facility, would be divided into sales stalls extending the length of the building. Use of standard, modular arrangements of space contribute to efficient use of space and economy of both the initial construction and the contemplated subsequent expansion. The center area would serve as an access aisle separating the two rows of vendor stalls. Displays and sales would face this aisle. Figure 27 illustrates the interior arrangement of the retail building.



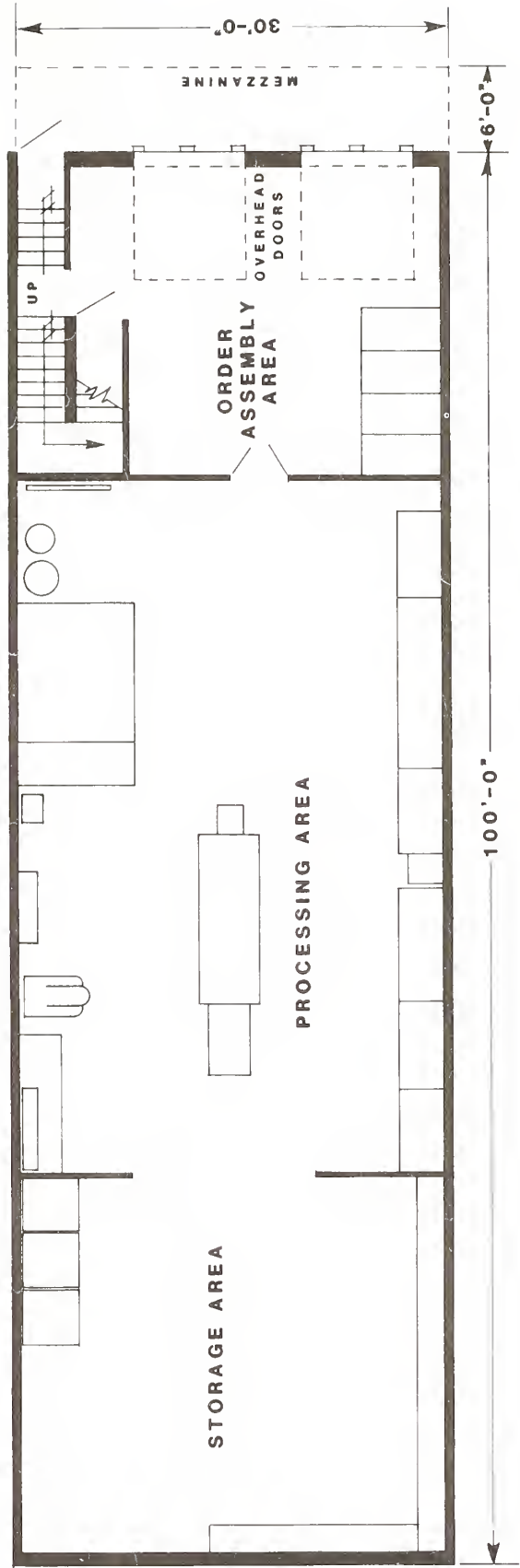
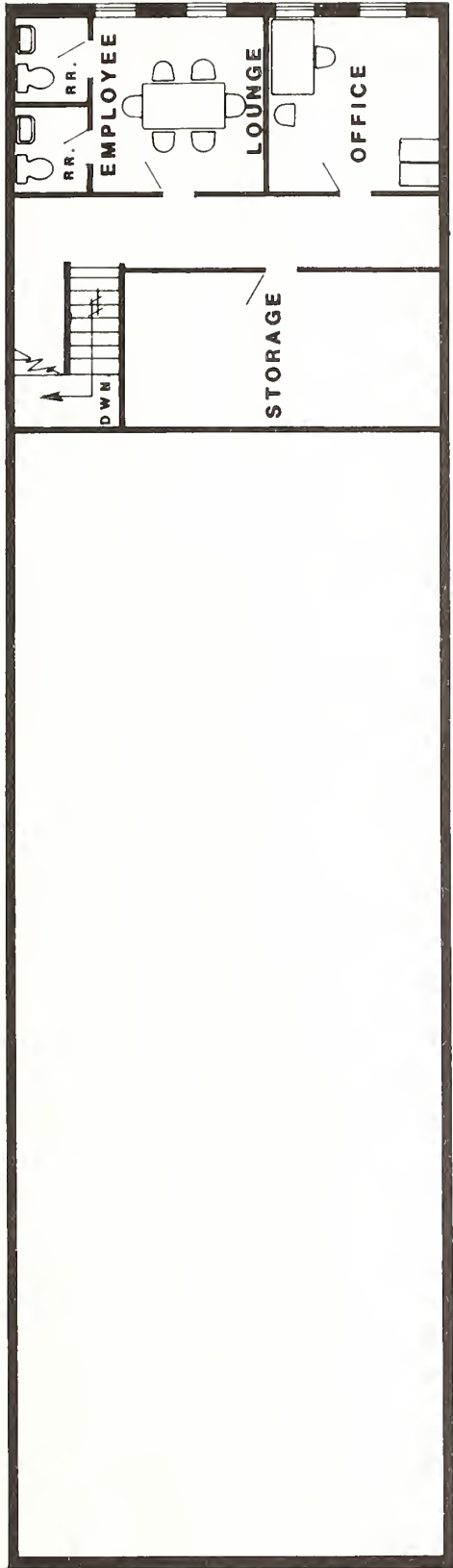
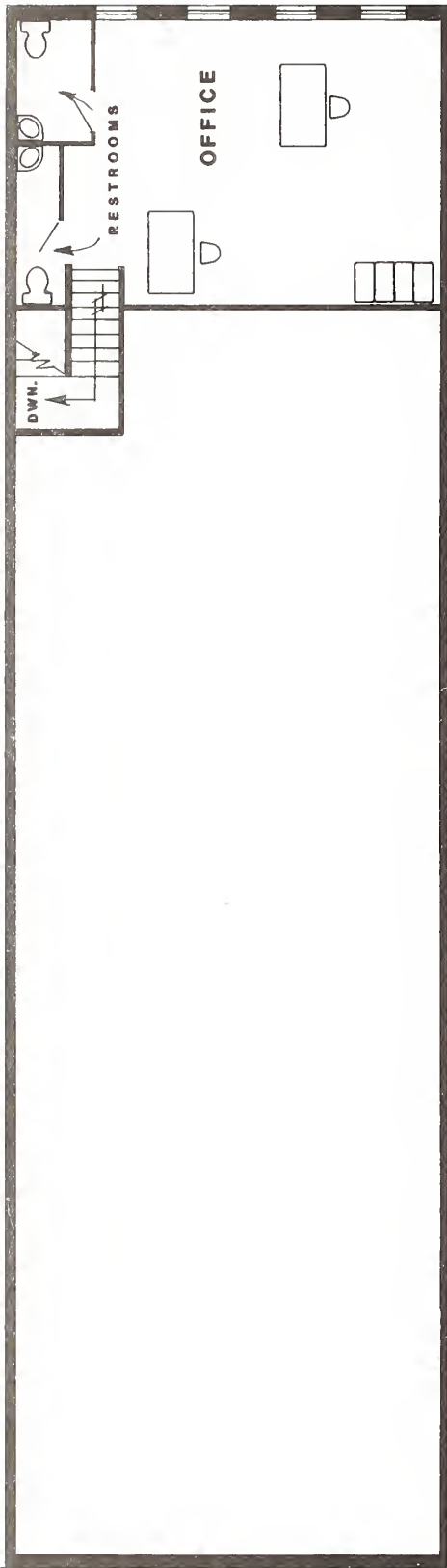
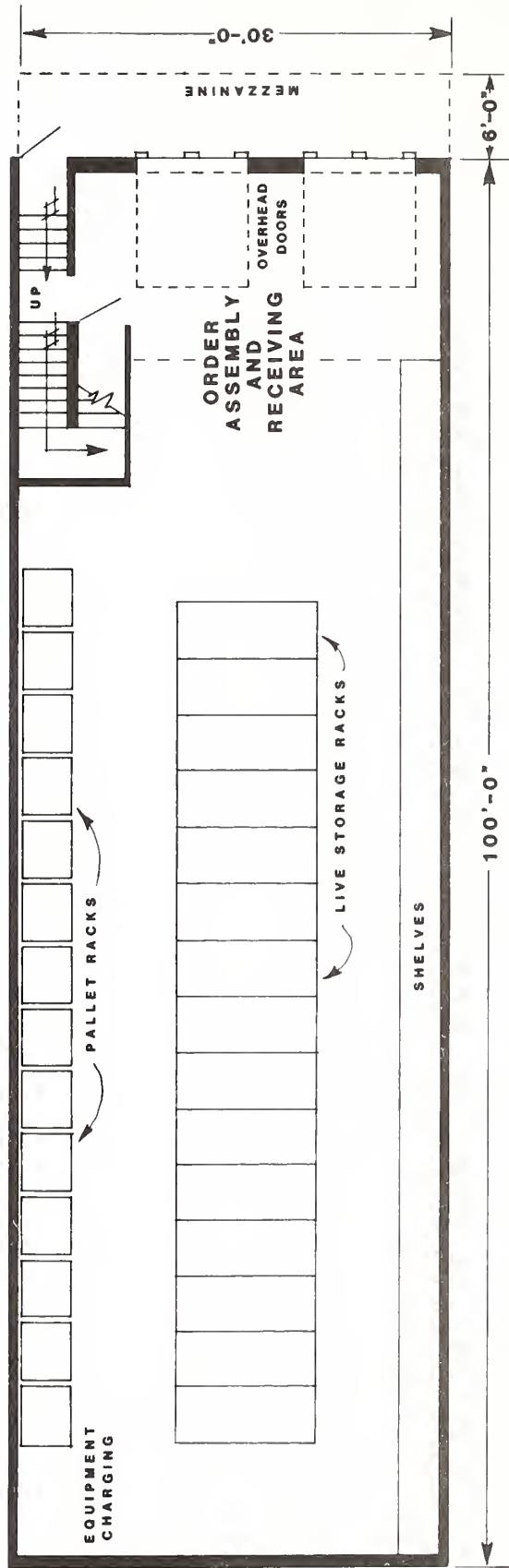


Figure 23.—Layout of a bakery firm in a multiple-occupancy building.

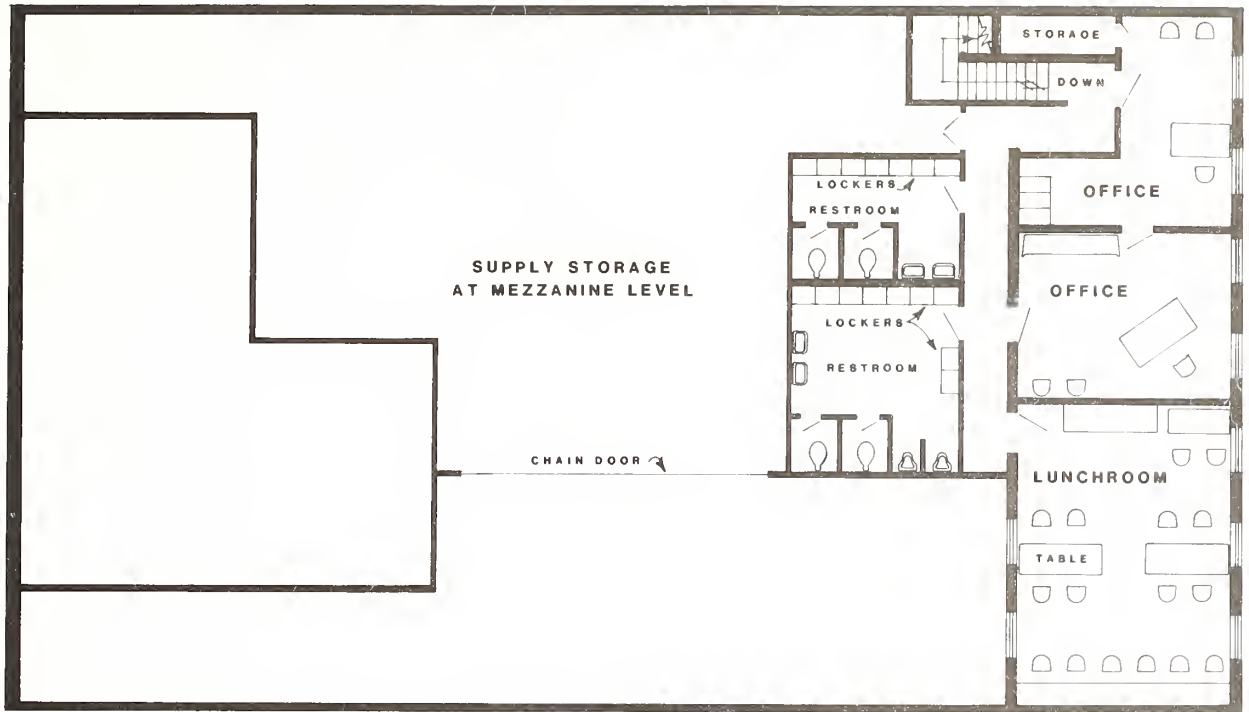


**MEZZANINE**

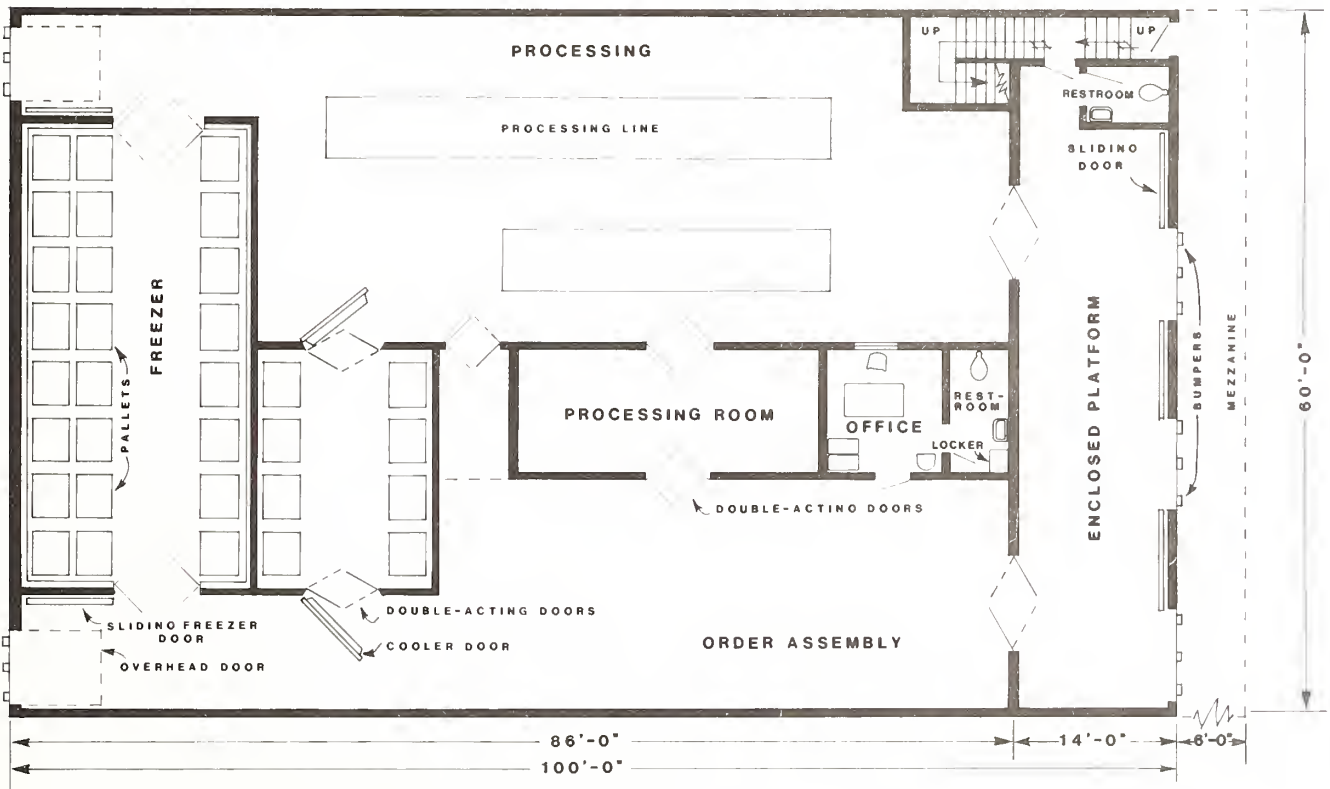


**FIRST FLOOR**

Figure 24.—Layout of a snack food firm in a multiple-occupancy building.



MEZZANINE



FIRST FLOOR

Figure 25.—Layout of a fish and shellfish firm in two units of a multiple-occupancy building.



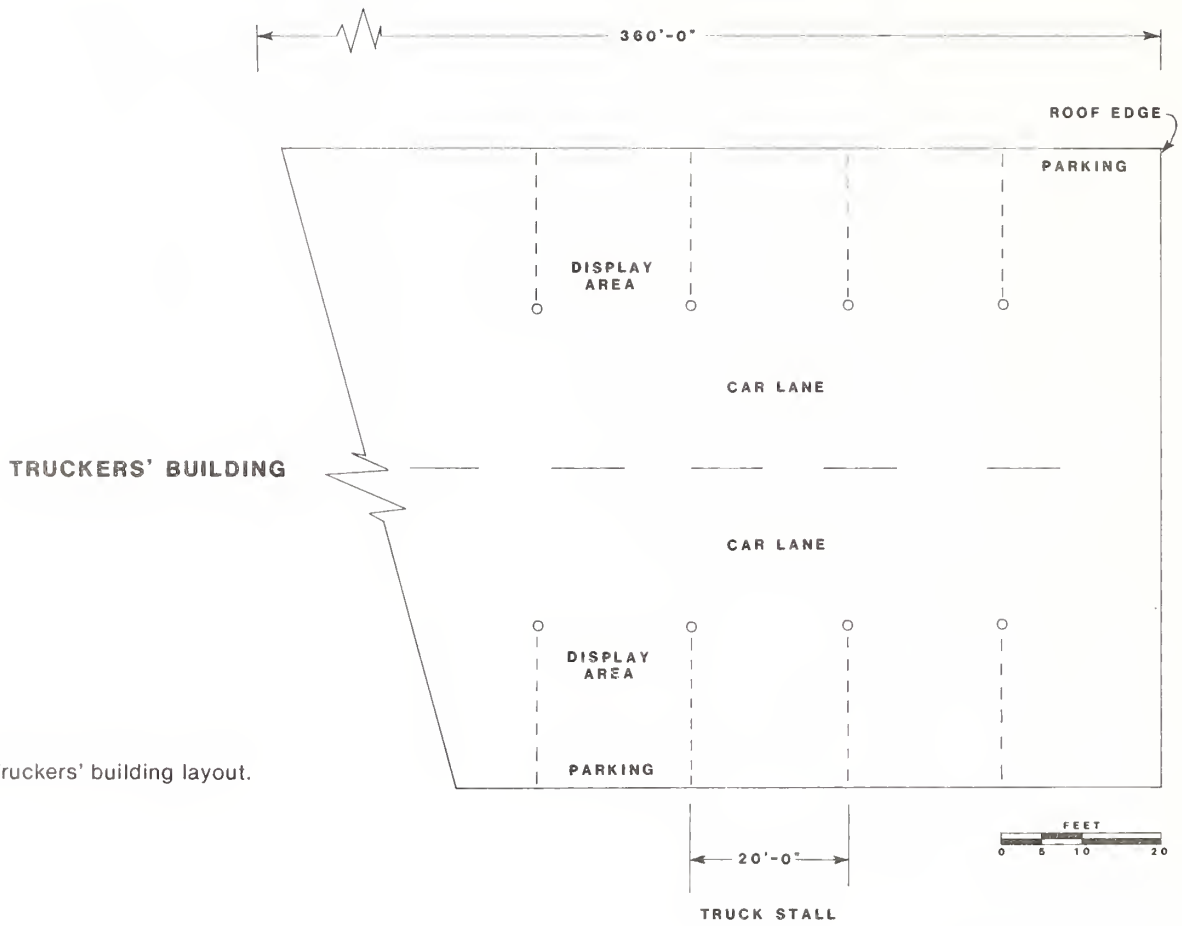
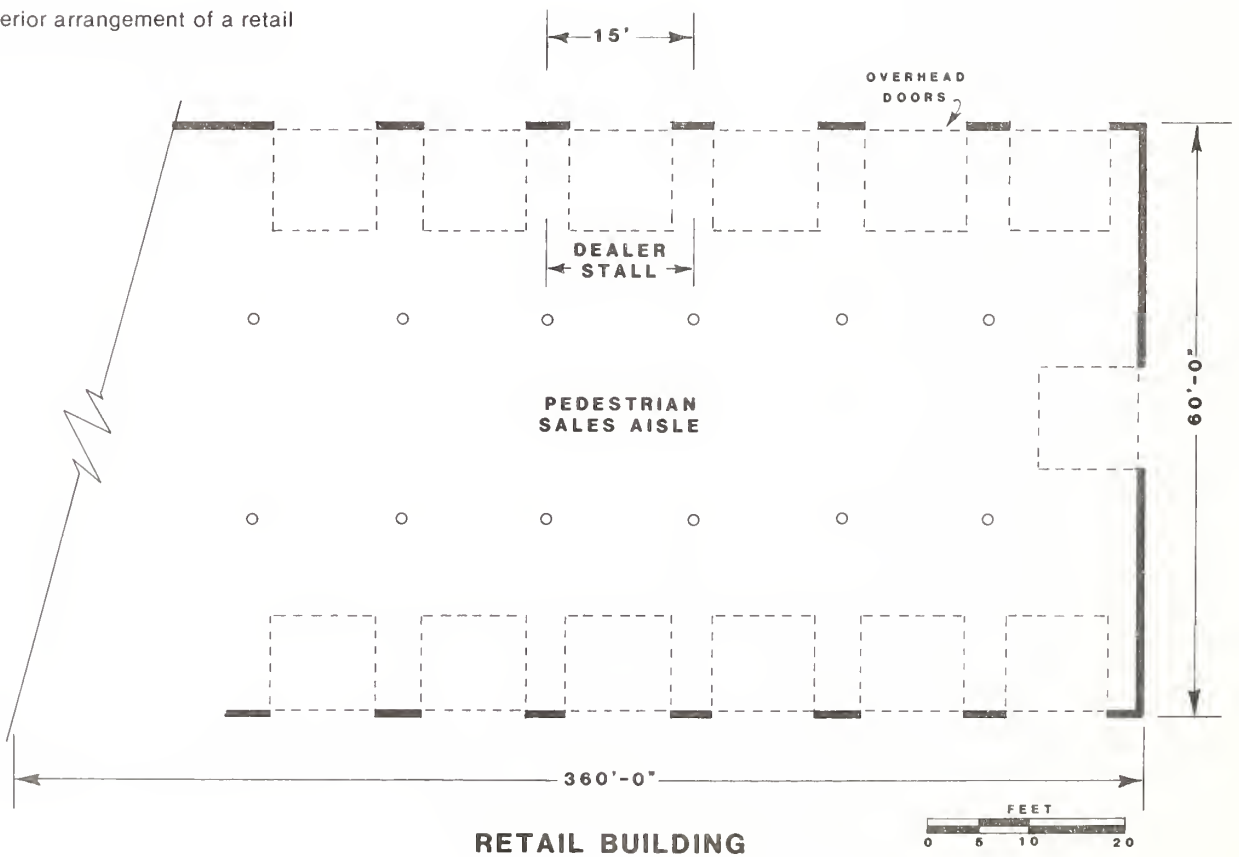


Figure 26.—Truckers' building layout.

Figure 27.—Interior arrangement of a retail building.



Growers would be able to unload produce into their individual stalls through 8- by 8-foot rollup doors. These doors along the exterior allow the building to be used during cold weather and secured at the end of the business day. Growers' trucks parked at their stalls can accommodate reserve storage. Merchandise sold from the stalls can be quickly replaced from these parked vehicles.

Customers would have a choice of parking. Customers anticipating small purchases would be able to park at nearby lots and walk to and from their cars. Others could park their cars for short periods directly at the building stall, where larger purchases can be efficiently loaded.

**Garden Supply Center**—A specialized single building is provided on the market for a garden supply firm needing new facilities. This 14,300-square-foot building would serve as a retail and wholesale outlet for a firm selling

bedding plants, shrubs, house plants, and other nursery items. Much of the merchandise would be displayed in an open area adjacent to the building. This outdoor area may be fenced off if desired.

### Market Support

Support facilities are also planned. An office building, a gatehouse, and a restaurant make up this portion of the market. Support facilities would total approximately 16,200 square feet, with provision for later expansion of the office building and restaurant to provide total support space of about 21,000 square feet. The office building planned for the center is a single-level building with private parking. A gatehouse is provided for controlling access to the market and collecting appropriate fees and charges (fig. 28). The restaurant planned for the market is housed in a multiple-occupancy building (table 29).

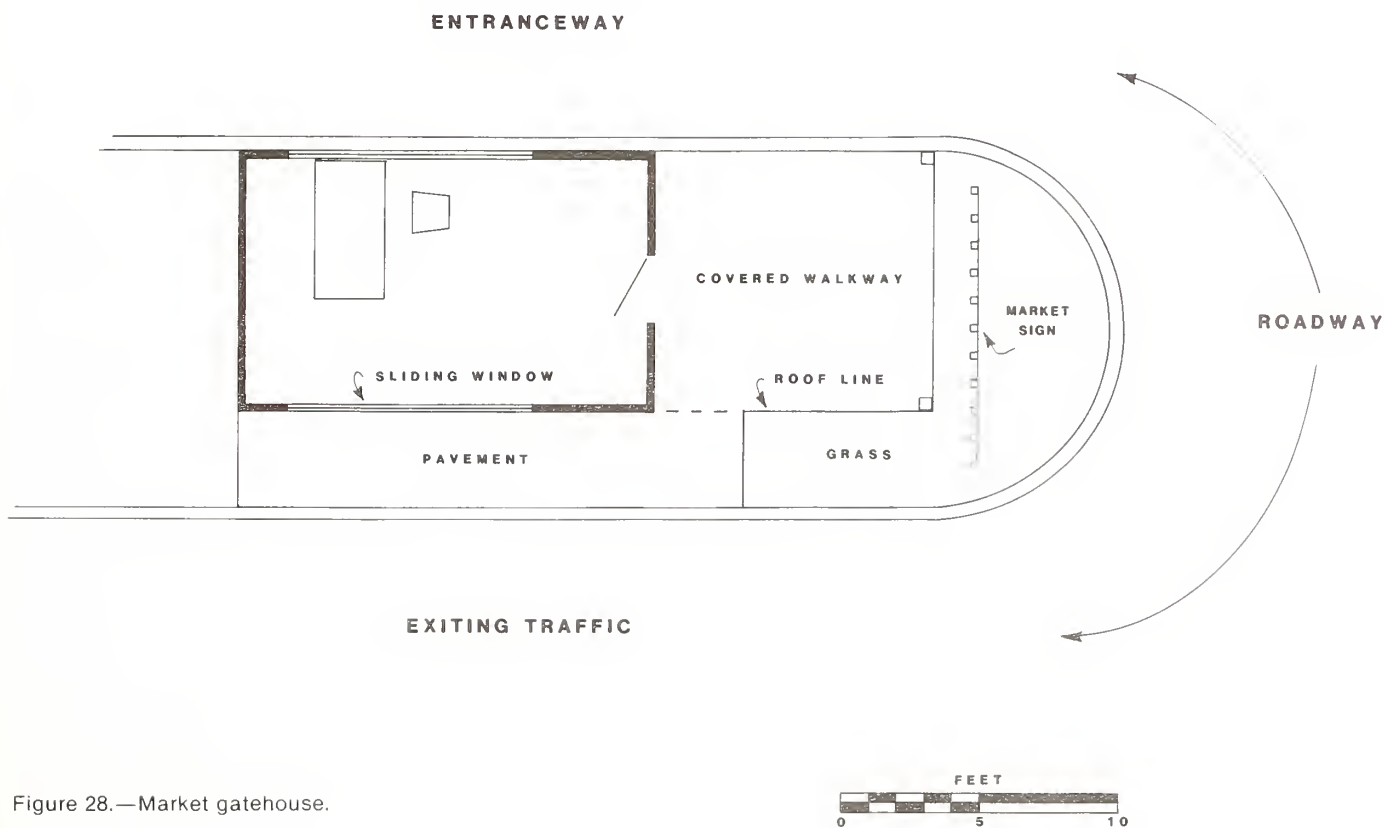


Figure 28.—Market gatehouse.

## Revenue Required

The revenue required to support the proposed wholesale food distribution center and farmers' market for central North Carolina includes the categories debt payment, taxes, insurance, and other costs. This revenue is realized from the firms on the new center and becomes one of the several principal costs of operating in new facilities. Table 30 summarizes the estimated revenue

required from the owners or users of the various sections of the new center as well as overall charges, relating to various sites and methods of financing. Total revenue requirements for the proposed center range from a high of \$2.7 million, assuming the facilities are located on a site in Wake County with private financing, to a low of \$1.7 million per year, assuming the

**Table 30.—Revenue required for the initial development and other site costs associated with the proposed wholesale food distribution center and farmers' market, by site location and method of financing**

Type of firm and/or facility	Harnett County site				Johnston County site			
	Private		Public		Private		Public	
	Cost	Cost per sq ft	Cost	Cost per sq ft	Cost	Cost per sq ft	Cost	Cost per sq ft
<i>Dollars</i>								
Wholesale market:								
Fruits and vegetables:								
Multiple-occupancy building	452,964	7.55	388,482	6.47	451,604	7.53	386,743	6.45
Single-occupancy building	0	—	0	—	0	—	0	—
Subtotal	452,964	7.55	388,482	6.47	451,604	7.53	386,743	6.45
Meat, poultry, and eggs:								
Multiple-occupancy building	108,463	7.23	93,185	6.21	108,167	7.21	92,794	6.19
Single-occupancy building	98,389	6.99	84,890	6.00	98,486	6.97	84,550	5.99
Subtotal	207,201	7.11	178,075	6.11	206,653	7.10	177,344	6.09
Groceries:								
Multiple-occupancy building	66,243	7.36	56,871	6.31	66,038	7.34	56,612	6.29
Single-occupancy building	587,989	7.17	504,998	6.16	586,248	7.13	502,767	6.13
Subtotal	654,232	7.18	561,869	6.17	652,286	7.17	559,379	6.15
Bakery and other foods:								
Multiple-occupancy building	138,897	7.72	119,015	6.61	138,691	7.71	118,651	6.59
Single-occupancy building	0	—	0	—	0	—	0	—
Subtotal	138,897	7.72	119,015	6.61	138,691	7.71	118,651	6.59
Total	1,453,294	7.33	1,247,446	6.30	1,449,234	7.31	1,242,117	6.27
Farmers' market:								
Truckers' building	174,046	10.88	147,282	9.21	174,693	10.91	147,539	9.22
Retail building	168,861	14.07	142,171	11.85	168,995	14.08	142,013	11.83
Garden center	145,556	10.17	123,600	8.64	145,425	10.16	123,275	8.62
Total	488,463	11.50	413,053	9.76	489,113	11.56	412,827	9.75
Market support								
Office building	133,413	10.26	113,241	8.71	132,800	10.21	112,544	8.66
Gatehouse	2,067	10.34	1,754	8.78	2,060	10.29	1,744	8.73
Restaurant	37,573	12.52	31,737	10.58	37,521	12.50	31,638	10.55
Total	173,053	10.60	146,732	9.05	172,381	10.64	145,926	9.01
Center total	2,114,810	8.24	1,807,226	7.04	2,110,728	8.22	1,800,870	7.02

Continued



facilities are located in Nash County and publicly financed.

The estimated revenue requirements shown in table 30 are, in turn, based on (1) building and associated investment requirements and (2) land costs. For pur-

poses of this report, it is assumed that construction costs are the same, regardless of site. Also, the arrangement of facilities (fig. 11) on which the construction costs are calculated is based on a location at a specific site in Wake County. Land costs do not include special preparation costs.

**Table 30.—Revenue required for the initial development and other site costs associated with the proposed wholesale food distribution center and farmers' market, by site location and method of financing —Continued**

Nash County site				Wake County site				Wake county site without land costs			
Private		Public		Private		Public		Private		Public	
Cost	Cost per sq ft	Cost	Cost per sq ft	Cost	Cost per sq ft	Cost	Cost per sq ft	Cost	Cost per sq ft	Cost	Cost per sq ft
<i>Dollars</i>											
450,571	7.51	385,521	6.43	555,073	9.25	475,794	7.93	476,023	7.93	412,554	6.88
0	—	0	—	0	—	0	—	0	—	0	—
450,571	7.51	385,521	6.43	555,073	9.25	475,794	7.93	476,023	7.93	412,554	6.88
107,935	7.20	92,515	6.17	133,693	8.91	114,722	7.65	113,968	7.60	98,942	6.60
98,285	6.96	84,303	5.97	122,278	8.66	104,963	7.40	103,753	7.35	90,143	6.38
206,220	7.08	176,818	6.07	255,971	8.79	219,685	7.54	217,721	7.48	189,085	6.49
65,884	7.32	56,432	6.27	80,754	8.97	69,290	7.70	69,579	7.73	60,350	6.71
584,925	7.13	501,199	6.11	719,573	8.78	617,499	7.53	617,648	7.53	535,959	6.54
650,809	7.15	557,631	6.13	800,327	8.79	686,789	7.55	687,227	7.55	596,309	6.55
138,477	7.69	118,359	6.58	179,247	9.96	153,215	8.51	146,397	8.13	126,935	7.05
0	—	0	—	0	—	0	—	0	—	0	—
138,477	7.69	118,359	6.58	179,247	9.96	153,215	8.51	146,397	8.13	126,935	7.05
1,446,077	7.29	1,238,329	6.25	1,790,618	9.04	1,535,483	7.75	1,527,368	7.71	1,324,883	6.69
174,859	10.93	147,276	9.20	267,105	16.69	225,135	14.07	185,880	11.62	160,155	10.01
168,909	14.08	141,781	11.82	240,669	20.06	202,579	16.88	179,769	14.98	153,859	12.82
145,236	10.16	122,989	8.60	194,407	13.59	164,898	11.53	154,057	10.77	132,618	9.27
489,004	11.56	412,046	9.74	702,181	16.60	592,612	14.01	519,706	12.29	446,632	10.56
132,385	10.18	112,086	5.62	157,885	12.14	134,427	10.34	140,335	10.80	120,387	9.26
2,052	10.27	1,737	8.69	2,476	12.39	2,107	10.54	2,176	10.88	1,867	9.34
37,465	12.49	30,806	10.27	49,936	16.65	42,205	14.07	39,811	13.27	34,105	11.37
171,902	10.61	144,629	8.93	210,297	12.98	178,739	11.03	182,322	11.25	156,359	9.65
2,106,983	8.21	1,759,004	6.99	2,703,096	10.53	2,306,834	8.99	2,229,396	8.69	1,927,874	7.51

## Building and Associated Investment

Building and associated investment costs make up most of the overall revenue requirements. Table 31 outlines investment requirements for various buildings and support facilities on the proposed center in addition to associated investment requirements.

Certain assumptions are made in the development of building construction costs. Wholesale building construction costs are based on a shell building, without some specialized equipment and finishing that may be required for actual use by specific kinds of food wholesale and processing firms. Construction costs shown in table 31 for the farmers' market and support facilities include all necessary equipment. Construction costs are shown in more detail in the appendix.

There are other investment requirements in addition to building construction costs. These costs, shown in table 31 as associated investment requirements, include paving and lighting, railroad track and switches, fencing, performance bonds, construction fee, design fee, and a contingency allowance. These associated investment costs comprise approximately 54 percent of total investment requirements, excluding land.

Of the three major sections of the proposed center, the wholesale market requires the largest total investment—approximately 72 percent. The farmers' market requires less building investment when compared with the wholesale market, but additional associated investment due to the large amount of paving and land preparation. Seventy-six percent of the total investment cost for the farmers' market is associated investment requirements. Of the total investment for the proposed center, the farmers' market will require approximately 21 percent of the total capital allocated. The remainder of the investment in buildings and associated costs is required for support facilities such as offices, restaurants, and gatehouses.

The construction costs incorporated in the investment requirements shown in table 31 are estimates and intended only to be used as a guide in planning facilities. These costs are not intended to replace estimates by local architects and contractors prior to actual construction.

## Land Costs

Land costs vary with the site and represent the second main capital requirement for the proposed wholesale food distribution center and farmers' market. Table 32 illustrates the land costs per acre and total land investment for the various sites considered. These sites are representative of sites available in different locations in central North Carolina. Inclusion of a site in the report does not constitute a recommendation for a specific location for the proposed center. Also, the land costs cited are for illustrative purposes; actual land costs are set by negotiation prior to actual sale. Land costs shown in table 32 were derived from an informal survey of representative sites in the study area.

## Calculating Revenue Requirements

As noted earlier, revenue requirements for the proposed wholesale food distribution center and farmers' market are comprised of debt service, taxes, insurance, and other costs.

**Table 32.—Land costs associated with the proposed wholesale food distribution center and farmers' market for central North Carolina**

County	Cost per acre	Total cost
	<i>Dollars</i>	<i>Dollars</i>
Harnett . . . . .	3,200	202,112
Johnston . . . . .	4,400	277,904
Nash . . . . .	5,000	315,800
Wake . . . . .	150,000	3,158,000

<sup>1</sup>Land costs in Wake County are normally higher than land costs in other counties in the study area. No precise costs were available at the time of the study concerning actual costs of a Wake County site.

Table 31.—Building and associated investment requirements for the initial development of the proposed wholesale food distribution center and farmers' market, central North Carolina

Type of firm and/or facility	Associated investment requirements										Total construction costs
	Total building space	Building construction costs	Paving and lighting	Railroad tracks and switches	Fencing	Performance bond	Construction fee	Design fee	Contingency allowance	Total associated costs <sup>1</sup>	
	Dollars										
<b>Wholesale market:</b>											
<b>Fruits and vegetables:</b>											
Multiple-occupancy building	60,000	1,207,800	362,660	87,266	12,825	15,282	340,792	90,210	83,528	992,563	2,200,363
Single-occupancy building	0	0	0	0	0	0	0	0	0	0	0
Subtotal	60,000	1,207,800	362,660	87,266	12,825	15,282	340,792	90,210	83,528	992,563	2,200,363
<b>Meat, poultry, and eggs:</b>											
Multiple-occupancy building	15,000	301,950	89,919	0	3,202	3,613	80,594	21,334	19,754	218,416	520,366
Single-occupancy building	14,125	273,601	80,973	0	3,003	3,270	72,946	19,309	17,879	197,380	470,981
Subtotal	29,125	575,551	170,892	0	6,205	6,883	153,540	40,643	37,633	415,796	991,347
<b>Groceries:</b>											
Multiple-occupancy building	9,000	181,170	50,161	9,615	1,813	2,220	49,523	13,109	12,138	138,579	319,749
Single-occupancy building	82,000	1,588,340	447,671	94,970	16,531	19,645	438,093	115,966	107,376	1,240,252	2,828,592
Total	91,000	1,769,510	497,832	104,585	18,344	21,865	487,616	129,075	119,514	1,378,831	3,148,341
<b>Bakery and other foods:</b>											
Multiple-occupancy building	18,000	362,340	144,784	0	5,330	4,688	104,541	27,673	25,623	312,639	674,979
Single-occupancy building	0	0	0	0	0	0	0	0	0	0	0
Subtotal	18,000	362,340	144,784	0	5,330	4,688	104,541	27,673	25,623	312,639	674,979
Total	198,125	3,915,201	1,176,168	191,851	42,704	48,718	1,086,489	287,601	266,298	3,099,829	7,015,030
<b>Farmers' market:</b>											
Truckers' building	16,000	58,317	610,065	0	13,176	6,234	139,038	36,804	34,078	839,395	897,712
Retail building	12,000	216,960	461,832	0	9,876	6,300	140,488	37,188	34,433	690,117	907,077
Garden center	14,300	276,991	283,940	0	6,548	5,191	115,766	30,644	28,374	470,463	747,454
Total	42,300	552,268	1,355,837	0	29,600	17,725	395,292	104,636	96,885	1,999,975	2,552,243
<b>Market support:</b>											
Office building	13,000	434,850	90,481	0	2,850	4,831	107,749	28,522	26,409	260,842	695,692
Gatehouse	200	6,690	1,458	0	45	74	1,671	442	410	4,100	10,790
Restaurant	3,000	100,350	49,497	0	1,641	1,385	30,904	8,180	7,574	99,181	199,531
Total	16,200	541,890	141,436	0	4,536	6,290	140,324	37,144	34,393	364,123	906,013
Undeveloped site	0	0	3,089,088	0	0	28,259	630,174	166,811	154,454	4,068,786	4,068,786
Center total	256,625	5,009,359	5,762,529	191,851	76,840	100,992	2,252,279	596,192	552,030	9,532,713	14,542,072

<sup>1</sup>Includes a share of a basic \$48,000 performance bond allocated on the basis of the tabulated original performance bond.



## Benefits and Conclusions

Debt service depends on the method of financing. For purposes of this report, two basic methods of financing were considered, public and private. Public financing was based on complete financing of the total construction costs over 30 years at an annual interest of 12 percent and a 12-percent annual land investment carrying charge (table 30). Private financing was calculated in the same manner except the interest rate assumed was 15 percent per year.

Taxes are set by the locality and are included in revenue requirements outlined for the new center at the various sites included in the scope of this report. Assessment is assumed at 100 percent of the total construction and land costs.

Insurance rates are based on estimates by local insurance companies. Fire and extended coverage rates are applied to the total building cost and liability insurance rates are based on the size of the building. Public financing assumes the State is a self-insurer; therefore no liability insurance costs are included in revenue requirements.

Other costs are comprised of management, maintenance, security, and solid waste disposal. These costs are based on similar constructed wholesale food distribution centers and farmers' market facilities. These cost estimates are outlined in the appendix.

The methods for calculating various fees for the remainder of the revenue requirements are also outlined in the appendix.

The proposed food center and farmers' market offers the potential of substantially improving the efficiency and effectiveness of food distribution in central North Carolina. These potential benefits are those that improve overall operating costs and other less tangible benefits to the community and local food industry.

### Analysis of Measurable Benefits in Wholesale Facilities

Measurable benefits to selected wholesalers considering relocating to the proposed new wholesale food distribution center and farmers' market are shown in tables 33 and 34. Both tables are based on the assumptions that (1) such wholesale firms remain in their existing facilities, or (2) relocate to a new center at each potential site and use various methods of organizing and financing the new facilities. Table 33 summarizes the projected net incomes (income minus all expenses for 30 years) and table 34 shows the present worth (equivalent current total value of funds received or spent in the future) of projected net incomes and estimated annual investments. Methods of calculation are shown in more detail in the appendix. Data in both tables are adjusted for assumed inflation incorporated in the analysis.

This analysis (illustrated in tables 33 and 34) includes costs and benefits determined only for the wholesale portion of the proposed center. Individual wholesale firms would have to conduct an individual analysis of their particular operations when considering actual relocation to new facilities. Costs and incomes were projected over 30 years, which is considered to be the normal useful life of this type of facility for planning purposes. Projected costs and incomes assume no room for expansion in existing facilities and anticipate some operating costs increasing annually from inflation and other factors. The rate of increase in various cost categories reflected in the analysis are based on a trend of producers' cost indexes as published by the Department of Labor.

Initial costs in wholesale facilities on the proposed center are based on experiences of similar firms relocating to other wholesale food distribution centers from crowded or obsolete facilities. Wholesale firms' operating costs in later stages of center development are based on anticipated increases in annual sales. Estimates of potential increases in volume are developed with a method outlined in a previous USDA report.<sup>4</sup> These increases are reflected in tables 33 and 34. Such projections are for illustrative purposes and for the

<sup>4</sup>Taylor, E.G., et al. Food distribution facilities for Memphis, Tennessee. MRR-1099, USDA, 93 pp., ill., May 1979.

Table 33.—Projected net income for selected firms in existing facilities and on the proposed wholesale food distribution center and farmers' market, assuming different sites, financing methods, and adjustment for assumed inflation

Year <sup>1</sup>	Site for new facilities											
	Harnett County			Johnston County			Nash County			Wake County		
	Existing facilities	Private financing	Public financing	Private financing	Public financing	Public financing	Private financing	Public financing	Public financing	Private financing	Public financing	Public financing
0	2,776	1,092	1,188	2,008	2,104	828	925	2,509	2,628	2,631	2,726	
1	2,776	1,540	1,609	2,257	2,326	1,333	1,403	2,658	2,744	2,747	2,815	
2	2,776	1,812	1,866	2,417	2,471	1,637	1,692	2,763	2,830	2,832	2,855	
3	2,776	2,002	2,046	2,535	2,580	1,847	1,893	2,845	2,901	2,902	2,947	
4	2,776	2,147	2,185	2,631	2,669	2,006	2,045	2,917	2,964	2,965	3,003	
5	2,776	2,265	2,298	2,713	2,747	2,135	2,168	2,982	3,023	3,024	3,056	
6	2,776	2,365	2,394	2,787	2,816	2,242	2,272	3,042	3,078	3,079	3,108	
7	2,776	2,453	2,479	2,854	2,880	2,336	2,363	3,100	3,132	3,133	3,159	
8	2,776	2,532	2,556	2,917	2,941	2,421	2,445	3,155	3,184	3,185	3,209	
9	2,776	2,605	2,627	2,976	2,998	2,497	2,519	3,208	3,235	3,236	3,257	
10	2,776	2,656	2,678	3,016	3,038	2,551	2,573	3,235	3,262	3,260	3,282	
11	2,776	2,721	2,742	3,073	3,093	2,619	2,639	3,288	3,313	3,312	3,332	
12	2,776	2,783	2,802	3,127	3,147	2,683	2,702	3,340	3,363	3,362	3,381	
13	2,776	2,842	2,860	3,180	3,199	2,744	2,762	3,391	3,413	3,412	3,430	
14	2,776	2,899	2,916	3,232	3,250	2,802	2,819	3,442	3,462	3,461	3,478	
15	2,776	2,954	2,970	3,284	3,300	2,859	2,875	3,492	3,511	3,510	3,526	
16	2,776	3,008	3,023	3,334	3,349	2,913	2,929	3,541	3,560	3,559	3,573	
17	2,776	3,061	3,075	3,384	3,398	2,967	2,981	3,590	3,608	3,607	3,621	
18	2,776	3,112	3,126	3,433	3,446	3,019	3,032	3,639	3,655	3,655	3,668	
19	2,776	3,163	3,176	3,482	3,495	3,070	3,083	3,688	3,703	3,702	3,715	
20	2,776	3,197	3,211	3,514	3,528	3,104	3,118	3,714	3,730	3,728	3,741	
21	2,776	3,247	3,260	3,562	3,576	3,154	3,168	3,762	3,778	3,776	3,789	
22	2,776	3,296	3,308	3,611	3,623	3,204	3,216	3,811	3,826	3,824	3,837	
23	2,776	3,344	3,356	3,658	3,671	3,252	3,265	3,860	3,874	3,872	3,884	
24	2,776	3,392	3,404	3,706	3,718	3,300	3,312	3,908	3,922	3,920	3,931	
25	2,776	3,439	3,451	3,753	3,764	3,348	3,359	3,956	3,969	3,967	3,978	
26	2,776	3,486	3,497	3,800	3,811	3,395	3,406	4,003	4,016	4,015	4,025	
27	2,776	3,533	3,543	3,847	3,857	3,441	3,452	4,051	4,064	4,062	4,072	
28	2,776	3,579	3,589	3,893	3,904	3,487	3,497	4,099	4,111	4,109	4,119	
29	2,776	3,625	3,635	3,940	3,950	3,533	3,543	4,146	4,158	4,156	4,166	

1,000 dollars

<sup>1</sup> From development of a new center.

analysis of potential benefits to selected wholesalers from relocating to new facilities. The limited illustrative projections outlined in this report should not be considered as predictions of area inflation or economic trends.

Most of the wholesale firms considered as candidates for relocation anticipate moving existing warehousing or processing operations from old facilities to new buildings on the proposed center. Present and projected costs of operations and investments associated with these firms are included in the material illustrated in tables 33 and 34. Two wholesale firms included in the plans for the new center do not anticipate relocating existing activities but plan to start completely new operations in new facilities. As no present costs are available for these completely new operations, present and projected expenses and annual investments of these particular firms anticipating such completely new operations, are not included in tables 33 and 34. Also, due to the particular nature of such operations, costs and annual investments associated with farmers' market and support facilities are also excluded from the data summarized in tables 33 and 34.

Relocation to any of the potential sites offers the opportunity for wholesalers to increase their net income (see table 33). Due to initial costs associated in developing new facilities that are needed for a growing local wholesale food industry, net income in proposed facilities during the very early years of the center's development is initially lower when compared with equivalent projected net incomes in present buildings. Location of wholesale facilities affects the values of projected net incomes of the wholesale firms included in this analysis.

Projected net incomes of wholesalers relocating to a new center in Wake County, assuming no land costs and public financing, would exceed equivalent incomes in existing facilities 1 year after constructing the development (base year 1980). Similar comparisons, assuming a Wake County location, for these wholesalers anticipates projected net incomes in present facilities would be exceeded by equivalent net income projections in new facilities in about 2 years assuming (1) private financing and no land costs, (2) public financing and land costs, and (3) private financing and land costs. Net incomes in the proposed facilities would not exceed equivalent incomes in existing facilities for 12 years assuming Harnett County location with both private

and public financing, 6 years in Johnston County for private and public financing, and 14 years in Nash County regardless of financing method.

Different factors influence the time required for net incomes in new facilities to exceed equivalent incomes assuming wholesalers remain in present facilities. Building and land costs are important factors, but delivery charges also are a major consideration. The large number of customers located in the heavily populated area around Raleigh minimized delivery charges from potential sites in Wake County. The potential for additional sales through the opportunity for expansion in future years help make new facilities attractive. Recognizing the importance of this particular factor, firms often cite their lack of expansion space as a major reason for considering new facilities. The information illustrated in table 33 indicates that a new center may be most beneficial if located on a site in Wake County.

The time at which potential benefits are realized over the life of the project is an important factor in evaluating a potential move to the proposed center. The present worth values shown in table 34 are calculated assuming the center is located on each of the alternative site locations and developed with private or public financing. The annual investment and net income anticipated for each development is discounted from the time it is expected to occur in the life of the project. Subsequently, each annual investment and net income is adjusted for inflation at a rate equal to the linear rate of increase of indices for increases in net income in present facilities.

For purposes of this study, various discount rates are applied to net incomes and investments. In these calculations, the present value of investments is treated as a minus and the present value of net incomes as a plus. The sum of the present values of both investments and net incomes over the life of the project equals the values summarized in table 34. All of the major capital requirements (i.e., buildings and equipment) in both present and proposed facilities are assumed to be fully financed. The investment requirements used in the calculations represent yearly additional contributions required to maintain a reserve fund at a level that would equal 1 month's operating expenses in each year of a 30-year period.

The advantages of a Wake County site for the proposed center are illustrated by material summarized in table 34. The sum of discounted projected net incomes and investments for wholesalers on the new center, assuming a site in Wake County, and a publicly developed facility, exceed equivalent values in present facilities



Table 34.—Present value of the sum of projected net incomes and investments for selected firms in existing facilities and on the proposed wholesale food distribution center, assuming different discount rates, sites, methods of financing and development, and adjustment for assumed inflation

Discount rate	Existing facilities	Site for new facilities											
		Harnett County			Johnston County			Nash County			Wake County		
		Private financing	Public financing	Without land costs	Private financing	Public financing	Without land costs	Private financing	Public financing	Without land costs	Private financing	Public financing	Without land costs
1	58,311	55,560	56,320	66,232	66,905	52,578	53,255	72,681	73,502	73,492	74,153		
2	49,652	46,104	46,723	55,599	56,221	43,349	43,974	61,361	62,120	62,114	62,725		
3	42,521	38,318	38,894	46,911	47,489	35,826	36,408	52,102	52,810	52,807	53,376		
4	36,609	31,927	32,467	39,764	40,306	29,655	30,200	44,480	45,143	45,142	45,675		
5	31,674	26,647	27,156	33,848	34,358	24,561	25,074	38,163	38,788	38,790	39,291		
6	27,528	22,259	22,740	28,919	29,401	20,330	20,815	32,895	33,486	33,489	33,964		
7	24,021	18,588	19,045	24,786	25,244	16,793	17,254	28,472	29,035	29,039	29,490		
8	21,036	15,497	15,934	21,298	21,735	13,819	14,259	24,736	25,273	25,278	25,708		
9	18,479	12,881	13,298	18,336	18,755	11,302	11,724	21,559	22,074	22,079	22,491		
10	16,276	10,652	11,053	15,807	16,208	9,161	9,565	18,843	19,337	19,343	19,739		
11	14,366	8,742	9,128	13,633	14,020	7,327	7,717	16,505	16,981	16,988	17,369		
12	12,700	7,096	7,468	11,754	12,128	5,749	6,125	14,482	14,942	14,949	15,317		
13	11,240	5,669	6,030	10,121	10,483	4,383	4,747	12,722	13,167	13,174	13,531		
14	9,953	4,427	4,777	8,694	9,045	3,194	3,547	11,181	11,613	11,621	11,966		
15	8,813	3,339	3,679	7,441	7,781	2,154	2,497	9,826	10,246	10,254	10,589		
16	7,798	2,382	2,712	6,334	6,666	1,240	1,574	8,628	9,037	9,045	9,371		
17	6,891	1,535	1,857	5,353	5,676	432	758	7,564	7,962	7,970	8,289		
18	6,075	783	1,097	4,478	4,793	-284	34	6,614	7,003	7,011	7,322		
19	5,340	112	419	3,695	4,003	-923	-612	5,763	6,143	6,151	6,455		
20	4,674	-489	-189	2,991	3,293	-1,494	-1,190	4,997	5,368	5,376	5,673		
21	4,068	-1,030	-736	2,356	2,651	-2,007	-1,710	4,304	4,668	4,676	4,967		
22	3,516	-1,519	-1,230	1,781	2,070	-2,471	-2,179	3,676	4,033	4,041	4,326		
23	3,010	-1,961	-1,678	1,257	1,541	-2,890	-2,604	3,104	3,454	3,462	3,742		
24	2,545	-2,364	-2,085	780	1,059	-3,271	-2,989	2,581	2,925	2,933	3,208		
25	2,117	-2,731	-2,457	343	617	-3,618	-3,341	2,102	2,440	2,448	2,718		
26	1,722	-3,067	-2,798	-58	211	-3,935	-3,663	1,662	1,994	2,002	2,268		
27	1,356	-3,376	-3,111	-427	-162	-4,226	-3,958	1,256	1,583	1,591	1,853		
28	1,016	-3,659	-3,399	-768	-507	-4,493	-4,230	880	1,203	1,211	1,468		
29	699	-3,922	-3,665	-1,084	-827	-4,740	-4,480	532	850	858	1,112		
30	404	-4,164	-3,911	-1,377	-1,123	-4,968	-4,712	209	523	530	780		
31	128	-4,389	-4,139	-1,650	-1,399	-5,179	-4,926	-92	217	225	472		
32	-131	-4,598	-4,351	-1,904	-1,657	-5,375	-5,126	-373	-68	-60	183		
33	-374	-4,793	-4,549	-2,141	-1,897	-5,557	-5,311	-636	-335	-327	-87		
34	-602	-4,975	-4,734	-2,363	-2,123	-5,727	-5,484	-882	-585	-577	-340		
35	-818	-5,145	-4,907	-2,572	-2,334	-5,886	-5,646	-1,114	-819	-812	-577		
36	-1,021	-5,304	-5,069	-2,768	-2,532	-6,035	-5,797	-1,331	-1,040	-1,033	-801		
37	-1,213	-5,453	-5,221	-2,952	-2,719	-6,174	-5,940	-1,536	-1,249	-1,241	-1,012		
38	-1,394	-5,594	-5,364	-3,126	-2,896	-6,305	-6,073	-1,730	-1,445	-1,438	-1,211		
39	-1,567	-5,726	-5,499	-3,290	-3,062	-6,429	-6,199	-1,913	-1,631	-1,624	-1,399		
40	-1,730	-5,851	-5,626	-3,445	-3,219	-6,545	-6,317	-2,086	-1,807	-1,800	-1,577		

within the range of discount rates considered in the comparison. Other development plans for a center in Wake County also compare favorably with present facilities over much of the range of discount rates shown in table 34. The present value of the same projected net incomes and investments anticipated for wholesalers locating on a new center at other potential sites exceeds equivalent values in existing facilities within all or most of the same range of discount rates.

Internal rates of return (the discount rate at which the present value of the sum of projected net incomes and investments equals zero) also are illustrated by the information in table 34. The often high internal rates of return illustrated on the table reflects the low equity levels assumed in both present and proposed facilities for the purpose of this analysis. Internal rates of return illustrated on the table should not be considered as an actual rate of return on investments. The value of the internal rates of return illustrated in the material shown in table 34 also reflects the limited nonfinanced investments anticipated both in present and proposed facilities. Discount rates included in the range of rates in table 34 are for illustrative purposes and do not represent anticipated cost of money or potential rates of return from alternative investments.

Numerous operating costs are considered in developing the analysis summary in tables 33 and 34. These operating costs are (1) direct labor, (2) equipment, (3) refrigeration, (4) occupancy, (5) energy, (6) transportation, and (7) other. Of these seven cost categories, two are affected by choice of site and all are affected by a potential move to new facilities.

Direct labor includes the salaries and benefits to employees that are directly engaged in handling or processing the food products handled by the companies considered as candidates for relocation. Increases in productivity have the potential of increasing the quantities of food that can be handled or processed by the present work force.

Equipment charges include the cost of the machinery required to move and store products as well as specialized equipment for processing operations. Opportunities for savings exist in equipment charges. Some new equipment also may be required to take full advantage of the advanced designs in modern buildings.

Refrigeration charges include the cost of insulation, blowers, doors, and other equipment associated with freezers and coolers in modern warehouse and food processing facilities. Refrigeration charges include energy requirements for operating coolers and freezers and are based on the installation of a central refrigeration system for the proposed center.

Occupancy costs are directly derived from the present rent, ownership, or lease costs plus associated charges in existing facilities. Equivalent charges in the proposed facilities are calculated from the revenue requirements illustrated in table 30. Occupancy costs in the proposed facilities are among the two items directly affected by a choice of different sites.

Energy costs reflect costs of heating and cooling the proposed and existing buildings. Some related economies are possible in new facilities due to energy efficiency features expected to be included in the new buildings.

Transportation costs include the the costs of owning, leasing, and operating trucks used for the delivery of food products from warehousing or processing facilities to the companies' customers. Company labor associated with delivery operations also is included in this cost item. Transportation or delivery costs to the various potential sites are summarized in the appendix. The methodology for developing these estimates is outlined in the appendix. This analysis illustrates that many firms locate as close as possible to their present customers. As a result, costs from all of the potential sites for the proposed center are higher than equivalent costs in existing facilities. Of the potential locations for a new food distribution center and farmers' market, the transportation analysis technique used in this report indicates a Wake County site would minimize delivery costs from new facilities. This analysis is not intended to be an exact prediction of delivery costs after relocating to a new center. It is intended to illustrate the impact that choosing different sites may have on such costs.

Other costs represent the total of a number of smaller cost items. Some of the other costs may be affected by relocation to new facilities. The remainder of these cost items are more directly affected by the annual sales volumes of the companies considered for relocation to the proposed center than by a move to a new location and building.

## Other Benefits

Other nonmeasurable benefits also can be expected to accrue from the construction of the proposed wholesale food distribution center and farmers' market. The center can be expected to benefit growers, consumers, central North Carolina governments, the area food industry as a whole, employees, and the public.

Growers and consumers using the proposed farmers' market on the center will have an opportunity to conduct business in modern facilities assigned to promote the retail sales of fresh farm produce effectively. Growers also will be able to move incoming produce quickly into the new center and display their products in an attractive manner. Customers will benefit from a central location, good access to roads, adequate parking, convenient facilities, and have support facilities available to make shopping on the center an enjoyable experience. Good facilities should attract additional customers who have not previously used a farmers' market as well as serving those already familiar with such centers.

Central North Carolina governments also will benefit from construction of the proposed wholesale food distribution center and farmers' market. Such a center may encourage wholesalers and other food related firms/organizations to relocate from areas ill suited for food wholesaling and retailing operations. This relocation should allow local governments to redevelop congested areas to promote activities generating higher tax revenues with less demand for city and county services.

The central North Carolina food industry as a whole would benefit from construction of the proposed wholesale food distribution center and farmers' market. This center would enhance the competitive status of the area food industry by promoting quick and efficient movement of food and food products through modern wholesale and processing facilities to retail and other customers. The availability of such a center would allow central North Carolina retail and associated wholesale customers to order and purchase supplies locally in lieu of turning to out-of-State sources. Still additional customers may be drawn to the center from outside central North Carolina. The proposed center also would serve as a model of efficient operations and modern facilities for area firms and others without an immediate need for new facilities.

Employees of firms relocating to the proposed center also would benefit from the project's construction and use. Modern facilities designed for efficient operations could be expected to promote improved morale, better working conditions, and more regular hours. Additional employment can be expected as firms on the proposed center expand their operations. Concentrating a significant number of related wholesale firms with the proposed new farmers' market would promote the efficient use of public transport to center. Safety and health regulations also could be more efficiently enforced and more easily followed in the new facilities constructed on the proposed center.

The public would be one of the principal beneficiaries of the construction of the proposed wholesale food distribution center and farmers' market for central North Carolina. First, the construction of the center would provide a significant influx of resources into the immediate area, providing a major source of employment in the construction industry. Second, the completed center would represent a major source of tax revenue both from the value of the improved property and from wages to employees. Such tax revenue could be expected to lessen the burden on local residential property taxes. Third, the completed center would represent a major source of continuous employment, particularly for semiskilled labor. Fourth, efficient operations and expanded sales by wholesale firms locating on the proposed center and an efficient, modern farmers' market offer the central North Carolina food industry the opportunity to realize cost reductions that could be passed on to the food buying public. Fifth, and finally, food moving through buildings designed for particular operations and functions would remain at a higher quality as damage resulting from inadequate and antiquated facilities could be avoided.



## Appendix

### Construction Costs

Construction costs for the proposed wholesale food distribution center and farmers' market are comprised of building and associated costs. Costs are estimated from standard references and intended only to be used as a guide in planning facilities. They are not intended to replace estimates by local architects and contractors. Additional charges for specialized land preparation are not included in the initial construction estimates outlined in this report.

The following unit costs are used in this report to develop the investment requirements shown in table 31.

Item	Cost
<b>Buildings:</b>	
Multiple occupancy . . . . .	\$20.13 per square foot
Single occupancy . . . . .	19.37 per square foot
Truckers . . . . .	3.64 per square foot
Retail . . . . .	18.08 per square foot
Offices . . . . .	33.45 per square foot
<b>Support facilities:</b>	
<b>Paving and lighting:</b>	
Auto stalls . . . . .	298.25 each
Truck stalls . . . . .	596.51 each
Roadway (30-foot-wide equivalent) . . . . .	66.26 per linear foot
<b>Railroad:</b>	
Tracks . . . . .	49.48 per linear foot
Switches . . . . .	955.50 each
Fencing . . . . .	9.02 per linear foot

In the interest of simplification, certain construction costs have been combined in table 31. Building costs include all facilities required for occupancy but do not include specialized additions or equipment required for specific wholesale storage or processing operations. Lighting, sewers, and other utilities have been included within other categories in support facilities or within the per square foot building charges. Bumpers are included in the linear foot charges for railroad track. All costs are installed or finished. Fencing includes the cost of gates. Costs are adjusted as of 1981.

The various fees are calculated on the basis of actual construction costs. The performance bond (PB) is calculated by the following formula:

$$PB = .00048 (C + P + R + F)$$

where C = building construction cost  
 P = paving and lighting costs  
 R = railroad track and switches  
 F = fencing cost.

A basic \$48,000 performance bond is allocated to individual facilities based on the unit performance bond calculated by the preceding formula. The construction fee (CF) is calculated by the following formula:

$$CF = .204 (C + P + R + F).$$

The design fee (DF) is calculated by the following formula:

$$DF = .054 (C + P + R + F).$$

The contingency allowance (CA) is calculated by the following formula:

$$CA = .05 (C + P + R + F).$$

The total construction cost (TC) is calculated by the following manner:

$$TC = C + P + R + F + CF + DF + CA.$$

Different methods are used to calculate the construction costs and charges for support facilities. Building construction costs are calculated building by building. Support facilities shared by the center as a whole and comprising a significant portion of the associated investment requirements are allocated to different buildings based on floorspace or use as shown in table 31.

Automobile stalls, often located adjacent to specific facilities, are used by both customers and individual firm employees. The total amount of parking on the proposed center is divided into individual firms on the basis of initial floorspace (tables 28 and 31). Truck parking, in contrast, is often used by one firm. Such parking is located for use by these firms in specific buildings on the proposed center and is allocated as shown on the plan in figure 11. Roads serve the entire market and are allocated to specific facilities based on the amount of land required to support specific facilities.

Railroad track is allocated based on use at specific facilities within lead-in track. Lead-in track is allocated according to the amount of house track at specific buildings. Fencing allocation is based on land use. Land, in turn, is based on use and amount of floor-

space. Other elements of the associated investment requirements shown in table 31 are based on other cost elements.

### Revenue Requirements

Revenue requirements are based on the amount of space used by each type of firm and the total investment in buildings and land. The items summarized in the tables include debt service (payment, land carrying charge), taxes, insurance, and other (management, maintenance and security, and solid waste disposal).

Debt service is the repayment of the money used to finance the buildings, associated construction costs and to acquire and prepare the site. Debt service (DS) is calculated in the following manner.

$$DS = 12(C(i/(1 - (1 + i)^{-12N}))) + ((L)(A)(I))$$

and  $i = I/12$   
 where  $I$  = annual interest  
 $N$  = years the investment is financed  
 $L$  = land cost  
 $A$  = acres allocated to the building(s)  
 $C$  = total construction cost

The first portion of the expression is shown on the revenue requirement tables as "payment" and the second expression as the "land carrying charge."

The amount of taxes ( $T$ ), depends on the assessment rate and the tax rate. Taxes are calculated in the following manner.

$$T = R(t_r)(C + (L)(A))$$

where  $R$  = assessment rate  
 $t_r$  = tax rate per dollar of value

There are two types of insurance—fire and extended coverage, and liability coverage. The insurance costs shown in the revenue requirement tables represents the sum of the costs of these two types of insurance. Insurance costs ( $IC$ ) are calculated in the following manner.

$$IC = I_r(B) + (SF/200)(L_r)$$

where  $I_r$  = the sum of the fire and extended coverage rates per dollar cost of the insured buildings  
 $B$  = building construction costs  
 $SF$  = size of the insured buildings in square feet  
 $L_r$  = liability insurance rate per 200 square feet

The other costs represent various charges for the upkeep of the buildings by the center management. Other costs include management, maintenance and security, and solid waste disposal. Other costs ( $OC$ ) are calculated in the following manner.

$$OC = (M_r)(SF) + (MS)(SF) + (SWD_r)(SF)$$

where  $M_r$  = management cost per square foot of planned space  
 $MS$  = maintenance and security cost per square foot of planned space  
 $SWD_r$  = solid waste disposal cost per square foot of planned space

### Transportation Costs

To evaluate the impact of relocation on delivery costs, an analysis was conducted on potential changes of such costs resulting from relocating candidate wholesalers. For purposes of this study, the availability of potential sites was assumed in each of the 11 subdivisions of the study area. Results of the analysis are included in tables 33 and 34 in the text of the report and summarized in appendix table 1. The costs shown in appendix table 1 are annual costs, representing present costs in existing facilities and equivalent costs in the first year of operation of a new center. This analysis is not intended to be an exact prediction of the delivery costs after relocation but is intended to illustrate the potential impact on such costs from choosing sites at various locations. Also for purposes of this study, transportation costs were broken into two components, (1) labor costs and (2) equipment costs. All costs normally associated with delivery operations were allocated to one of the two categories.

The transportation analysis technique used in this report is based on several assumptions. The first assumption supporting the technique is that there will be no immediate change in customer location as a result of the wholesalers' relocation to new facilities. It also is assumed that labor and equipment costs will vary directly with changes in the driving time and distances to customers from the present location and from the various potential sites. In addition, it is assumed a proportionate share of the total cost of delivery would be borne by the volume moving outside the study area and this portion of the delivery cost would not be affected

**Appendix Table 1.—Present delivery costs from existing facilities and initial delivery costs from potential sites for wholesalers considered as candidates for relocation**

Type of firm	Site location													
	Present		Wake County Area 1		Granville County Area 2		Durham County Area 3		Orange County Area 4		Franklin County Area 5			
	\$/ton	Total	\$/ton	Total	\$/ton	Total	\$/ton	Total	\$/ton	Total	\$/ton	Total		
Fruits and vegetables .....	20.08	2,167,874	22.05	2,381,356	41.98	4,532,723	25.53	2,756,800	33.86	3,655,856	35.73	3,858,196		
Meat, poultry, and eggs .....	19.13	119,919	20.31	127,372	37.16	233,000	18.15	113,771	29.95	187,798	35.36	221,693		
Groceries .....	32.76	2,798,756	32.22	2,752,346	39.41	3,366,669	33.48	2,859,783	34.39	2,938,144	37.18	3,176,055		
Bakery and other foods .....	229.72	866,982	247.94	944,402	585.83	2,210,941	259.57	979,597	443.35	1,673,191	471.54	1,779,604		
Total .....	29.26	5,953,531	30.40	6,205,476	40.62	10,343,333	38.08	6,709,951	38.95	8,454,989	40.04	9,035,548		

Type of firm	Site location											
	Nash County Area 6		Johnston County Area 7		Wilson County Area 8		Harrett County Area 9		Lee County Area 10		Chatham County Area 11	
	\$/ton	Total	\$/ton	Total	\$/ton	Total	\$/ton	Total	\$/ton	Total	\$/ton	Total
Fruits and vegetables .....	39.88	4,306,205	28.80	3,110,018	40.17	4,336,616	38.04	4,107,041	44.65	4,820,490	45.66	4,930,332
Meat, poultry, and eggs .....	45.32	284,162	33.17	208,006	51.94	325,674	45.30	284,024	50.17	314,586	51.94	325,643
Groceries .....	38.72	3,307,622	34.94	2,985,174	38.97	3,329,048	36.45	3,113,813	36.93	3,155,174	37.30	3,186,870
Bakery and other foods .....	527.46	1,990,646	323.85	1,222,204	554.47	2,092,567	489.84	1,848,658	632.12	2,385,621	714.63	2,697,005
Total .....	48.61	9,888,635	42.80	7,525,402	45.05	10,083,905	45.28	9,353,536	47.16	10,675,871	48.25	11,139,850



by a move to new facilities. The last assumption supporting the transportation analysis technique allocates a proportion of the total present labor and equipment costs equal to the proportion of the volume presently moving to each area.<sup>5</sup>

The time-distance chart shown in appendix table 2 formed the basis of the calculations to develop the wholesalers' transportation costs as shown in appendix table 1. Appendix table 2 was developed by first calculating the center of population in the 11 areas.<sup>6</sup> A route was selected between each of the 11 centers of population and the driving time and distances were subsequently developed through consulting detailed maps of the appropriate parts of the State. The following formula is used to calculate estimated transportation costs from the various potential sites for the proposed wholesale food distribution center and farmers' market to wholesalers' customers.

$$C_n = \left[ \frac{(L + E)}{V_d} \right] V_{bsa} + \sum_{i=1}^{11} \frac{V_{isa}}{V_d} \left[ \frac{T_{i2}}{T_{i1}} (L) + \frac{D_{i2}}{D_{i1}} (E) \right]$$

where

- $C_n$  = distribution cost from site n
- L = total distribution labor cost
- E = total distribution equipment cost
- $V_{bsa}$  = volume distributed beyond the study area
- $V_d$  = total volume distributed
- $V_{isa}$  = volume distributed to area i within the study area
- $T_{i2}$  = driving time from site n to area i
- $T_{i1}$  = driving time from present location to area i
- $D_{i2}$  = distance from site n to area i
- $D_{i1}$  = distance from present location to area i

<sup>1</sup>Number of areas within study area.

### Present and Projected Costs

Several separate steps are incorporated into the methodology used to analyze the potential benefits of relocating the wholesale firms identified as needing new facilities from existing buildings to the new wholesale food distribution center and farmers' market shown in tables 33 and 34. These steps are (1) projecting the volume anticipated to be handled by these firms over the new center's life; (2) estimating the costs of handling this volume during the same period; and (3) comparing projected present and proposed costs for each alternative by site, financing method, and organization of the new center. Initial costs in present and proposed facilities are shown in appendix table 3.

<sup>5</sup>See appendix table 1 for geographical identification of each area.

<sup>6</sup>(PC(V1) - 35. U.S. Dept. of Commerce, Bureau of the Census, Census of Population, N.C., December 1970.

**Appendix table 2.—Time and distance data within and between 11 areas, central North Carolina, as used in a comparative transportation analysis<sup>1</sup>**

Area <sup>2</sup>	Round trip time in minutes											Round trip distance in miles										
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11
1	80											33										
2	206	83										80	35									
3	38	112	69									44	52	28								
4	140	242	132	67								64	86	34	23							
5	150	182	162	294	96							64	80	74	108	44						
6	154	322	264	292	246							92	142	136	156	108	48					
7	94	276	204	232	244	176	59					54	130	98	118	118	118	34				
8	202	714	312	342	330	96	80	44				90	190	134	154	162	60	58	30			
9	174	370	286	314	326	312	124	166	87			72	150	116	136	136	198	42	94	34		
10	222	578	318	186	322	336	278	302	136	66		88	158	108	74	150	188	124	146	52	26	
11	300	378	266	136	306	252	258	408	262	128	109	84	142	90	56	146	164	122	174	104	52	39

<sup>1</sup>Developed from available references and most likely routes between centers of the population of each area.

<sup>2</sup>See appendix table 1 for the geographical identification of each area.

Appendix table 3.—Initial costs in present and proposed facilities of wholesale firms considered as candidates for relocation by center site and method of financing

Site and method of financing	Cost of			Annual expenses							Net income		
	Annual sales	goods sold	Gross income	Direct labor	Equipment	Refrigeration	Occupancy	Energy	Transportation	Other		Taxes	Total
Present facilities .....	130,990	108,716	22,274	3,066	392	789	582	658	5,954	5,280	2,777	19,498	2,776
Harnett County:													
Private financing .....	130,990	108,716	22,274	2,125	377	844	1,355	494	9,354	5,540	1,093	21,182	1,092
Public financing .....	130,990	108,716	22,274	2,125	377	844	1,163	494	9,354	5,540	1,189	21,086	1,188
Johnston County:													
Private financing .....	130,990	108,716	22,274	2,125	377	844	1,351	494	7,525	5,540	2,009	20,265	2,009
Public financing .....	130,990	108,716	22,274	2,125	377	844	1,158	494	7,525	5,540	2,106	20,169	2,105
Nash County:													
Private financing .....	130,990	108,716	22,274	2,125	377	844	1,348	494	9,889	5,540	829	21,446	828
Public financing .....	130,990	108,716	22,274	2,125	377	844	1,154	494	9,889	5,540	926	21,349	925
Wake County:													
Private financing .....	130,990	108,716	22,274	2,125	377	844	1,668	494	6,205	5,540	2,511	19,764	2,510
Public financing .....	130,990	108,716	22,274	2,125	377	844	1,431	494	6,205	5,540	2,629	19,645	2,629
Private financing without land costs .....	130,990	108,716	22,274	2,125	377	844	1,424	494	6,205	5,540	2,633	19,642	2,632
Public financing without land costs .....	130,990	108,716	22,274	2,125	377	844	1,235	494	6,205	5,540	2,727	19,547	2,727

1,000 dollars

Volume projections differ between present and proposed facilities. For the purposes of this analysis, it is assumed that additional quantities of products cannot be handled through the existing buildings. This assumption is consistent with the identification of lack of expansion space as a primary incentive for relocation by most of the firms identified as candidates for the new center. Initial volumes of both present and new facilities are based on the recorded sales of candidate firms at the time of this study. Additional products are anticipated to be handled in subsequent years through new buildings.

Planned increases in volume in the proposed wholesale facilities are based on projected historical population trends. These projections are included in this report solely for estimating facility expansion requirements; actual volume movement over the analysis period could vary substantially from these estimates.

Present costs are based on interviews with company management and others familiar with the wholesale food industry in central North Carolina. These estimates are grouped into a single total to avoid revealing confidential information concerning specific firms. All of the costs are tabulated into an annual total and represent such costs for the year prior to this study.

A number of different types of information are considered in the comparison of present and proposed costs for the wholesale firms included in new facility planning. Annual expenses are comprised of (1) cost of goods sold, (2) direct labor, (3) equipment, (4) refrigeration, (5) occupancy, (6) energy, (7) transportation, (8) other, and (9) taxes. Several income categories are also included in the cost comparisons. These income categories include (1) annual sales, (2) gross income, and (3) net income. Net incomes in present and proposed facilities are summarized in the text of the report in table 33.

Initial costs in new facilities are based on a series of analyses of the different cost categories outlined in this report. Occupancy costs are based on the revenue requirements to support the new facilities. Transportation costs from the various sites for the new center are developed using the transportation analysis shown elsewhere in this report. Direct labor and equipment costs in new facilities are based on an analysis of the current methods of operation of the individual firms included in new facility planning. Current costs of labor and equipment are adjusted from present levels, if appropriate, to reflect identified costs associated with equivalent activities of other progressive food firms cur-

rently located in well-designed, modern facilities. These adjustments also reflect research by the USDA and other organizations about modern food warehousing and processing techniques. Refrigeration and energy costs reflect the anticipated use of a central energy plant on the new center and USDA research on refrigeration and related costs of firms locating on wholesale food centers.<sup>7</sup> Refrigeration and energy costs are adjusted to reflect cost changes since publication of the research. In most instances, the items included in the category "other costs" are not anticipated to be directly affected by relocation to a new wholesale food distribution center. Adjustments in other costs, where appropriate, reflect an analysis of anticipated specific company plans and operations after relocation to new facilities.

Increases in prices also are a major factor in changing costs in both existing and proposed facilities. Price changes utilized in this analysis are derived from trend lines calculated from U.S. Department of Labor historical producer price indices appropriate for each of the defined cost categories. As historical trends or price changes may not be a fully reliable basis on which to predict future economic performance, this information is used only for the purpose of this analysis. The use of historical producer price indices should not be represented as a firm prediction or estimate of future national economic activity but only as a summary of recent historical information assembled for the purposes of this report.

Potential price changes are applied to the various cost categories in the analysis in different ways. Producer price indices are calculated for each year of the project life and applied to the initial per ton charge associated with the categories, "annual sales," "cost of goods sold," "direct labor," "equipment," "refrigeration," "energy," and "transportation." The calculated and adjusted unit costs are subsequently applied to the projected volume anticipated to be handled through both present and proposed facilities. Occupancy costs in new facilities for each year of the analysis reflect both the ongoing costs of the initial buildings and expansion space, if anticipated, constructed at 10-year periods. Per-square-foot construction and related costs associated with building this expansion space are adjusted by producer price indices calculated from appropriate trend lines.

<sup>7</sup>Stahlman, Robert L. A study of refrigeration systems for urban food distribution centers. MRR 921, U.S. Dept. of Agric., January 1972, 107 pp.



Some income or cost items are calculated from other cost information. Gross income is calculated from estimated annual sales volumes and cost of goods sold. Taxes are calculated at a rate of 50 percent of total expenses subtracted from the gross income. Net income is calculated from the addition of the total expenses and estimated taxes subtracted from gross income. Actual tax payments by the wholesale food firms included in this analysis would be affected by a wide range of particular business circumstances. The estimated tax payments shown in this analysis are solely for the purposes of this analysis and do not represent an estimate of potential tax revenue.

Two wholesale firms are not included in the financial analysis as those particular new facilities represent an initial enterprise for which no present costs are available. These firms anticipate retaining their operations in existing buildings and locating completely new activities on the center. Appendix table 4 shows an adjustment in revenue requirements to support the new wholesale food distribution center and farmers' market that excludes these firms for application to the occupancy cost category.

Potential projected incomes and expenses of the remaining wholesale firms included in this analysis are shown summarized in table 33, assuming that (1) these firms remain in their present facilities, or (2) these same firms relocate to a new center located at various sites and developed by different means. The data in this table are adjusted to compensate for assumed inflation of various cost categories incorporated into the calculation of projected net incomes. The techniques for this adjustment are outlined in the methodology for calculating present worth values. The initial costs from which projections are made are illustrated in appendix table 4.

The present worth values shown in table 34 are drawn from the projected expenses and incomes summarized in table 33. There are several steps involved in calculating these values. These steps include (1) determining investments by year for each year of the analysis and (2) adjusting the sum of the investments and net income for assumed increases in prices and calculating present worth values with the application of various discount rates.

Investment requirements for each year of the analysis ( $Inv_i$ ) are calculated in the following manner:

$$Inv_i = ((Exp_i + Cg_i)/12) - \sum_{n=1}^{n=i-1} Inv_n$$

where

$Inv_i$  = investment in year  $i$

$Exp_i$  = total annual expenses (the sum of direct labor, equipment, refrigeration, occupancy, energy, transportation, other, taxes) in year  $i$

$Cg_i$  = cost of goods sold in year  $i$

$Inv_n$  = investment requirements through the previous year,  $i - 1$ .

The present worth values (PW) are calculated in the following manner:

$$PW = \sum_{i=1}^{i=30} ((NI_i - Inv_i)(F_i))/(1 + d)^{i-1}$$

where

$NI_i$  = net income in year  $i$

$F_i$  = inflation factor required to level net income in present facilities for year  $i$ , equal to the net income in present facilities in year 1

$d$  = discount rate

Appendix table 4.—Adjusted revenue required for the initial development and other site costs associated with the wholesale market within the proposed wholesale food distribution center and farmers' market by site location and method of financing

Type of firm and/or facility	Harnett County site			Johnston County site			Nash County site					
	Private		Public	Private		Public	Private		Public			
	Cost	Cost per sq ft	Cost	Cost	Cost per sq ft	Cost per sq ft	Cost	Cost per sq ft	Cost per sq ft			
Wholesale market total <sup>1</sup> . . . . .	\$1,453,294	\$7.33	\$1,247,441	\$6.30	\$1,449,234	\$7.31	\$1,242,117	\$6.27	\$1,446,077	\$7.29	\$1,238,329	\$6.25
Firms not included in cost analysis . . . . .	98,738	6.99	84,890	6.01	98,486	6.97	84,550	5.99	98,285	6.96	84,303	5.97
Adjusted wholesale market . . . . .	1,354,556	7.36	1,162,551	6.32	1,350,748	7.34	1,157,567	6.29	1,347,792	7.32	1,154,026	6.27

<sup>1</sup>See appendix tables 1 to 4.

Type of firm and/or facility	Wake County site			Wake County site (no land costs)				
	Private		Public	Private		Public		
	Cost	Cost per sq ft	Cost	Cost	Cost per sq ft	Cost per sq ft		
Wholesale market total <sup>1</sup> . . . . .	\$1,790,618	\$9.04	\$1,535,483	\$7.75	\$1,527,368	\$7.71	\$1,324,883	\$6.69
Firms not included in cost analysis . . . . .	122,278	8.66	104,963	7.43	103,753	7.35	90,143	6.38
Adjusted wholesale market . . . . .	1,668,340	9.07	1,430,520	7.77	1,423,615	7.74	1,234,740	6.71

<sup>1</sup>See appendix tables 1 to 4.

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