AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

2.84Ab
Cr56

MARKETING FACILITIES for FARM and RELATED PRODUCTS at SAN JUAN, PUERTO RICO

UNITED STATES DEPARTMENT OF AGRICULTURE
Production and Marketing Administration
Marketing and Facilities Research Branch

in cooperation with

Department of Agriculture and Commerce
Government of Puerto Rico

Washington, D.C.
June 1951

LIBRARY
CURRENT SERIAL RECORD
SEP 6 1951
U.S. DEPARTMENT OF AGRICULTURE

Agriculture Information Bulletin. No.60

ACKNOWLEDGMENTS

The assistance and cooperation of many agencies of the Government of Puerto Rico, including representatives of the Agricultural Extension Service, Agricultural Experiment Station, and the University of Puerto Rico, made this publication possible. Special recognition is due the Honorable Ramon Colon Torres, Commissioner of Agriculture and Commerce, for his assistance and advice; Robert E. Branson, Agricultural Economist of the Social Science Research Center, University of Puerto Rico, for his cooperation and assistance in the collection of basic data and for making available information used in this report; Rafael Pico and staff of the Puerto Rico Planning, Urbanizing, and Zoning Board for consultation and assistance in preparing maps and related data; Santiago Diaz Pacheco, Head, Economic Research Department, Industrial Development Company; Arturo Roque, President, Puerto Rico Agricultural Company (in July 1950 Dr. Roque returned to the Agricultural Experiment Station as its Director; he was replaced by Luis Antonio Serrano); Buenaventura Quinones Chacon, Chief of the Puerto Rico Coffee Industry Relief Commission and Director in charge of the Coffee Insurance Corporation; Salvador V. Carro, General Director, Transportation Authority of Puerto Rico; Teodora Moscoso, Administrator, Puerto Rico Economic Development Administration; Harvey S. Perloff, Member, and Emilio Davilo, Planning Consultant of the Puerto Rico Planning Board; Julio B. Ortiz, Secretary, Puerto Rico Chamber of Commerce; Pedro Jose Diaz, Engineer of Caguas, who assisted with certain engineering aspects of the study; and many other individuals and organizations who aided in making this report.

Special recognition also is due to George W. Stark, President, Stark and Wetzel Packing Company, who operates three slaughtering plants, two in Indianapolis, Ind. and one in Frankfort, Ind.; Philip J. Caito, President, Caito and Mascari, wholesale produce and banana dealer; John M. LaRosa, wholesale produce dealer and tomato producer and repacker; Paul T. Rochford, Attorney of Rochford and Rochford, law and business analyst firm, all of Indianapolis, Ind.; and to C. B. Libbert, Vice President and Treasurer, Acme-Goodrich Company, operator of 40 country elevators in Indiana and a terminal grain company in Cleveland, Ohio. These people constituted an advisory committee on the economic, engineering, operational, and management aspects of this study. Each of them has had 15 to 30 years experience in his field, and they made many valuable suggestions.

Recognition also is given to A. B. Lowstuter, architectural engineer, for his work on the engineering phases and to Catharine A. Perry for the preparation of models used in the study. Both are employed in the Marketing and Facilities Research Branch, Production and Marketing Administration.

Funds appropriated under the Research and Marketing Act of 1946 were used in part in making this study and report.

PREFACE

The Government of Puerto Rico, particularly the Commissioner of Agriculture and Commerce and his staff and the Puerto Rico Planning, Urbanizing, and Zoning Board, the various administrative agencies of the municipal governments included in metropolitan San Juan, and many other agencies and individuals in Puerto Rico have been interested for a number of years in the improvement of the market facilities and distributive system in the San Juan area and for the Island as a whole. Early in 1949 Governor Luis Munoz Marin requested the assistance of the Marketing and Facilities Research Branch, Production and Marketing Administration, U. S. Department of Agriculture, in undertaking a study of the marketing facilities and distributive system of Puerto Rico, with special emphasis on the needs of metropolitan San Juan. The study was begun in the fall of 1949.

The present facilities used for handling farm produce and related products throughout most of the Island were visited and inspected. It was found that the first step in improving the market facilities and the distribution system should be the provision of proper facilities in San Juan. This report, therefore, considers only market facilities, distribution, and related problems in metropolitan San Juan. Soon after the study was begun, it became obvious that certain nearby lands were dependent upon facilities in Puerto Rico. Accordingly, the Virgin Islands and the Dominican Republic were visited to get a general view of the marketing problems there; also, some review was made of production and marketing methods in other nearby areas.

A preliminary statement covering the major marketing facility problems of the San Juan area was presented to the interested agencies of the Government of Puerto Rico at an informal meeting during July 1950. At this meeting many valuable suggestions were received and certain determinations made which permitted a more accurate appraisal of the problems of the area. In December 1950 a preliminary report was presented in a series of eight meetings to Government agencies and private individuals and firms interested in the market. Included in this presentation was a scale model layout of the facilities recommended. From these meetings came many suggestions that have been given consideration in the preparation of this report.

CONTENTS

DEFINITIONS

The problems relating to marketing, distribution, and physical facilities in Puerto Rico have been rather loosely defined and have led to much misunderstanding in the past. It is necessary to include, therefore, definitions of some of the major items to be discussed in this report in order that everyone will be fully informed with respect to the terminology used.

Marketing facilities are the physical facilities used in the movement of products from the place of harvest, creation, or manufacture to the point of consumer purchase. This definition covers a wide variety of facilities, including roads, wharves, transportation and communication facilities of all kinds, packing sheds, canning factories, wholesale and retail stores, and all kinds of warehouses and processing plants that products move through from point of production to the consumer.

Distributive system may be defined as the channels through which products must move from point of production to consumer. In the distribution of farm and food products, there is need for various organizations to assume title to the products and to finance, handle, and process them if necessary. A farmer-producer can only retain title to and handle such products for a short distance from the point of production.

Wholesale distributors. There are two main groups dealing in imported commodities at the wholesale level; namely, the broker or distributor agent and the wholesale dealer. Although those doing business classify themselves either as brokers or wholesalers, there is some overlapping of activities, and in a few instances there has been some vertical integration of these activities. The broker or distributor performs several functions, but the principal one in connection with imported merchandise is to contact suppliers and to resell it on arrival or prior to arrival to a wholesale dealer. The broker may sometimes take the position of a wholesale dealer and store commodities and sell them directly to a retail buyer. The broker also arranges with the producer or his agent for the sale of exported merchandise and collects from the receiver in a foreign market. Some brokers own or rent warehouse space. Others do business entirely from an office.

A wholesale dealer is one who buys commodities in large quantities (both imported and locally produced), stores the products, and sells them in small quantities to retail buyers. In a number of cases the wholesale dealer may sell a part of his supplies to another wholesaler.

Many wholesale dealers in San Juan buy directly from foreign suppliers, their activities thus overlapping those of the broker. All wholesale dealers maintain warehouse space for storing and distributing supplies.

A retailer is one who buys commodities for sale to consumers or for use in restaurants, hotels, and other institutions. The retail-store buyer procures the product in the quantity offered at the wholesale level and displays and sells it in the smaller quantities desired by the consumer. For example, the retail buyer may procure a 100-pound bag of rice and sell it a pound at a time to consumers. As a part of this service, the retailer will probably furnish the bag in which the pound of rice is placed. Various individuals engaged in other businesses may become retail sellers. Some farmers sell directly to consumers on the streets, in stands at public markets, and by other means. A few wholesale dealers in San Juan sell directly to consumers as well as to retail stores or restaurants.

The producer is the one who grows farm products, who catches fish, or who manufactures the commodities handled in trade.

The consumer may be defined as the family or individual who buys for consumption rather than for resale.

A wholesale market is the center of wholesale activities which is the central place where most of the wholesale stores and other physical facilities used in wholesaling are located. Because individual wholesale dealers generally do not handle a complete line of all commodities handled by a retail buyer, wholesale dealers as a group find it to their mutual advantage to obtain facilities as close to each other as possible. Although the concentration of wholesale stores has not been planned in San Juan, these stores locate as near as possible to existing wholesale stores and other wholesale facilities, including unloading piers, in order to be in the general area to which buyers come.

A retail market is a place where a retailer displays and sells commodities in the small quantities desired by consumers. With the exception of public markets and a few nonpublic market places, the retail facilities are situated in close proximity to the homes of consumers. Hundreds of different kinds of commodities are handled in retail establishments--fresh perishable food products, nonperishable food products, and nonfood products of all kinds used in the household. In many instances, feed, seed, fertilizer, drugs, and many other nonhousehold commodities are handled in retail stores. The public retail market, as it exists in San Juan and other parts of Puerto Rico, was originally planned to provide a central market place

for the sale of food and other products to consumers living nearby. When such facilities were originally planned, large metropolitan centers and modern facilities and equipment were nonexistent. As population began to disperse and modern and fast-moving motorized distributive equipment became available, private citizens began to open retail stores of all kinds close to the new communities. The most modern term applied to this new development is the "shopping center."

Washington, D. C.

Issued July 1951

MARKETING FACILITIES FOR FARM AND RELATED PRODUCTS AT SAN JUAN, PUERTO RICO

By Caleb J. Otten, Agricultural Economist
Marketing and Facilities Research Branch
Production and Marketing Administration
United States Department of Agriculture
Guillermo Serra, Director, Marketing Administration
and Bartolome M. Morell, Chief, Market News Service
Department of Agriculture and Commerce
Government of Puerto Rico

SUMMARY

The principal purposes of developing plans for improved market facilities in Puerto Rico are: (1) To facilitate the distribution of commodities produced on the Island so that production can be increased and the living standards of the people raised, and (2) to make more efficient the receipt and distribution of imports which come primarily from the States by boat. San Juan, being the largest port and handling about 75 percent of the total receipts in Puerto Rico, is the principal market and is the point at which improvements in marketing facilities might be expected to result in the greatest benefit to the people on the Island.

The primary defects in the San Juan market facilities for handling food and related products are: (1) The lack of sufficient warehouse facilities at shipside, (2) the splitting of market operations among several market areas, (3) excessive costs of cartage, deterioration, and spoilage, (4) the absence of a suitable livestock market with the necessary slaughtering and processing facilities for the proper handling of animals, particularly of heavier weights, (5) the lack of grain storage, feed mixing, and milling facilities for the efficient handling of imported grain and utilization of the various commodities produced on the Island that could be used in mixed feeds, and (6) the need for improved vegetable-oil-extracting facilities.

To correct these defects this report proposes the construction of three types of facilities, which will provide a satisfactory outlet for an increased production of food products on the Island and for the efficient handling, processing, and distribution of these and imported products to the people in the San Juan metropolitan area, and to a lesser degree throughout the Island.

Wholesale Produce Market

It is recommended that facilities be constructed for shipping lines, including a wharf and warehouses; warehouses or stores for all kinds of wholesale handlers of food; sheds for farmers and truckers; a small retail market building; and that space be provided for public storage buildings, allied industries, and a service station, and for the expansion of each kind of facility to meet the growing needs of the future. Enough of these facilities are planned for initial construction to take care of the requirements of all those market handlers who expressed an interest in moving into a new market--about 65 percent of the firms conducting from 75 to 80 percent of the total volume of business. The cost of developing this wholesale produce market, including the necessary dredging, wharf, and bulkhead is estimated to be about $6,000,000. To amortize this investment and pay the operating expenses of the market, annual rentals that would have to be collected from tenants would amount to about $430,000. Although this payment to make the proposal self-liquidating may appear large, it would be much more than offset by savings that could be made by operating under the improved conditions. For the shipping lines and farmers no estimates of savings were determined, but it is estimated that annual savings of all other operators in the produce market would be about $670,000 in excess of the rentals which they would have to pay.

Slaughtering and Meat-Processing Plant

To provide the facilities that are needed to handle properly the live meat animals produced in Puerto Rico it is recommended that one good slaughtering plant with facilities for curing, rendering, canning, and manufacturing be constructed adjacent to the wholesale produce market. To meet present needs this plant should have a capacity for handling about 60 cattle and 200 hogs daily, with adequate yards and pens. The estimated cost of these facilities, including the cost of land, fill, and equipment is $1,350,000. To amortize this investment over the estimated useful life of the facilities and pay their maintenance costs and taxes, rentals of about $123,000 per year would have to be collected from the tenants.

Grain Storage, Feed-Mixing, Milling, and Vegetable-Oil-Extracting Facilities

It is recommended that grain storage, modern feed-mixing, milling, and vegetable-oil-extracting facilities be developed in the same area as the produce market and the livestock slaughtering plant. To meet present needs it is suggested that the grain storage facility have a

capacity of 300,000 bushels, the feed mixing mill be able to grind and mix about 40,000 tons of feed annually, milling facilities and equipment be provided for handling up to 1,500,000 bushels of grain per year for human consumption, a vegetable-oil-extracting plant be provided to handle 10,000 tons of these products per year, and a grain drier with a capacity of 400 bushels per hour be installed. These facilities would require wharf space for the direct receipt of shipments of grain in bulk and by other means. It is estimated that their total cost, including land, wharf, and fill would amount to about $2,077,000 which would require the collection of annual rentals of about $183,000 to liquidate the investment and pay the maintenance costs over the estimated useful life of the facilities and equipment.

Suggested Site

To construct these three types of facilities and provide sufficient land for the expansion of each to meet future needs, about 79 acres of land would be required. A satisfactory site must meet several requirements: First, because of the importance of water transportation in bringing supplies to and from the facilities, the area selected must be on a water front accessible to boats. In addition, it should be near the geographical center of the 5,000 retail outlets in the metropolitan area that will be supplied from the facilities, convenient for the receipt by motortruck of supplies brought in from all parts of the Island, convenient to out-of-town buyers, and so located that rail connections can be provided to such parts of the facilities as may need rail transportation. In order to hold down the cost of the development, it is necessary to use inexpensive land; and to facilitate the policing of the area and the handling of traffic it should be possible to enclose the entire site with a suitable fence, which of course makes it necessary to select a location through which only market traffic needs to move. The site which most nearly meets all these requirements is on San Juan Bay immediately southwest of the mouth of Martin Pena Channel.

Ownership and Management

In view of the widespread public benefits to be derived from the construction of these facilities, the apparent absence of any private corporation that is willing to undertake the construction, and the fact that many of the facilities constructed would be the only comparable facilities on the Island, thus tending to monopolistic advantages, it is suggested that the facilities be developed by the Puerto Rican Government through the use of some public benefit corporation and that this corporation lease the facilities under suitable terms to responsible and capable operators who would perform

the functions of receiving, processing, and distributing the food. Only such facilities as are immediately needed and can be covered by lease agreements with responsible firms and individuals should be built at this time. The present operators of wholesale food establishments in San Juan, the shipping lines, and farmers would be the principal tenants of the produce market; but it would seem desirable to work out suitable arrangements with financially responsible experienced firms from the States for the operation of livestock slaughtering facilities and the facilities for handling grain, feed, and vegetable oils.

Potential Benefits

Although considerable savings from operating in the improved facilities would accrue to the firms operating in them, due to competition among these agencies, a substantial part of these savings would be passed back to farmers or on to consumers, so the benefits of the proposed facilities would be reflected largely in the economy of the Island. The recommended facilities would provide a dependable outlet for much of the food products that can be grown economically in Puerto Rico; hence they would encourage larger production on the farms on the Island, thus reducing the extent to which it is dependent on outside sources for its food supply. The availability in one area of these foods, augmented by such imports as are necessary to give a complete variety, would make it much easier for all retail outlets to obtain economically, quickly, and regularly the supplies that are needed by the people they serve. The increased production, milling, slaughtering, canning, and other processing which the facilities would make possible would afford opportunities for increased employment of Puerto Rican labor. The ability to store bulk grain in considerable quantities and process it into food for human and animal use would make possible savings in the cost of transportation and make the Island less dependent upon each week's unloads of these commodities. Many products which are now going to waste in Puerto Rico including some hides, edible and inedible wastes from slaughter, coconut and pineapple waste, coffee bean and cane pulp, some oil seeds, and similar products could be salvaged in facilities of the type proposed. Foods could be handled under more sanitary conditions, the necessary food inspection could be facilitated, foods especially suited to the tastes of Puerto Ricans and to the nutritive needs of animals on the Island could be more readily obtainable, and traffic problems in the metropolitan area would be simplified.

All of these benefits can be obtained without any subsidy from taxpayers if proper care is used in building only those facilities for which responsible tenants can be found, and if capable operators are

obtained for the slaughtering, grain storage, milling, feed-mixing, and related facilities. In order to insure the continuation of adequate rentals from the properties to be constructed to amortize their cost, reasonably long-term leases, or contracts to lease, should be entered into prior to construction. Much effort will be required to bring together the various groups and agencies whose cooperation is needed to make these proposed facilities successful, because the proposals constitute a major undertaking affecting the business and well-being of many people. Nevertheless, the development and proper operation of facilities of this kind are essential to the economic advancement of the Island. It is not necessary that all the facilities discussed in this report be built at one time, but those planning the initial construction should keep constantly in mind the fact that all the facilities discussed in this report are related and therefore should be in close proximity to each other, and that appropriate provision should be made for each in the original layout.

INTRODUCTION

Puerto Rico lies 1,000 miles south and east of the eastern tip of Florida between 17°55' and 18°30' north latitude (fig. 1). 1/ It includes a number of nearby islands, of which Vieques and Culebra, situated a few miles off the east coast, are most important. Puerto Rico is approximately 100 miles long, east and west, and 35 miles wide, north and south. It contains about 3,435 square miles, which is about two-thirds the size of Connecticut. 2/ Its population is in excess of 2,220,000, more than 640 people per square mile as compared with about 50 people per square mile in the continental United States. 3/

Puerto Rico is part of a mountain range submerged in the ocean. Low, narrow alluvial coastal plains almost encircle the Island. The interior is largely mountainous, with a few fertile valleys. The mountains in the northern section are generally rounded, sometimes called "hay stacks." The interior mountains reach a maximum elevation of about 4,398 feet. Average yearly rainfall is 71 inches, with variations from a low of 21 inches in the southwest to 170 inches in the northeast, occasionally reaching almost 200 inches on some of the higher mountains. The climate is frost free, with an average winter temperature of 75° and summer temperature of 80°. 1/ The Island is subject to hurricanes. In the 126-year period 1825 to 1951, 22 tropical cyclones or hurricanes have caused severe destruction of property on the Island.

Columbus discovered the Island on his second voyage to the New World in 1493. The Indians 4/ he found cultivated corn, tobacco, and various root crops and fished and utilized the native tropical fruits. Their crop production, however, was sufficient to maintain only themselves, and the Spanish settlers were dependent largely on imported foods.

Puerto Rico was under Spanish rule for more than 400 years after its discovery. Columbus brought sugarcane in 1493. This crop has greatly influenced the economy of the Island as well as most other islands of the Caribbean area. Although large settlements by immigration, such as took place in later years on the American Continent, were not made by the Spanish, those who came brought with them their culture, which has had an influence on the development of the marketing system and facilities currently in use on the Island.

1/ Puerto Rico Planning, Urbanizing, and Zoning Board, "A Development Plan for Puerto Rico," 1944.

2/ Perloff, Harvey S., "Puerto Rico's Economic Future," 1950.

3/ Preliminary 1950 Census data.

4/ Indian population has been variously estimated at 12,000 to 40,000.

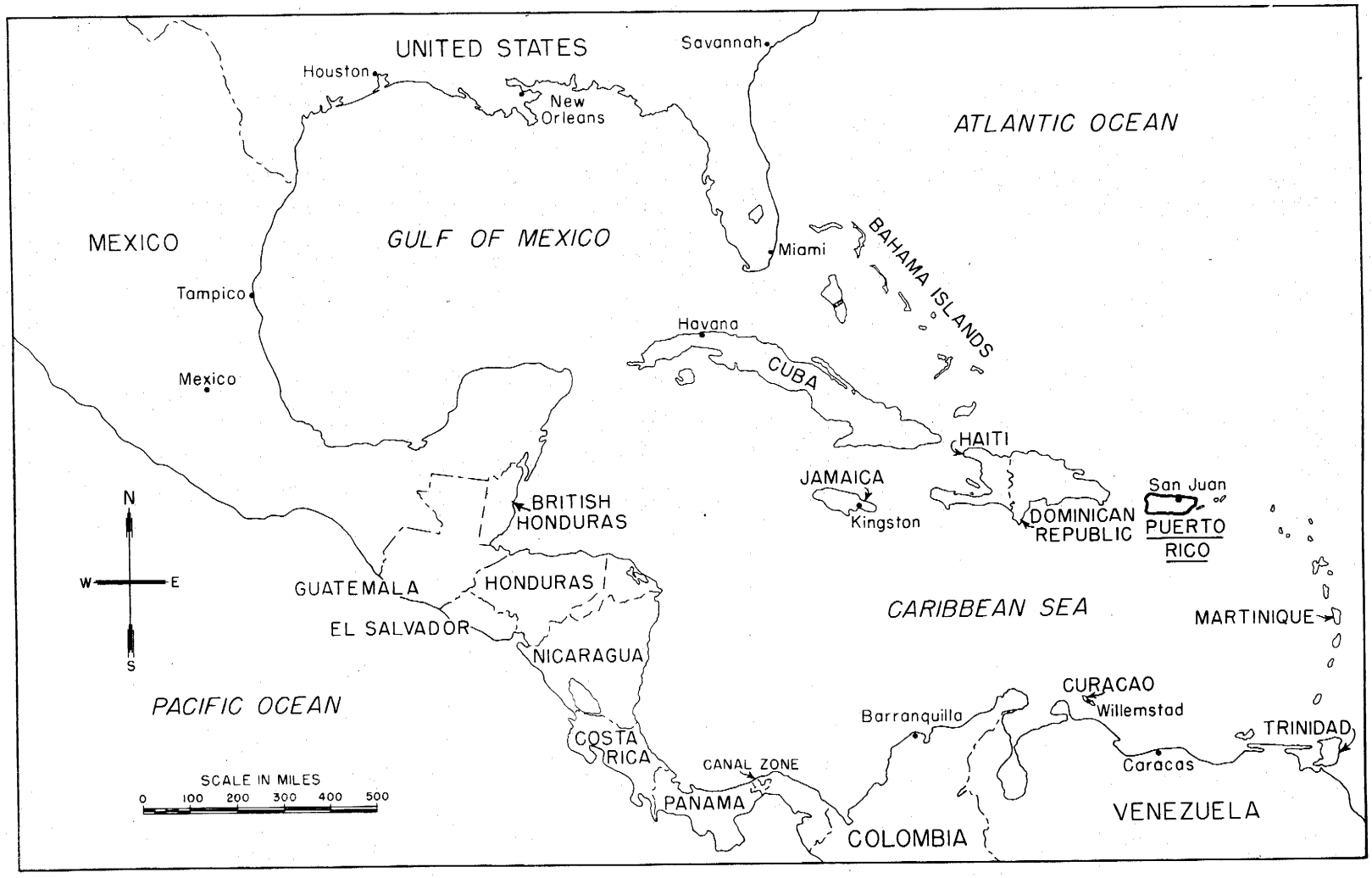


Figure 1.--Location of Puerto Rico with respect to the United States, other islands in the Caribbean, and Central and South America.

Puerto Rico is primarily agricultural. About a third of its tillable acreage is devoted to the production of sugarcane. Sugar is its leading export. Its principal trade is with the States, and its trade balance is generally unfavorable. An abundance of labor is available on the Island, and the supply would be even larger if it were not for the continued migration of laborers to the continent, primarily to New York City. There is an ample quantity of gravel, sand, limestone, and clay, but few other mineral resources of consequence. The soils are relatively productive, having originated mainly from volcanic action and disintegration of calcareous and other rock materials. The soils are responsive to good tillage and fertilization practices.

Agricultural Production

Hogs, chickens, goats, cattle for milk and beef production, many fruits, vegetables, some grains (corn and a small amount of rice), coffee, cotton, and numerous tropical fruits and crops are grown in Puerto Rico. The native cattle, which are of a relatively poor dairy type, are most prevalent on the Island. Oxen are used in decreasing numbers to furnish power on farms; and these, together with animals from dairy and beef herds, are slaughtered for food. Puerto Rico, however, has generally been on an import basis with respect to meat and animal fats.

A limited quantity of grain (primarily corn) is produced on the Island, but the major part of the edible rice, wheat, and other grain products has been imported for many years. The bulk of the animal feed concentrates is imported, even though some is produced locally. Although cottonseed from the sea-island cotton grown in Puerto Rico is available with quantities of coconuts, small amounts of peanuts and soybeans, and other oil-bearing products, there are no modern facilities for crushing these products for oil and for manufacture into edible products. Edible vegetable-oil products are imported.

There is no bulk grain storage or milling equipment for the manufacture and/or processing of corn meal, wheat flour, or rice, and only small quantities of nonmodern feed-mixing equipment are available. Thus, most of the grain and feed concentrates fed to animals and fowls is imported in bags, and all flour, rice, and cereal edible food products are imported in the same manner.

Since Puerto Rico is a frost-free Island, substantial quantities of fresh fruits and vegetables are produced throughout the year. Most of the production is for local consumption in fresh form. Although the canning of pineapples is a well-established industry, there are few canneries or other processing plants of importance for preserving

other fruits or vegetables. As a result, substantial quantities of canned fruits and vegetables are imported, many of which compete with products grown in the territory.

Coffee production occupies a substantial acreage in the mountainous region and forms a part of good forestry and conservation practice in this area. Relatively adequate processing facilities are available to handle the coffee produced. Cigar-filler type tobacco is produced largely in the central eastern mountainous region and in the west central region of Utuado and Jayuya. The demand for this tobacco for export declined sharply during the late 1920's and has never reached the previous level. Some shift in production from tobacco to vegetable crops has been taking place. Sea-island cotton of relatively good quality is produced on a limited acreage, largely for export. The production of forest products for commercial use is very limited, except for charcoal, which is used extensively for fuel on the Island.

Marketing and Distribution

Marketing and distribution problems in any area dictate the kinds of facilities required to do a given job. In Puerto Rico two types of problems are involved: (1) Those related to maximizing food and fiber production on farms, the distribution of these products to people living in Puerto Rico, and the export of any surplus, and (2) the more efficient receipt and distribution of imports (primarily from the States), which must be obtained by boat. Of course, a few products may be and are at present being obtained by air freight.

Ships may stop at any of 10 ports to discharge or pick up supplies, but only 3 ports--San Juan, Mayaguez, and Ponce--are on scheduled stops at this time. The remaining 7 ports are used only occasionally, primarily at times when substantial quantities of raw sugar are to be shipped or very large quantities of certain supplies are to be unloaded.

Shipped-in commodities arrive mainly by boat to the Island; they are unloaded at the wharves, from which part is distributed and the remainder moved into warehouses for distribution during the period between boat arrivals. Distribution from the wharves is in wholesale lots, the products moving to wholesale and retail dealers in various quantities needed. The ultimate consumers of all these products obtain them principally from retail establishments in the vicinity of their residences. Storage facilities for perishable products generally are publicly or privately owned refrigerated warehouses that contain both cooler and freezer space (high and low temperatures).

In the market facilities in San Juan many farm and related products are handled. Because of the limited population to be served and the limited volume of a single commodity, in most instances an agent must handle a group of commodities, some food and some nonfood, in order to make a living. Thus, in addition to fresh and processed foods, distributors handle toilet paper, soap, kitchenware, and a multitude of other grocery and nongrocery items. Dealers also handle animal feed, insecticides, and many other commodities. 5/ Thus, in the discussion which follows consideration is given to facilities for handling a wide range of products, farm or nonfarm, because from the standpoint of both the seller and the buyer, it would not be economical to handle them in separate facilities.

In the movement of farm and related products from the farmer to the consumer various kinds of physical facilities are used. When farm products are to move a distance, it is usually necessary to move them first from the farm to some type of assembly or packing facility for shipment to wholesale markets in distribution centers. They must be brought by rail, boat, or truck from all producing areas, sometimes from foreign countries, and assembled at these centers. When so assembled, both imported and locally grown products can be distributed more efficiently to buyers from one central point. Producers located within trucking distance may truck their own products direct to a wholesale or retail market place. Puerto Rico is small enough to bring producers generally within trucking distance of the primary market places. They may sell either on their own or through a producer cooperative organization, but in any event they are near enough to the market outlet to handle directly most of their sales for local consumption.

In exporting, some producers have outlets in distant areas, but the bulk of the export movement is through agents. When products must be canned or otherwise processed before moving into local or export markets, the producer generally releases title to them either to the cooperative or to an independent agent. These products, after they are processed, are moved through various kinds of wholesale facilities. Commodities exported move through wharf facilities, are transported by boat, move through wholesale market facilities into the area to which they are shipped, and enter into distribution channels in such territory. When canned or processed products remain on the Island, they are stored or otherwise held in warehouses or wholesale facilities from which distribution through other wholesale and retail facilities is made.

5/ A partial list of commodities handled is given in tables 11 to 16 in the Appendix.

The total volume of food, liquors, animal feed, and related products imported into Puerto Rico and handled by the wholesale distributors represents a substantial annual tonnage, averaging in excess of 550,000 tons in 1948 and 1949. During this same period about 55,000 tons of these products were exported.

Table 11 in the Appendix shows the quantity and value of certain imports in Puerto Rico by commodities from the United States for calendar years 1948 and 1949. Table 12 shows the volume and value of Puerto Rican imports of food and related products from countries other than the United States for the fiscal year 1948-49. Table 13 shows the total volume and value of Puerto Rican imports from the United States and all other countries. Table 14 shows the exports of food and related products from Puerto Rico to the United States, and table 15 the exports from Puerto Rico to other countries. Table 16 shows total annual exports from Puerto Rico to the United States and other countries. On the basis of the method by which the foregoing data are reported, it is not possible to determine the exact volume of the products unloaded at docks in metropolitan San Juan. However, data obtained from the trade people doing business in San Juan indicate that at least 75 percent of the products shipped to Puerto Rico are unloaded there. On the other hand, on the basis of a survey made for the Puerto Rico Planning, Urbanizing, and Zoning Board, about 80 percent of all Puerto Rican imports are shown to be unloaded in San Juan. 6/

Importance of Metropolitan San Juan in the Marketing of Farm and Related Products

The metropolitan San Juan market is the most important wholesale market place in Puerto Rico in the receipt and distribution of farm and related products. In the San Juan area more than 400,000 tons of food and related products, with an estimated value in excess of $130,000,000 were handled in 1949. This amount represented imports valued in excess of $100,000,000, and locally produced supplies for local consumption and export values at about $30,000,000. Included in the imports are meat and meat products; lard, fats, and oils; rice, beans, and other grains and cereals; canned and processed foods; dry grocery items; fresh fruits and vegetables; poultry and poultry products; and other commodities handled in the market area. The locally produced products included fruits, vegetables, poultry, eggs, meat, and some commercially canned goods.

6/ According to import data, in excess of 535,000 tons of these commodities were received in 1949. This estimate indicates that about 75 percent is unloaded at San Juan. According to the report of William B. Crosby for the Puerto Rico Planning, Urbanizing, and Zoning Board, 80 percent of the receipts in Puerto Rico are unloaded in San Juan.

San Juan is on the north coast--about two-thirds of the distance from the west coast toward the east coast--(fig. 2). As the capital city, San Juan has adopted more of the continental culture than other cities of the Island. It is rapidly growing into a metropolis with many diversified industries, as well as becoming the major center of transportation, communication, institutions of learning, and Insular and Federal Government offices. The old city of San Juan is located on an island of about 7 square miles. It is separated from the mainland by San Juan Bay, San Antonio Channel, and the channels leading from Condado Lagoon (fig. 3). The channels leading from the lagoon are only about 300 feet in width.

For many years San Juan was primarily an outpost or port of trade for Spain. In order to protect the city and the bay, the fortress, El Morro Castle, was constructed during the period 1529 to 1649. Before it was completed it was decided to encircle the city by a wall as further protection from attack (fig. 4). Since the north coast of San Juan is very rocky and the water too shallow to admit seagoing ships, all docks are situated on the south side. The wall created a barrier to the movement of food and other products to the city of San Juan, so a set of gates was built at the base to provide a direct entrance from the docks to the city.

When San Juan and other settlements were made, a public market place was laid out within the city for the distribution of imported food and related products and the products grown by nearby farmers. The pattern for public market places was established very early. They were usually located near the "plaza" (the central park, consisting of several square blocks in the heart of the city or town), church, and public buildings.

During the past 10 years nearby cities and towns have increased in population to the extent that there are now about as many people living in them as in San Juan proper. It has been estimated that by 1960 there will be more people living in the nearby cities than in the capital city. Table 1 gives the population for the municipalities in the San Juan metropolitan area (fig. 3), for 1920, 1930, 1940, 1945, and 1950. The Puerto Rico Planning, Urbanizing, and Zoning Board estimates that by 1970 the population of the metropolitan area will be about 800,000.

Metropolitan San Juan is well situated with respect to the receipt and distribution of produce throughout Puerto Rico, including the adjacent islands. The coastal highways Nos. 2 and 3, together with highways reaching into the interior--Nos. 1, 9, 63, 25, and 23--lead from the metropolitan area to the interior of the Island and connect there with other routes.

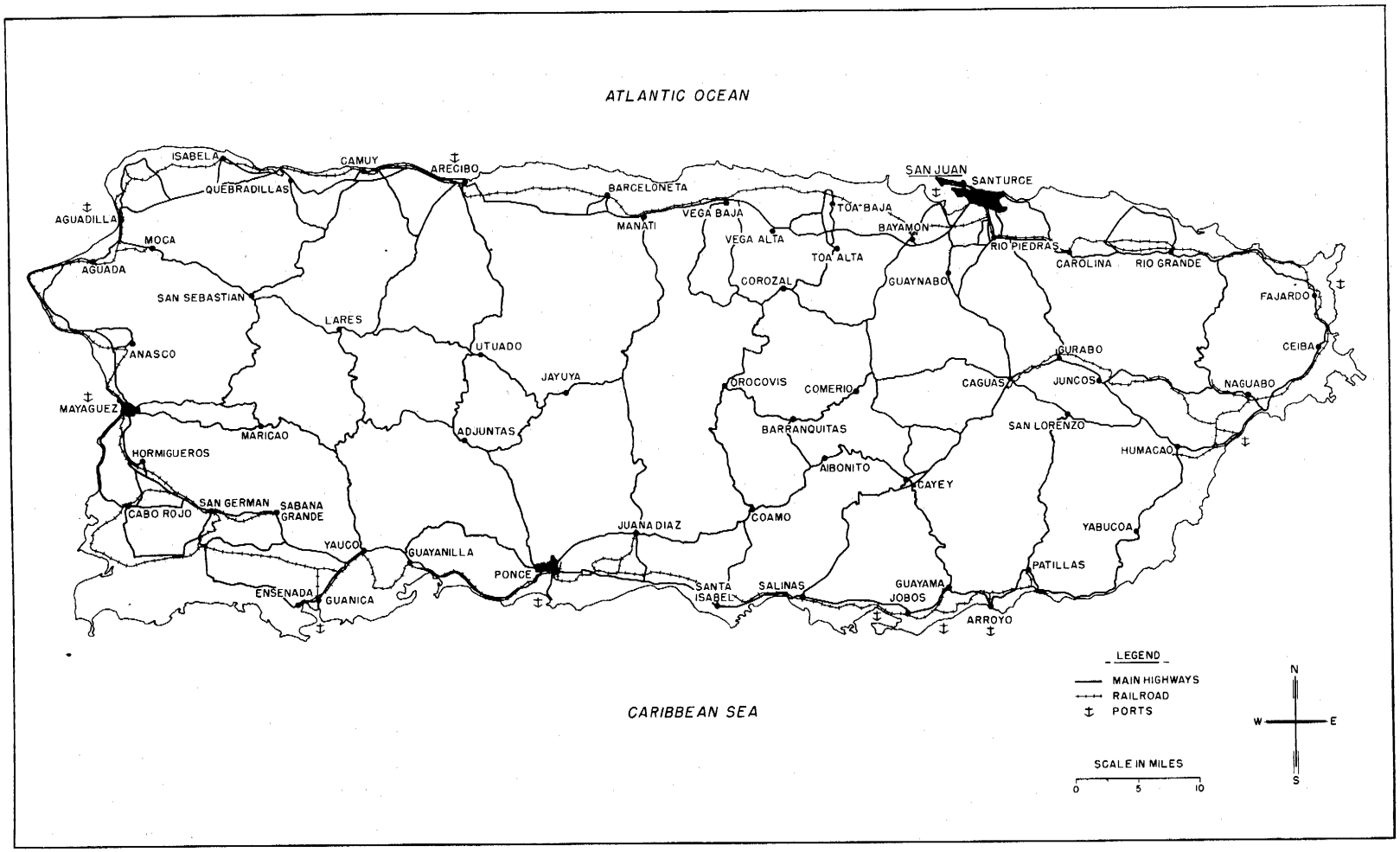


Figure 2.--Location of San Juan, P. R., and of the railroad, highways, principal streets, and wharves.

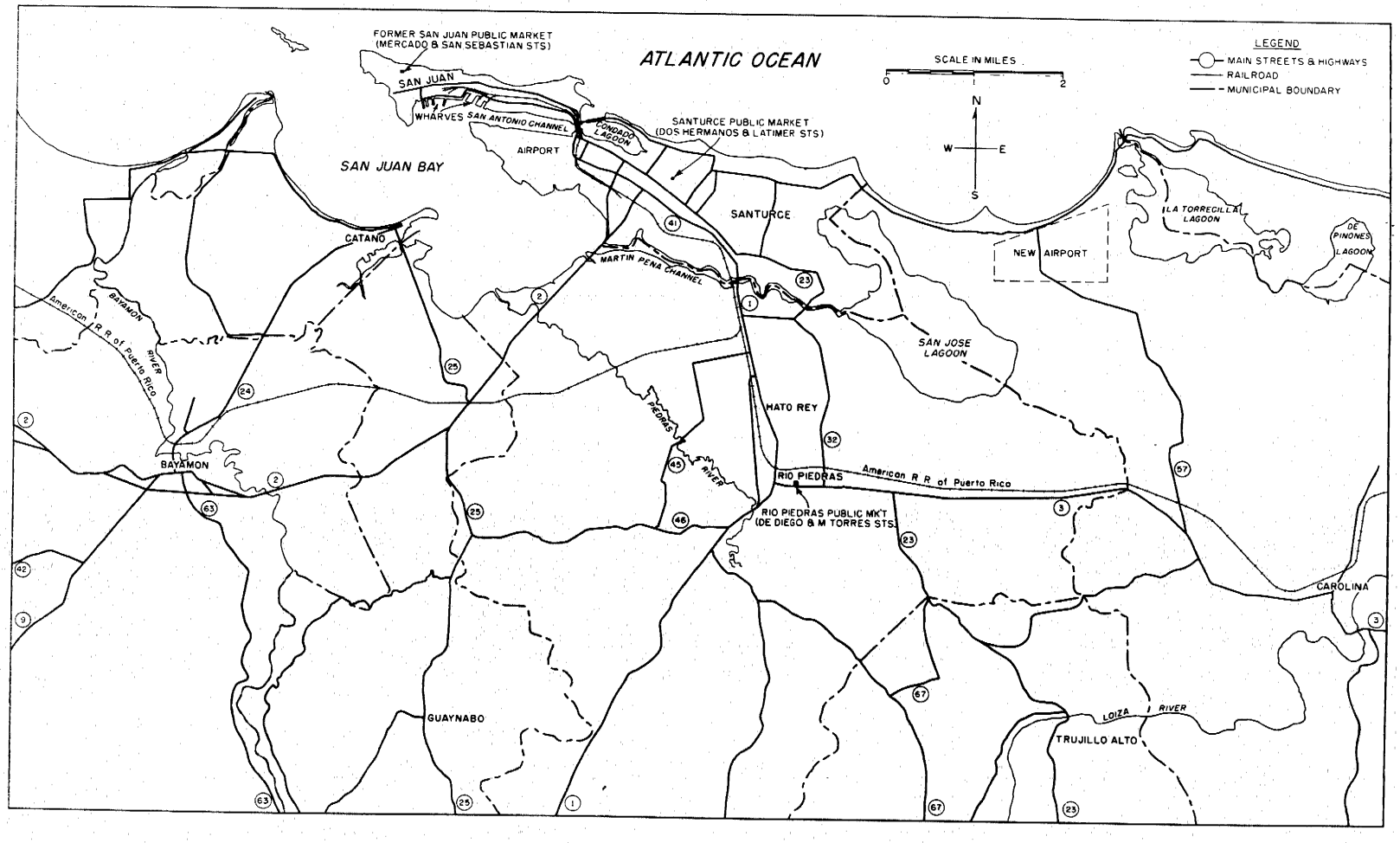


Figure 3.--Metropolitan San Juan, showing municipalities and towns, present wharves, airport, streets, highways, and related facilities.

Figure 4.--Fortress El Morro Castle showing northern rocky coast of old San Juan. The present airport in the background is encircled with a white line.

Table 1.--Population of the metropolitan area of San Juan, 1920 to 1950 1/

Municipality	U. S. Census-- 1920	1930	1940	1945 2/	1950 3/
San Juan 4/	71,443	114,715	169,247	197,600	223,947
Bayamon	12,268	15,180	18,813	21,000	48,183
Carolina	5,079	7,515	9,877	11,400	29,143
Catano	6,835	7,530	8,522	11,100	19,856
Guaynabo	2,522	4,759	7,420	9,800	29,057
Trujillo Alto	7,470	9,576	11,726	5/	13,588
Rio Piedras	15,653	31,594	56,624	79,500	143,897
Total	120,270	190,869	282,229	330,400	507,671

1/ Estimates were rounded to the nearest hundred.
2/ Estimated by the Puerto Rico Planning, Urbanizing, and Zoning Board.
3/ Preliminary 1950 census tabulation.
4/ Includes Santurce.
5/ Not available.

Ships docking at San Juan also stop at the ports of Ponce and Mayaguez. Thus, some supplies handled by distributors in San Juan may be diverted to consignees and unloaded at those two ports. The use of this system for diverting highly perishable produce is very limited, because supplies unloaded in San Juan can be trucked to Ponce and Mayaguez before a ship can make delivery there. However, the use of ships for transporting other commodities to those cities is of some importance.

The San Juan area is served by one railroad that almost encircles the Island. Its use is limited to the area it serves along the coast (fig. 2). The introduction of modern trucks that can deliver direct to the stores of buyers has eliminated the use of the railroad in the handling of perishables and most other produce. Having no refrigerator cars, the railroad affords no protection to perishables.

San Juan is served by one airport, which is in San Juan Bay. It was made by filling part of the bay. A new airport is being developed immediately to the east of the San Jose Lagoon, about 5 miles east of the present airport. The airport at San Juan is relatively more important in the receipt of produce than most airports in the States, because transportation of produce from the States and other areas is limited to either boat or air freight. All boats from the important shipping points arrive within a 24-hour period each week. Shuttle boats ply between San Juan and nearby islands.

Because of the need for a number of kinds of market facilities in the San Juan area, and in order to define each more clearly and to permit those who will carry out the recommendations to do so on an individual project basis, this report is divided into three parts. The first part discusses wholesale produce market facilities; the second, livestock slaughtering and meat-processing facilities; and the third, facilities for grain, feed, and vegetable oils. Action might be taken on the recommendations for any one of these major groups of facilities without consideration of the other, but there is a definite relationship among them. Therefore, they all should be regarded as constituting one market.

PART I

THE WHOLESALE PRODUCE MARKET FOR FARM AND RELATED PRODUCTS

Very early after the settlement of San Juan a market place was established on the south side of the city near the docks. At this point shipped-in food and other consumer products and limited quantities of native-grown products were sold. After the erection of the wall surrounding the city, a public market place was established inside the wall. The most recently established public market place was located at Mercado and San Sebastian Streets, but its use was discontinued in 1947, largely because of a decline in its importance and pressure for the use of the facility for other purposes.

As the population of the San Juan area expanded into the adjacent areas of Santurce, Rio Piedras, Bayamon, and numerous other villages, some of these cities set aside land for use as a public market, and facilities were constructed for handling food and related commodities. The most important of these public market places in the metropolitan area is in Rio Piedras at De Diego and Monsenor Torres Streets, in the center of the older part of the city. It is the most accessible market place in the area, but in its immediate neighborhood the streets are very narrow, thus preventing the free flow of traffic in and about the market. It can be readily observed from an inspection of the market that it was originally designed for retail operations and with the expectation that patrons would walk to and from it.

With the increase in population and per capita consumption in metropolitan San Juan, and the use of the Rio Piedras market as a distributive center for many cities and towns outside of metropolitan San Juan, selling at wholesale became more important. The public market, because of limited stall space, did not lend itself to an expanded wholesale business. Those dealers desiring to do a wholesale type of business began to occupy residential and business buildings on adjacent streets. Thus, the market area now includes both retail and wholesale facilities.

Santurce established a market place at Dos Hermanos and Latimer Streets. Because of changes in the distribution of population and competition with other markets, this market never became as important as the Rio Piedras market.

The city of Bayamon and the other towns and villages in the metropolitan area have no established public market place. Officials of Bayamon, however, are considering the development of a small retail market; the marketing of products is at present permitted on public streets.

Although the public market places in early years were practically the only retail outlets in the cities and towns of the San Juan area, the population has dispersed into more distant areas and retail outlets have sprung up near these centers of population. There are now a total of about 5,000 retail outlets in the San Juan metropolitan area.

TYPES OF MARKET OPERATORS

The principal handlers of farm and related products in the San Juan wholesale market are brokers, wholesale dealers, farmers, truckers, and retailers. The term "San Juan wholesale market," as here used, includes all the main handlers in the metropolitan area, who are located in old San Juan, Rio Piedras, and Santurce.

Brokers

A total of 47 brokers and distributive agents, 45 in San Juan and 2 in Santurce, were covered in this study. These firms handle the wide variety of food, feed, and related products, imported and of local origin, that are listed in tables 11 through 16 in the Appendix, in addition to many others of local origin. Their total volume of business in 1949 amounted to about 260,000 tons, with an estimated wholesale value of about $90,000,000. 7/ All these firms dealt in imported goods, and 4 handled locally grown products, chiefly for export to New York.

Brokers in metropolitan San Juan handle about 65 percent of the goods imported into the Island. About 50 percent of all the products in which they deal are sold to buyers for consumption outside metropolitan San Juan. About 90 percent of the business done by brokers is based upon advance orders from buyers. In other words, before ordering merchandise, the broker obtains orders from buyers for most of the products they want and delivers the merchandise to the buyers from 10 days to 3 weeks afterward.

About 80 percent of the receipts handled by brokers are unloaded at the boat docks for direct distribution to buyers, and the remainder are diverted to other Island ports, namely Ponce and Mayaguez, where buyers pick up the produce. The products diverted in this manner are nonperishable, such as rice, beans, and canned goods. Some of the products unloaded onto ship docks in San Juan are picked up directly by wholesale and retail buyers within 5 days after the ships are unloaded, but a large part of the receipts are held in storage by the broker for distribution during each day of business between boat arrivals. A greater proportion of the more perishable commodities are moved into storage than of the nonperishable commodities, because buyers are not well equipped to handle large quantities of perishable products at one time.

7/ Based upon the average value shown for all commodities imported in 1949.

Only four brokers reported the handling of locally grown products. According to their reports they handled a large percentage of the total food products exported from the Island, exclusive of sugar, tobacco, canned pineapple, cotton, and certain other commodities. One broker handled the bulk of the exports of cured cattle and calf hides.

About half the brokers in the area perform functions in addition to those normally done by a broker. In fact, in most instances they also act as a wholesaler by distributing to retail stores, institutions, and other retail buyers, as well as to wholesale buyers. All but three of the brokers covered in the survey sell their products to all parts of the Island, and about 40 of them employ about 160 salesmen on a permanent basis to travel about the Island to sell and take orders for merchandise.

Wholesale Dealers

There are approximately 136 wholesale dealers operating in establishments located in metropolitan San Juan, of whom 72 use facilities in San Juan, 33 in Santurce, and 31 in Rio Piedras. About 10 percent of the wholesale dealers also sell some products at retail. Those dealers doing retail as well as wholesale business are located primarily in and near the Rio Piedras and Santurce public markets. The total volume handled by wholesale dealers is difficult to determine because of their inadequate records. From data available it is estimated that they handled in 1949 about 250,000 tons valued at $80,000,000.

Of the total volume, about 60 percent was distributed for consumption in metropolitan San Juan, 39 percent was sold for consumption in the remainder of the Island, and about 1 percent was exported or sold to ships docking at port. Of the volume moving into the Island about 31 percent moved west, 15 percent moved southwest, 30 percent moved south, and 24 percent moved east. Most products sold for distribution on the Island are hauled from San Juan in trucks of buyers, hired trucks, or by merchant truckers who make a practice of servicing retail outlets with products from San Juan and obtaining a return load of native products for sale in San Juan. A large part of the products sold for consumption in metropolitan San Juan are delivered by the wholesaler or by hired trucks. Buyers, including truckers coming to the stores of distributors, haul substantial quantities.

The business of wholesale dealers is greatly diversified, and a wide variety of imported and locally grown processed and fresh products are handled. About $30,000,000 worth of products are imported direct by wholesale dealers; $35,000,000 worth are procured from brokers in San Juan; and $15,000,000 worth of fresh and processed

products are procured from farmers, truckers, and processors or manufacturers. Of the locally grown products handled by dealers approximately $3,000,000 worth of merchandise is exported.

Wholesale dealers usually are not specialized and do very little processing, packing, or other work connected with the sale of products. One wholesaler of fish does considerable processing, taking the frozen fish at boat dock and furnishing the retail trade with a ready-to-cook product. Several other wholesale dealers make a limited amount of sausage and certain other meat products from native hogs.

The largest part of the business of wholesale dealers, approximately 80 percent, is with imported products. Although about half the dealers handle locally grown products, these products represent only about 20 percent of their total volume of business. Most of the locally produced goods circumvent the wholesale market, moving direct to retail outlets, peddlers, and consumers. Since most crops and products produced locally are tropical, the need for cooler space, except for locally canned goods, has been a limiting factor for marketing such products at wholesale. Thus, wholesalers have not been a major factor in the handling and distribution of local products.

Farmers

The San Juan market has been a desirable outlet for all kinds of perishable and other food produced on farms over all of Puerto Rico. The volume of farmer sales in metropolitan San Juan could not be determined because of the lack of records and the nature of the business. It is substantial, however, and the business is carried on throughout the entire year. Following is a partial list of locally produced commodities that may be found on the Rio Piedras market when such products are in season:

Plantains	Beets
Bananas	Chayotes
Sweetpotatoes	Beans (dry and green)
Tanniers	Cowpeas (dry and green)
Yams	Pigeon peas (dry and green)
Pumpkin	Corn (dry shelled)
Dasheen	Avocados
Root celery	Oranges
Cassava	Grapefruit
Tomatoes	Limes
Peppers	Pineapples
Cabbage	Coconuts
Lettuce (bunch)	Papayas

Eggplant	Mangoes
Cucumbers	Guavas
Okra	Coffee (green and roasted)
Snap beans	Hogs (live and dressed)
Sweet corn	Goats (live and dressed)
Turnips	Poultry (live and dressed)
Radishes	Eggs
Carrots	Charcoal

The lack of space in the public market places of metropolitan San Juan has caused many farmers to sell to truckers at their farms, at any point between the farm and the market place, or direct to retail outlets. Also, some farmers sell through cooperatives, and a limited number operate a fleet of pushcarts in various residential areas. It was observed that one farmer prepared baskets of produce on his farm for delivery direct to consumers on advance orders taken at the time of the previous delivery. Of course, many farmers sell the entire crop of oranges or other produce on the trees or in the fields, the buyer assuming the responsibility for picking and marketing the crop.

Except for the farms of a few large operators, few farms are equipped for washing, grading, processing, and preparing a standard package of produce except for fresh pineapples. Practically all products are brought to market places in bulk or in used containers of various sizes. Even commodities exported, except fresh pineapples, tomatoes, and a few other crops, are placed in various sizes of used boxes, crates, or bags.

Truckers

The San Juan market is frequented daily by many truckers who bring locally grown products from farmers and others about the Island. According to a survey made by representatives of the Puerto Rican Department of Agriculture and Commerce, an average of about 24 truckers come daily to the Rio Piedras market and 18 to the Santurce market with supplies. The daily volume handled by these truckers is estimated as exceeding 150,000 pounds, or 45,000,000 pounds per year, with a value in excess of $4,000,000. In addition to the truckers frequenting the Río Piedras and Santurce markets, a large number come to San Juan to deliver supplies to other market places, wholesale dealers, retail establishments, peddlers, and consumers.

The trucker may be acting as an order buyer or may be buying on his own account; in a few instances he may be the agent of a producer or a contract hauler. Generally there is no regularity in the services rendered by truckers in the market. Most of them operate on their own account, buying at the lowest possible price and selling at the best price they can obtain.

954117 O - 51 - 3

Retail Buyers

The San Juan wholesale market is important for the servicing of retail stores dealing in all kinds of perishable and nonperishable food and grocery items for distribution to consumers. It also is important for the servicing of hotels, institutions, restaurants, peddlers, and others servicing consumers. Metropolitan San Juan has in excess of 5,000 retail stores, restaurants, hotels, institutions, and other outlets that are dependent upon supplies distributed at wholesale in the markets.

Another group of buyers, who sell chiefly native fresh fruits and vegetables in the metropolitan area, is the pushcart peddler and street-stand operator. The pushcart peddler operates from a two-, three-, or four-wheel hand cart and obtains his supplies largely from wholesalers, truckers, farmers who deliver the produce, or the Rio Piedras or Santurce markets. He travels through residential areas and sells a small volume daily direct to consumers, or he may take up a permanent location at a street corner.

The street-stand operator may have a movable unit on wheels or a stationary stand from which sales are made direct to consumers. He may go to the market for supplies or have a wholesaler, trucker, or farmer bring supplies to him. As in the case of the pushcart peddler, the quantities sold daily are small.

Puschart peddlers and street-stand operators must be inspected by the Insular Government's Department of Public Health in order to handle food. They may be licensed by the municipal government, but no control is exercised over the quality of food they offer for sale. In practically all cases observed, however, the produce was not protected nor was any refrigeration available. Because these operators have a small volume of business, they must have a wide margin of profit in order to make a living.

Usually in port cities important buyers are the ships that dock and need supplies to feed passengers. This is not true of San Juan, however, where it was found that no significant amount of supplies was purchased by this group. A limited amount of supplies is moved by boat to the Virgin Islands and other nearby islands.

DESCRIPTION OF PRESENT WHOLESALE PRODUCE MARKET FACILITIES

The wholesale produce business of metropolitan San Juan is carried on in facilities in three principal sections of the city (fig. 3): (1) In San Juan within a six-block area of the wharves on the north side of San Juan Bay, (2) in the Rio Piedras market area near De Diego and Monsenor Torres Streets, and (3) over a wide area in Santurce but concentrated largely in and around the public market place near Dos Hermanos and Latimer Streets.

The location of the wholesale marketing facilities in two or more areas is generally referred to as a "split market."

Facilities of Brokers

The 47 brokers in the area use office space or permanent dry and cold storage space, or both, in the conduct of their business. Of the 47 brokers, 35 use office space only, and 12 use both office and warehouse space. Offices range in size from 200 square feet to 3,000 square feet and are on the first, second, third, and fourth floors of all kinds of buildings in San Juan and Santurce. Table 2 shows the amount of space occupied, rentals paid, and number of vehicles used by the brokers in 1949.

Many of the offices are in buildings formerly designed for retail or residential purposes, and the buildings are old. Some roofs and walls are not waterproof and are subject to leakage in rainy weather.

The permanent warehouses of brokers are scattered about San Juan and Santurce. Most of them were not designed for handling food products. Many are not adjacent to wharves, so boat receipts cannot be unloaded direct into warehouses. They are without platforms, adequate streets, and parking areas, and they are neither rodentproof nor fireproof. Some of them do not have mechanical lifting devices, such as elevators or conveyors, for the movement of produce between floors. The floors of many warehouses are from 6 to 12 inches or more above the street level, which prevents the use of modern wheel-type equipment in the movement of produce in and out of the building.

Wholesale Dealers' Stores

The stores of wholesale dealers are mainly in 3 separate areas: Within an 8-block area of the wharves, within a 10-block area of the Santurce public market but mainly between the Santurce market and San Juan, and within a 4-block area of the Rio Piedras market. Figure 5 is a photograph of the Rio Piedras market area. Others have facilities scattered throughout the metropolitan area. The amount of space occupied, rentals paid, and number of vehicles used by dealers in 1949 are shown in table 2.

Table 2.--Amount of space occupied, rents paid, and number of vehicles used by 47 brokers and 136 wholesale dealers, by location in metropolitan San Juan, P. R., 1949

Item	Unit	All brokers	Wholesale dealers in-- San Juan	Santurce	Rio Piedras	Total
Space occupied						
Office space	sq.ft.	46,000	59,000	3,200	3,000	65,200
Warehouse space						
First floor	sq.ft.	12,000	175,000	52,000	50,000	277,000
Second floor and higher	sq.ft.	6,000	50,000	8,000	8,000	66,000
Total warehouse space	sq.ft.	1/18,000	225,000	60,000	58,000	2/343,000
Cold storage space						
Annual basis	cu.ft.	-	152,690	10,720	4,040	167,450
Part-time basis	cu.ft.	-	56,415	-	-	56,415
Rentals paid on office and warehouse space 3/	dollars	2/136,000	151,380	41,040	31,068	2/223,488
Trucks owned	number	-	95	30	21	146
Salesmen's cars used	number	-	208	32	11	251

1/ Does not include processing space used in the business of certain of the larger brokers.

2/ Incomplete.

3/ Rentals paid on cold storage space not available.

Figure 5.--Rio Piedras Market. (Courtesy Puerto Rico Extension Service.)

The stores of dealers are of about the same general type as the warehouses used by brokers. The depth of buildings varies from about 15 to 100 feet and the width from 11 to more than 50 feet. The floors are uneven. Many are from 8 inches to 3 feet above the street level. Very few stores have platforms. Most of them front on public streets, the building forming the property line. The buildings are of wood and masonry. Most of them are neither fireproof nor rodentproof. Floors are mainly masonry or wood, and some are dirt. Most stores are not provided with water hose connections, and the floors are rarely washed. Where sidewalk space is available, most dealers use it to pile and display produce. Sidewalks vary in depth, some being as much as 10 feet with 6-inch curbs. Many of them are uneven and broken.

Most stores do not have rear entrances. The few that do have them cannot use them to advantage because of the narrow alleys at the rear, many of them being 8 feet or less in width. Therefore, the dealers must unload and load out practically all supplies at the front entrance.

Streets in front of stores vary in width from 12 to 50 feet. Except for a few stores in San Juan and Santurce, receipts and deliveries at most stores must be unloaded or loaded from trucks parked parallel to the curb. (See fig. 6.) Most streets slope to the curb. Wastes accumulate at the curb and under the tropical temperature deterioration sets in rapidly, causing bad odors in the market areas. Because of continuous congestion in the area, sanitation by street washing is delayed or in many instances prevented.

Only about 8 percent of the wholesalers maintain cold storage space of sufficient size to hold at least a quarter of a carload (10,000 pounds). Very few have freezer space. A few small wholesalers have some cooled display space, such as may be found in retail stores, and a few use ice for certain products. However, many products--fresh or frozen meats, fish, and the like--are displayed by wholesalers without protection or refrigeration. None maintains banana degreening rooms or other facilities for processing and preparing locally grown products. Those who have such space are generally the larger distributors of a national organization of the States.

Wholesale dealers in meats and other products do practically no processing. Most products are sold in the form that they are imported. Fresh meats of local origin are cut from quarters or halves of the animal by the dealer to the size or weight requested by the buyer. Bananas, plantains, and other local products are not hung but are piled on the floor, and they generally are sold green or full-ripe from the tree as selected by the buyer.

Figure 6.--Wholesale store facilities in San Juan. (Courtesy Puerto Rico Extension Service.)

Wharf Facilities

Wharves are maintained in San Juan by all shipping lines coming to ports in Puerto Rico. Three of the six lines handle about 90 percent of the receipts that are consigned to brokers or wholesale dealers. The wharves are important facilities in the receipt and distribution of food products in San Juan. The wharves or piers and the adjacent or nearby warehouses handle in excess of 75 percent of the business done in the San Juan market. The piers vary in depth from 25 to 300 feet and extend into San Juan Bay or parallel it for distances of from 300 to 720 feet. (See fig. 7.) They are from 8 to 10 feet above high tide, which is only 13 inches above low tide. Boat receipts are unloaded onto four-wheel trailers on the pier, where merchandise lots are checked and delivered to the warehouse. A gasoline-powered tractor may pull four to eight trailers at a time.

Some of the warehouses are adjacent to the wharf, others are situated within a few hundred feet of it, and some are separated from it by a roadway 80 to 100 feet in width. Each shipping line provides, without charge, warehouse space for storing merchandise for a period not to exceed 5 days. A few dealers lease, on a permanent basis, dry and cold storage space in the warehouses adjacent to the wharves.

Some of these warehouses are substantial buildings. One built in more recent years is 425 feet long by 150 feet deep, with a 35-foot wharf on the bay side and a 10-foot platform, 38 inches high, on the street side. One steamship line has a series of wharves, extending 300 to 400 feet into the bay, which are covered by warehouses, except for a 12- to 35-foot platform adjacent to the water. A large amount of the warehouse space of this line is used for the storage of raw and processed sugar. Ceiling heights in warehouses are from 20 to 30 feet. Although many commodities are stacked 20 feet high, palletization is in use on the docks of only one shipping line. Bags of sugar, feed, grains, and certain other commodities are piled by use of a power-driven conveyor, but much hand labor is also used.

All the unloaded highly perishable commodities must be moved immediately to cooler or freezer storage or to retail outlets. Since retail outlets are limited in the volume they can store, they buy mostly on a day-to-day basis. Most wholesalers and brokers move as large a volume of the commodities unloaded as is possible within the period of grace granted by the shipping lines, but a large part of this volume is ultimately moved to warehouses owned or rented by them or to public dry or cold storage warehouses. Of course, many importers buy substantial quantities of some products at certain seasons for distribution at a later date.

The railroad line traverses most sections of the wharves.

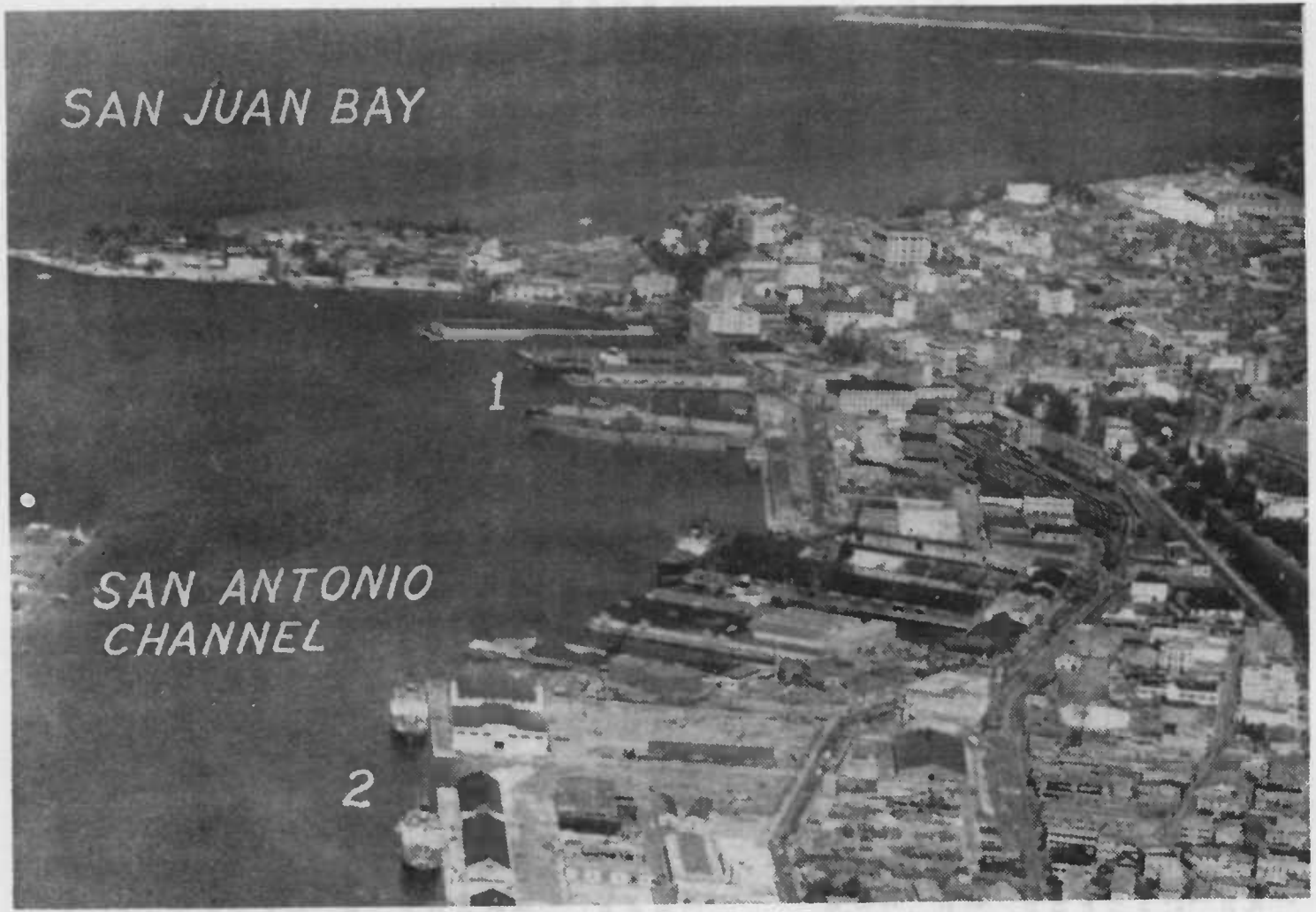


Figure 7.--Present wharves, warehouses, and related facilities on San Juan Bay.

Airport Facilities

The airport, located in San Juan Bay, is readily accessible to all parts of Santurce and San Juan, connecting directly with Fernandez Juncos Street. Very few shipments of produce, except chilled meat and meat products, are made by air. About 12 million pounds, consisting chiefly of fresh chilled meat, were received in 1949. Space is provided at the airport for unloading meat onto trucks for delivery to warehouses or direct to retail establishments. In many instances buyers accept delivery at this point. This practice has been discouraged, however, because of the congestion caused by the many buyers' trucks on the airport grounds.

The new airport that is being developed about 5 miles east of the present one will be substantially larger than the old one and will have ample space to handle cargoes of perishables. Since it is doubtful that the airport management will permit the delivery of products direct to buyers, produce probably will have to be trucked to some other location for resale.

Public Cold Storage Facilities

In the immediate vicinity of the wharf market area are three public cold storage warehouses. Besides providing storage services, the owner of one warehouse processes frozen fish and distributes it to wholesale and retail outlets in the metropolitan area. In addition, there is one small improvised public warehouse adjacent to the Santurce public market.

The principal business of the public cold storage warehouses is to provide space, both freezer and cooler, for storage of commodities. The peak holdings generally occur when boatloads of products are brought into San Juan, and the use of space declines until another boat arrives. Only a small amount of space is used for locally produced commodities. Most of the products placed in storage are ultimately destined for export.

The cold storage warehouses are of masonry and wood construction and are one or two stories high. Only one has a platform at truck-bed height. Several have equipment capable of holding almost any temperature from -10° F. up. The warehouse in Santurce was originally a retail store or dwelling, but the owner installed refrigerated space with a capacity of several cars of produce which serves dealers in the area adjacent to the Santurce public market. None of the warehouses is on the railroad, but such a location is not necessary, since the railroad owns no refrigerated cars for hauling perishables.

The total available cooler and freezer space in all warehouses is 185,000 cubic feet. Of the listed cooler space, 60,000 cubic feet are interchangeable from cooler to freezer. Rooms within warehouses vary in size. Although there is some segregation of merchandise in warehouses, particularly of fresh or frozen fish, commodities are generally commingled in rooms.

Several of the warehouse operators provide dry storage space for merchandise, such as canned goods, between boat arrivals, but there appeared to be a general shortage of such space in the market area.

Farmers' Facilities

The only facilities available to farmers in the San Juan area are at the Rio Piedras market. Farmers are allocated a small part of the sidewalk and street space, enough area to accommodate about 18 farmers, but they are not provided roof protection or platform space to display and sell produce. It is understood that since early in the spring of 1950 the use of this space has been limited to selling before 6 a.m., and farmers have not been able to obtain space after that hour. The space allocated averages less than 30 square feet per farmer and allows no space for his truck; thus, the volume farmers can offer for sale is limited, and most sales are at retail. Information on the rentals paid by farmers for these facilities was not obtained during the survey.

Truckers' Facilities

Truckers coming to the Rio Piedras and the Santurce markets are provided a place to park their trucks and to display and sell produce at the rear of their trucks on streets or sidewalks in the market areas. Most of the space provided is without roof protection. About 24 trucks occupy such space in the Rio Piedras market and 18 in the Santurce market, the number varying throughout the year. It was not possible to determine the actual rental paid by truckers for the use of this space.

Many truckers sell produce at wholesale and deliver it direct to dealers' warehouses or to shipping line warehouses for export. An undetermined number sell to retail outlets and pushcart peddlers, the latter representing the largest volume of business. On the return trip, truckers usually haul on contract or procure supplies in San Juan for delivery to various parts of the Island, thus giving them a load each way.

Publicly Owned Markets

The locations of the public markets, as in the case of wharves, have had a major influence on the location of wholesale market facilities and other wholesale activities in San Juan.

Santurce Public Market

The Santurce public market building (fig. 8) is 80 feet long and 40 feet wide. It is situated at Dos Hermanos and Latimer Streets. The building is divided into stalls or booths, with aisles running the length of the building.

The building is of masonry construction and is typical of any public market that may be found in other municipalities of the Island. The streets around the building are narrow--about 16½ feet wide. No parking is permitted on streets, but trucks stop on either side to load or unload produce. No open or designated parking space is in the adjacent area.

Many items, including food, clothing, and pots and pans, are sold in the building and most perishables outside the building. Sales are at wholesale and retail, but sales of items of a nonperishable nature are largely at retail. Although sanitation at this market could be improved, it is more closely observed there than at the Rio Piedras market.

Rio Piedras Public Market

The Rio Piedras public market building (fig. 5) is 270 feet long and 120 feet wide and is located at De Diego and Monsenor Torres Streets. The building is divided into four parts, with each division containing stalls for sellers. Additional stall space is provided on the sidewalk surrounding the building, and street space in the adjacent area is leased to sellers. Streets in the area are from 20 to 30 feet wide.

The building is of masonry and wood construction and is not fireproof or rodentproof. Sanitation in the area is poor. Live chickens, rabbits, and other animals in the area add to the odors that are ever present in the market. Although the city of Rio Piedras in the past year has made some improvements in a part of the market building, these improvements have not corrected the major defects. Congestion is still prevalent, and a serious lack of facilities for properly handling perishable food products prevails.

Most of the business in this market building is retail. Almost any item--including shoes, clothing, drugs, and pots and pans--is offered for sale. This market has the most complete line of locally grown products of any market place in metropolitan San Juan, and a part of the business is conducted on a wholesale basis.

Streets and Traffic in Market Areas

The streets in the market areas were not designed to handle the heavy volume of traffic that must be carried over them in the conduct of the wholesale business. Lack of parking areas for buyers and

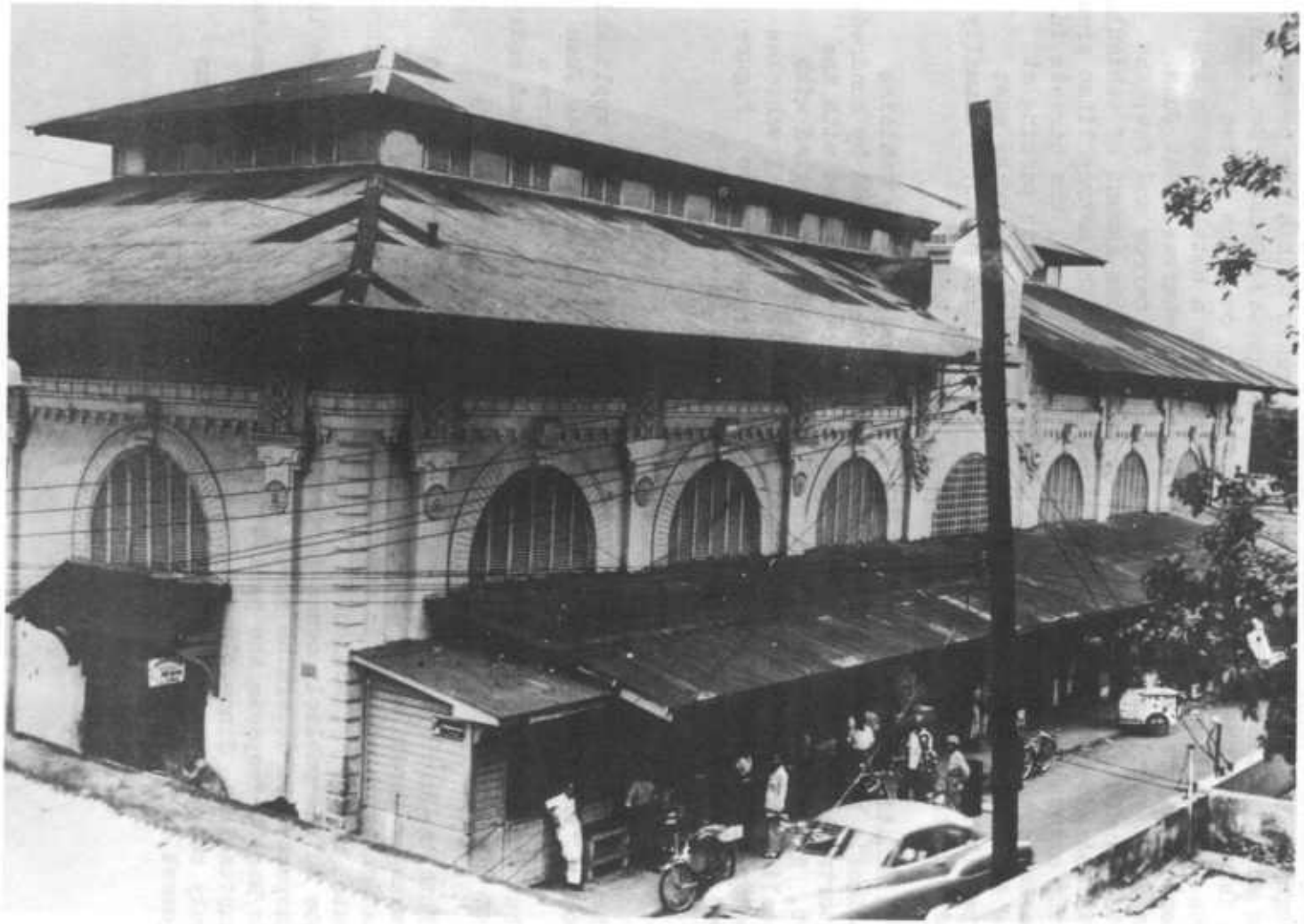


Figure 8.--The Santurce market building. (Courtesy Puerto Rico Extension Service.)

sellers results in additional movement of traffic over streets. In the neighborhood of the wharves there is some parking space, and although the traffic situation is more favorable within the property of the shipping lines, this space is not adequate. Because San Juan is an island, all vehicles must enter the city over one of two bridges. (See fig. 3.) Thus, the bridges form a bottleneck in the movement of buyers' and sellers' trucks to the wharves. San Juan was laid out many years ago, when vehicles were narrow and few; the streets therefore are too narrow to accommodate the amount of vehicular traffic and size of trucks now required to serve the metropolitan area. With the exception of the docks of the shipping lines, the streets in the market areas are too narrow to permit perpendicular parking at stores for loading and unloading purposes. Therefore trucks must park parallel, and each package of merchandise must be moved manually to and from them.

In addition to the traffic congestion caused by the vehicles of wholesale buyers and sellers, the market areas are used by hundreds of motortrucks and cars of people on errands not concerned with the market. The fact that retailing of merchandise is commingled with wholesaling in the wholesale market areas brings additional vehicles and pedestrians into the area and causes further congestion. Figure 9 shows the congestion in the Rio Piedras market area.

Marketing Regulations

No established marketing hours or other regulations are applicable to brokers, wholesalers, and others using facilities in the San Juan area. Some wholesalers' establishments are open almost 24 hours a day, but the principal market period begins at about 4 a.m. and ends at 1 or 2 p.m.

Both the Rio Piedras and Santurce public markets are operated by a manager appointed by the Mayor. These managers have charge of regulations with respect to opening and closing hours, establishment of rental rates, collection of fees, and determination of who may operate in the publicly owned facilities. Produce offered for sale is not inspected to determine grade or purity, but the Department of Public Health inspects the market from the standpoint of public health and sanitation. Since old San Juan has abandoned the use of its publicly owned market for the handling of food products, it has no management for marketing.

Figure 9.--Traffic congestion on streets adjacent to Rio Piedras market.

DEFECTS IN THE MARKET FACILITIES AND DISTRIBUTION SYSTEM

The most apparent defects in the metropolitan San Juan market are: (1) Inadequate facilities at the wharves, where the bulk of the products handled are received; (2) a split market, with wholesale facilities scattered in several areas; (3) lack of proper facilities, including buildings, streets, and parking areas; and (4) absence of marketing regulations.

Inefficiencies of Wharf Facilities

A primary inefficiency of the existing wharves is the congestion which occurs there and in the adjacent warehouses, this resulting from the unloading of all kinds of merchandise at one location. (See fig. 10.) Some of the wharves were built a number of years ago when the volume of supplies unloaded was much smaller than it is today. In addition, exports over these same wharves have increased, adding to the problem of the efficient handling of products.

The facilities of each shipping line are fenced off from those of other lines. Although the wharves are in one general area, they are owned by individual companies and do not operate as a single unit.

Some of the wharves are too narrow to permit the use of present-day wheel-type handling equipment. Although the warehouse buildings are relatively well designed, some are too deep to permit the most efficient handling of produce, because the extra depth means additional moving time from boat to storage or truck. The perpendicular wharves, of course, require the movement of products by wheel-type equipment for hundreds of feet to deliver to a truck. Their inadequate capacity for the volume of business that is currently being done requires the stacking of products to greater heights, thus adding to the cost of doing business. Moreover, the commingling of perishable and non-perishable foods with fish, feeds, fertilizer, cement, machinery, and other products is not good.

These inefficiencies in facilities are aggravated by the fact that all six shipping lines schedule the arriving boats into the port of San Juan within the same 24-hour period each week. One line has two ships coming from the same city on the same day.

Scattered Wholesale Market Facilities

One of the primary defects which leads to many inefficiencies in the marketing of farm and related products in San Juan is the location of the warehouse facilities in three sections of the metropolitan area.

954117 O—51——4

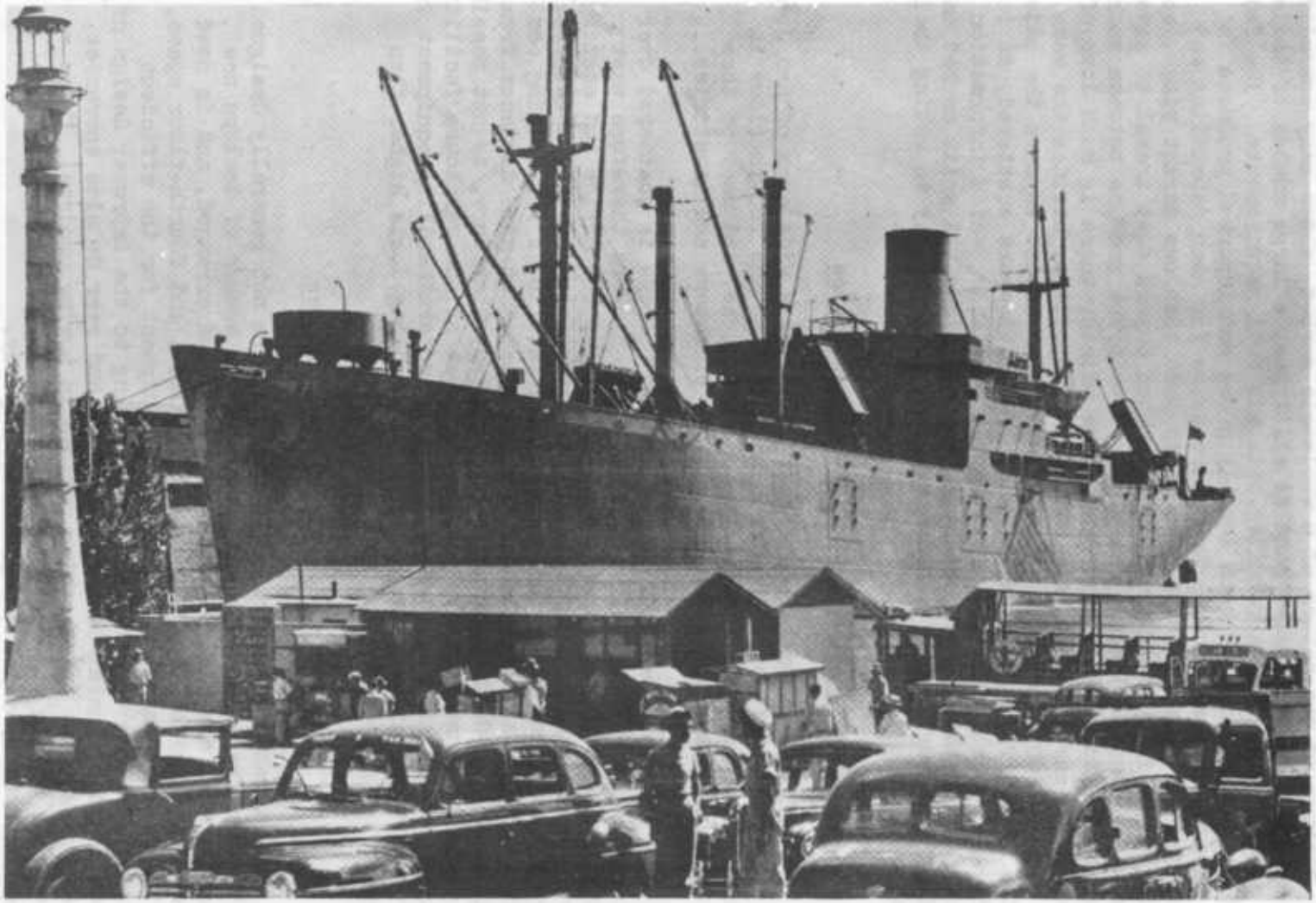


Figure 10.--Congestion near boat docks in San Juan at time of boat arrival.

Because of the nature of a wholesale market, where many commodities are sold and no one dealer handles all types, a large number of dealers are needed to service a retailer with his full requirements. The fact that a complete line of both locally grown and imported products is not assembled in any one market place makes for much rehandling and trucking, and requires buyers to visit more than one market place, so adding to their cost of procurement. When buyers must travel to several areas or wholesale dealers are required to truck produce between such areas to service retail buyers at these points, there is much loss of time, extra cartage cost, and unnecessary spoilage, besides the wear and tear on public streets and extra policing needed to move the added burden of traffic. In a market where facilities are scattered, it is difficult to determine the total supply available, which information is necessary for the correct establishment of prices. A split market makes it difficult for buyers to compare prices with quality in making their purchases.

Inefficiencies of Brokers' Facilities

The offices of brokers are scattered over a wide area of San Juan and Santurce. Offices occupy from the first to the fourth floor in buildings designed for residences and other uses, and many of them are without modern conveniences, such as elevators and lavatories.

The permanent warehouse space used by brokers is scattered over a wide area away from their offices. These brokers therefore must maintain a crew at the warehouse as well as at the office and must travel between these two points in the supervision of their business. Many of them maintain dry or cold storage facilities for holding commodities, which also are inconveniently located at some distance from their offices. Good supervision of business, therefore, is not possible, and costs are unnecessarily increased. Most of the warehouse facilities used by brokers are not modern; generally modern handling equipment is not used, which in many instances makes handling costs higher than necessary.

Inefficiencies of Wholesale Stores

The stores used by wholesale dealers were not generally designed for the wholesale produce business. A large number of dealers use buildings that are old, poorly constructed and arranged, and in need of repair. Many of them use second-, third-, and fourth-floor space, and they do not have proper elevating equipment for the efficient movement of products between floors. Owing to the improper design of stores and the general lack of platforms and rear or side entrances, dealers cannot use labor-saving devices in moving produce. These factors all add to the cost of doing business and to the ultimate price consumers pay for the products they buy.

Some dealers who handle meat and certain other highly perishable products have refrigerated space, but many do not. Much of the available space is inefficiently designed and so located that extra handling is required in moving the products into and out of storage. All imported perishables, such as meat, eggs, fresh fruits, and dairy products, move in transit from three to five days prior to unloading in San Juan, which means that the extra exposure of these products to high temperatures on arrival has a serious effect on their quality and often results in substantial spoilage before reaching consumers.

Lack of Farmers and Truckers' Facilities

With the exception of a limited amount of open street and sidewalk space at the Rio Piedras and Santurce markets, there are no facilities for farmers and truckers. The limited space available affords no protection to the produce offered for sale, and many farmers and truckers can find no space in which to display their products.

Lack of Adequate Streets and Parking Areas

The streets in metropolitan San Juan, as in most cities in other parts of the world that were laid out many years ago, are not wide enough to handle the number of heavy motorized vehicles moving over them. Streets in market areas vary in size from 12 to 50 feet, and their use is limited by the necessity of parking buyers' and sellers' vehicles on either side. In some market areas the traffic flow is limited to one lane; even on one-way streets buyers' vehicles in many instances must stop in the middle of the street to pick up supplies. During the period of these stops other buyers and sellers must wait in line. The loss of time of buyers and sellers and of their vehicles in congested traffic adds to the distribution cost. Moreover, the narrow streets and traffic congestion are a hazard to life and to the control of fire in market areas.

All market areas lack parking space for buyers' and sellers' trucks. Although some space is provided in the wharf area, it is not sufficient to meet the needs. In no other area is space set aside for parking except on public streets. The lack of space adds to the volume of vehicular movement on public streets and prevents the proper servicing of buyers' vehicles in front of stores.

Since most store buildings do not have adequate rear entrances, all loading or unloading of trucks at these stores must be done through the front entrances. Where trucks are parked parallel, the number that can be serviced at one time is limited. In the few streets in the city where trucks park perpendicularly to dealers' stores, there is not enough space for the free movement of traffic. Under present conditions the proper control of traffic in the present markets is practically impossible.

Difficulty in Enforcing Regulations

Although a wholesale market consists of many different types of operations and businesses, it must function as a unit if it is to serve a distribution area economically. Although individual brokers, wholesale dealers, farmers, and truckers who operate in a market should have a maximum degree of freedom in the conduct of their business, they, as well as buyers, usually find it to their mutual advantage to establish a few regulations for all to observe.

Where various segments of a market are scattered, as in San Juan, it is practically impossible to have a common organization to enforce any regulations governing market operations and practices. Moreover, the wholesale facilities in the San Juan area are on public streets where it is not possible to control traffic for the benefit of dealers nor to regulate the hours of marketing. Lack of an established selling period means longer work days, excessive exposure of perishable produce to high temperatures, and greater fluctuations in price throughout the selling period. Without definite market hours buyers do not know when to arrive on the market in order to find the largest variety and highest quality of produce. Regulations also are needed to maintain sanitation, policing, and other services.

INTEREST IN A NEW WHOLESALE MARKET

The extent of the interest of various groups in getting improved facilities and their willingness to use and support a new market are important considerations in deciding on the practicability of developing one. Nothing would be gained by the building of a new market if those who are expected to occupy it did not do so. If one were built and used by only a few dealers, its construction might split still further the market business and in such a manner that no advantages would be gained. To determine the interest of all groups toward the proposal for building a new market in metropolitan San Juan, individual operators were asked during the survey the extent of their interest and the amount and kind of facilities they would desire.

Of the 47 firms doing a brokerage or distributive business, 30 of them, representing about 75 percent of the total volume of business done by brokers, expressed a definite interest in securing space in a new market. Of the 30 brokers, 18 requested only office space, and 12 office and storage space. Since the brokers are largely importers and receive merchandise of all kinds by boat, they need some storage space for supplies for servicing the trade between boat arrivals. Since some brokers or distributive agents who own or rent space for this purpose currently have such facilities at some distance from their offices, they are interested in bringing their office and storage operations together.

Of the 136 wholesale dealers covered during the survey, 89 stated they were interested, 33 indicated no interest, and 14 were indefinite with respect to their desire for space in a new market. Many dealers in the latter group were not in a position to commit their firms because someone else in the organization had charge of such determinations. Also in this group were a few people who would want to see the proposition, or perspective, before committing themselves. Some dealers stated that market improvement was needed even though they were not in a position to use the facilities if built. The dealers interested in moving to a new market handle practically all kinds of products currently being handled and about 80 percent of the present volume.

The possibility of developing a new consolidated market was discussed with a representative number of producers in many parts of Puerto Rico. Most of them recommended that one be built. Farmers in the vicinity of Rio Piedras are particularly in need of facilities in which they can display and sell their perishable products. Many farmers in other parts of the Island said that a good market in San Juan would aid them in disposing of their products.

The truckers hauling produce to and from the market places in San Juan are interested in the development of a good centralized market, and they would want to use it. An improved market would offer them a better place in which to sell their products, and it would improve the facilities of the handlers from whom they buy products for a return load. Of more importance, however, is the saving in time that they might realize by being able to sell and procure all of their supplies at one location.

The buyers in metropolitan San Juan and in all of Puerto Rico who would procure supplies in the market are interested in the improvement of the wholesale market facilities and distribution practices. They are interested from the standpoint of reducing travel time to and from the market areas, the number of areas they need to visit, and the delay in getting delivery of their purchases caused by inadequate market facilities. Moreover, they believe that with improved market facilities they may obtain products of better quality at lower prices than they are now getting and thus better serve consumers.

The consumers in the distribution area of San Juan are concerned with the improvement of the market facilities and the distribution system for perishables and other products. They want to obtain food in the freshest state, at the least cost, and in ample quantities at all times. The improvement of the San Juan market would facilitate the movement of all kinds of products to consumers in a better condition at lower cost.

Transportation agencies that move produce and related products for wholesale distributors want to improve the service they render to tradesmen, and they believe that with improved facilities and handling methods they could give better service at a lower cost. Moreover, the shipping lines servicing Puerto Rico believe that with improved market facilities they would be able to handle a larger tonnage of products to and from San Juan at less cost than now. The most important shipping lines expressed interest in securing wharf and warehouse space for imports and exports transported by them.

Several cities and towns in the metropolitan area of San Juan as well as in other parts of the Island would like to improve and rebuild their market places. The city of Rio Piedras is interested in improving its market, and the city of Bayamon in building a new retail market place, although it has no facilities for this purpose. The making of such improvements would be influenced by any market development in the metropolitan area.

The Insular Department of Agriculture and Commerce, the Puerto Rico Planning, Urbanizing, and Zoning Board, the Department of Public Health, the Agricultural Extension Service and Experiment Station, as

well as farm and trade groups, have been interested in obtaining improved market facilities for many years. Many of these agencies have been concerned with the improvement of production practices, the marketing of farm and food products, and the improvement of the dietary habits of consumers in Puerto Rico. Since the market in San Juan is the principal distribution center and serves, at least in part, the needs of consumers of all the Island, the improvement of its facilities and distributive system and practices becomes of utmost importance to them.

Accordingly, the solution to the general market problem in San Juan is of major concern to many people and administrative units in Puerto Rico.

KIND AND AMOUNT OF FACILITIES NEEDED

In building a centralized market it is highly important to provide the proper kind and number of buildings and other facilities in the proper location and to have them laid out and operated in such a manner as to insure the most orderly and efficient movement of goods between incoming and outgoing carriers. The number and kind of facilities needed, the land area necessary on which to place these facilities, and the area required for future expansion must be determined before selecting a site. The greatest savings in the total cost of distribution through the development of a new market can be brought about only by efficient design and layout and the selection of a site that will be of the most service to the largest number of people who will use the market.

The people who are responsible for building the market should make sure that it is not overbuilt at the start. Only such facilities should be built as could be immediately rented for enough income to pay for them within a reasonable time. A good policy to follow would be to build only those facilities for which satisfactory leases could be obtained. However, it is necessary that adequate provision be made for all groups at present needing space and for a sufficient area for future expansion.

An attempt was made during the survey to find out the needs of the various groups and individuals for space and facilities in the proposed new market. It is difficult to determine in advance the exact number of facilities that can be leased, because some operators want to know before making a definite commitment what kind of facilities are offered, the approximate rental charge, and other facts about the market development plan. Others may want to change their space requirements. The plan described in this chapter provides space only for those handlers who stated they would move to a new market, and it assumes that they will operate in a manner comparable with the method now used except as noted and that their volume of business will remain about the same.

Before making the specific recommendations for the various groups that will form a part of the market, it should be pointed out that in San Juan, where more than 75 percent of the supplies are brought in by boat, the market should be so located that boat receipts may be unloaded directly into the market area. Therefore the wharf and warehouse requirements of the shipping lines will be considered first. It is obvious that if ships are to be unloaded directly into the market area, the market will have to be adjacent to water of a depth of 30 or more feet.

Facilities Required by Shipping Lines

A number of problems must be dealt with in considering the kind and size of facilities needed by the six shipping lines that serve San Juan. The cost of moving a ship to two or more wharves, methods of loading and unloading merchandise into and out of the boat, the introduction of palletization from ship to warehouses--these and many other problems will have to be considered by the shipping lines and by those who will build the market. Not all these problems can be solved satisfactorily in this report, because of the variability of operations and equipment among the shipping lines concerned and the new and improved handling methods at shipside and in warehouses.

As shown previously, these lines have a total of seven ships arriving each week, all within a 24-hour period. The wharf space serving the wholesale produce market should be large enough to berth five ships at one time. The length of these ships varies from 350 to 525 feet. To accommodate five ships averaging about 450 feet long would require about 2,250 linear feet of wharf space.

The current practice of shipping lines is to unload imports, classify them as to receiver(s), and pile such merchandise in warehouses they own or control. The receiver is granted 5 days in which to dispose of the merchandise, after which the shipping company can have a receiver's merchandise carted to a public warehouse at the expense of the receiver, or he may charge a storage fee for products left on the docks. In many cases it is difficult to collect for the extra time merchandise is left on the wharf. The 5-day free storage period starts when the merchandise is unloaded into the warehouse.

Another practice followed in San Juan is that of a single receiver having the shipping lines segregate his receipts into the orders of his buyers, with the shipping lines assuming the responsibility of distribution to these buyers. Prior to the day the boat arrives, the receiver may make up orders for the delivery of as much as 50 percent of such merchandise to 20 or more buyers. Withdrawals may all be made at one time, or they may be made daily for the 5-day free period. The large number of withdrawals, some of which may be as small as 2 or 3 bags of flour, require a large number of employees on the payroll of the shipping lines. Any change in the present system by action on the part of the Insular Government, shipping lines, or Federal Government is unlikely in the immediate future.

In excess of 400,000 tons of the food and related products forming a part of the market business are unloaded or loaded annually on the wharves and into warehouses of the shipping lines. At least 40,000 tons of these products are in the form of bagged feed, grains, and

similar products that could be imported in bulk if proper facilities for milling and feed mixing were available. Of the remaining 360,000 tons of these products, it is expected that about 35 percent, mostly the highly perishable commodities, would be picked up within 24 hours after boat arrivals. Average weekly unloads to be stored in shipping lines' warehouses therefore would amount to 5,000 tons. But since at certain peak seasons of the year about twice this amount would be unloaded each week, warehouse space for 10,000 tons should be provided for piling merchandise by not more than an estimated 35 percent.

If the shipping lines are to perform the most economical service in the market, they should all adopt palletization at and from ship-side. The few lines which follow this practice use odd-sized pallets, varying from 40 inches by 68 inches to 44 inches by 75 inches. In the States two sizes are generally used: 40 inches by 48 inches or 48 inches by 48 inches. Although the shipping lines in San Juan may need pallets of different sizes from those used in the States, the various groups who plan to use the market should settle on one size that they could all use on an interchangeable basis. Although it is recognized that many pallets would be needed to service the market, a satisfactory arrangement of this kind probably could be worked out. For instance, a public warehouse operator could own all the pallets and lease them to the users on the market at a nominal fee; the shipping lines might be in a position to perform this service; a separate corporation might be set up to do it for all of them. A precedent for this practice, an interchangeable fluid milk bottle, is already operating in some cities in the States.

If all shipping lines used 48- by 48-inch pallets and stacked them on an average of two pallets high, 8/ the 10,000 tons would require 163,269 square feet of space, including aisle space of 30 percent of total space. In addition, the shipping lines would need about 50,000 square feet of warehouse space for odd lots of other kinds of merchandise not distributed in the market area. It is estimated, therefore, that 213,269 square feet of space would be sufficient to take care of all their needs.

To provide this amount of warehouse space would require four buildings, totaling about 1,580 feet in length by 135 feet in width. The roof of these warehouses should extend 10 feet over the wharf side of the building to provide a covered space for men and equipment while loading and unloading ships during bad weather. To assure access to the rear of the warehouses and adjacent stores a covered passageway (not a public thoroughfare) at least 15 feet wide should be provided between the shipping lines' warehouses and the stores of wholesale dealers and

8/ Based on 1,400 pounds per pallet.

brokers for their joint use in transporting products between the wharves, warehouses, and these stores. Thus, the total width of the roof over the warehouses would be 160 feet, including the overhangs. This roof should be about 18 feet above the floor level in order to make it possible to stack products three pallets high when necessary.

Facilities for Brokers

The type of business done by the 12 brokers who want both office and storage space is such that they require about 36,000 square feet of storage and handling space to hold commodities between boat arrivals, particularly the perishable products.

A building 400 feet long and 70 feet deep, with a covered front platform 16 feet deep, would provide a total of 34,400 square feet of floor space. This building could be divided into store units 20 feet wide, and the space allocated to brokers on the basis of such a unit. A mezzanine office in the rear, 16 feet deep and placed across the entire wharf side of the building, would provide an additional 6,400 square feet of space. The building should be parallel to the warehouses of the shipping lines and separated from them only by the covered passage-way, 15 feet wide, which would be used to transport merchandise from the boats or warehouses into the brokers' stores (fig. 11). At the rear of each store unit overhead doors, 10 feet wide, should be provided to give ready access for the movement of this merchandise. On the end of each building adjacent to the ramp from the wharf area to the street, there should be provided a platform about 10 feet wide to give access to the front platform of brokers' stores.

The front platform should be 45 inches in height, which is about the average height of truck beds. A step about 22 inches high and 24 inches deep should be placed along the platform to permit ready access to buyers and to service small panel trucks and other low-bed vehicles The platform and the store floor should be at the same level as the floor of the shipping line warehouses and the wharf.

At the front of each unit in the building overhead doors, at least 16 feet wide, and folding steel mesh gates should be provided. Because of the continuous warm climate, the folding steel mesh gates would be used during most of the year. Each door should be provided with a locking device. The solid doors are required to protect merchandise in case of severe storms. Steel mesh gates might also be used at the rear of the store building.

Durable but removable partitions should be used to separate the operations of dealers within the building. Heavy steel mesh wire partitions would be preferable in order to facilitate ventilation, and

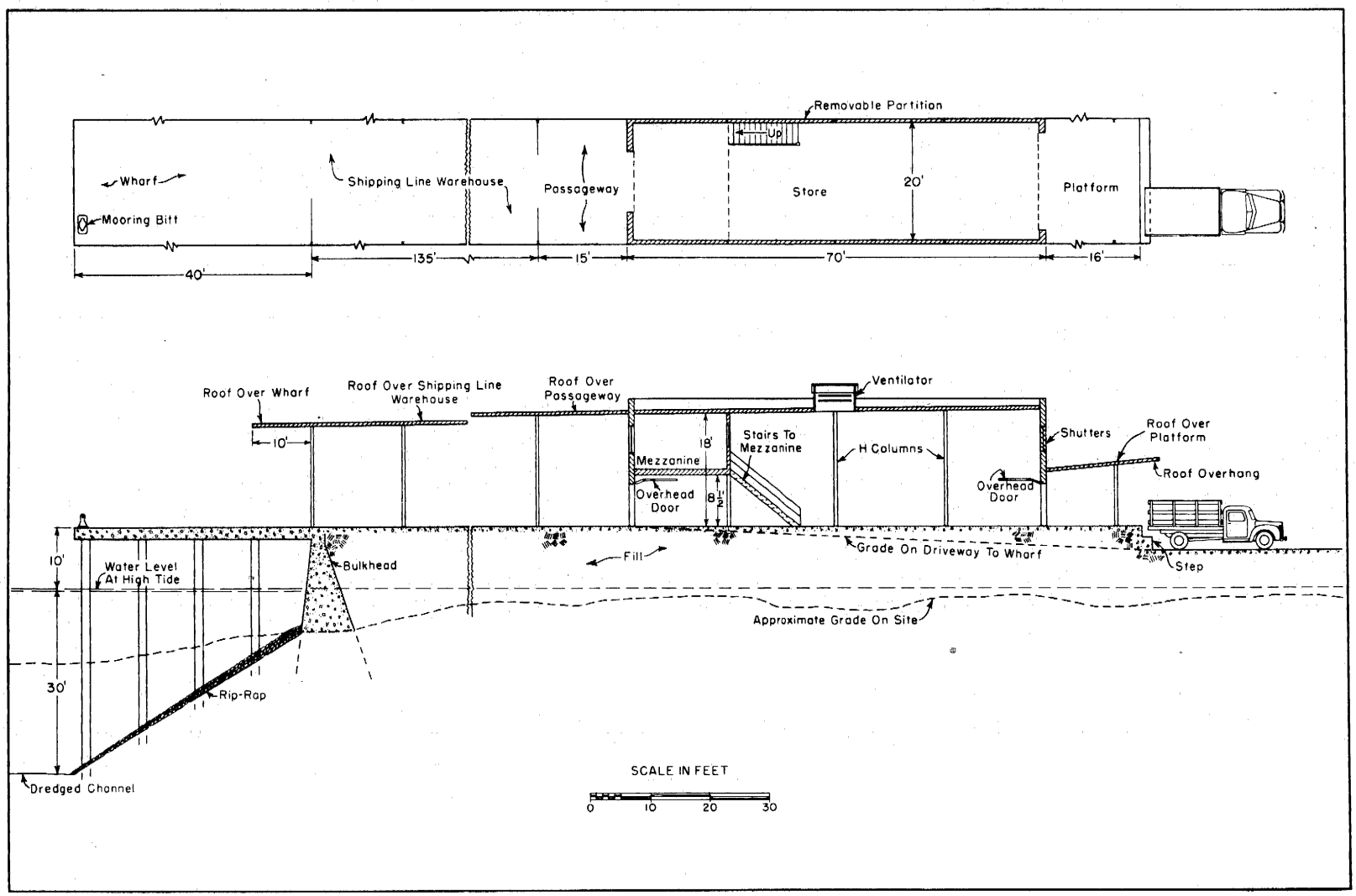


Figure 11.--Cross section view of wharves, warehouse of shipping line, and a broker or wholesale store building.

they probably would be cheaper to install. The ceiling of the building should be at least 18 feet in the clear to allow an 8½-foot clearance between the store floor and the floor of the office and also between the floor of the office and the ceiling of the building. From this office the proprietor would be able to see the front half of the store and the platform where most of the trading takes place, and the warehouse and wharf in the rear, where boats are unloaded and merchandise is sorted. Toilet facilities would be on the mezzanine.

Space for the 18 brokers who want office space only will be discussed later in this chapter.

Wholesale Stores

The volume and kind of business done by the 89 wholesale dealers requesting space in the market are such that they require two different types of buildings. The business of 36 dealers is quite comparable to that of the 12 brokers; therefore, they could use the same kind of stores. These dealers are direct receivers at the wharves of imported products, they export some native-grown products, and they act in a brokerage capacity in making sales to other wholesale dealers as well as in servicing retail buyers. The remaining 53 dealers mainly handle imported products obtained from brokers or other dealers in San Juan and locally grown products obtained from farmers or truckers. Their turnover of commodities is more rapid than that of brokers or larger wholesale dealers. Consequently, they would not need the same amount of space per unit volume handled, so they would not require the same depth of building. However, they would need more platform, street, and tailgate space for servicing buyers' trucks.

For the 36 dealers who do a large wholesale business and need space for holding merchandise, such as cold storage and dry storage space, it is suggested that 40 store units, providing 68,800 square feet of storage and handling space of the kind described for brokers, be built. Office space on the mezzanine would provide 12,800 square feet of additional space. This space could be provided in two buildings of the same design as the brokers' building, each 400 feet long by 70 feet wide, with a covered front platform 16 feet deep. (See fig. 11.) These buildings also would be parallel to the warehouses of the shipping lines, separated from them by the covered passageway.

For the 53 smaller wholesale dealers, 60 store units, 20 feet wide and 45 feet deep, with platforms 24 feet deep in front and 12 feet deep in the rear, would be needed. These 60 units would provide a total of 97,200 square feet of storage and handling space and 18,000 square feet of mezzanine office space. Figure 12 shows a suggested plan for these stores.

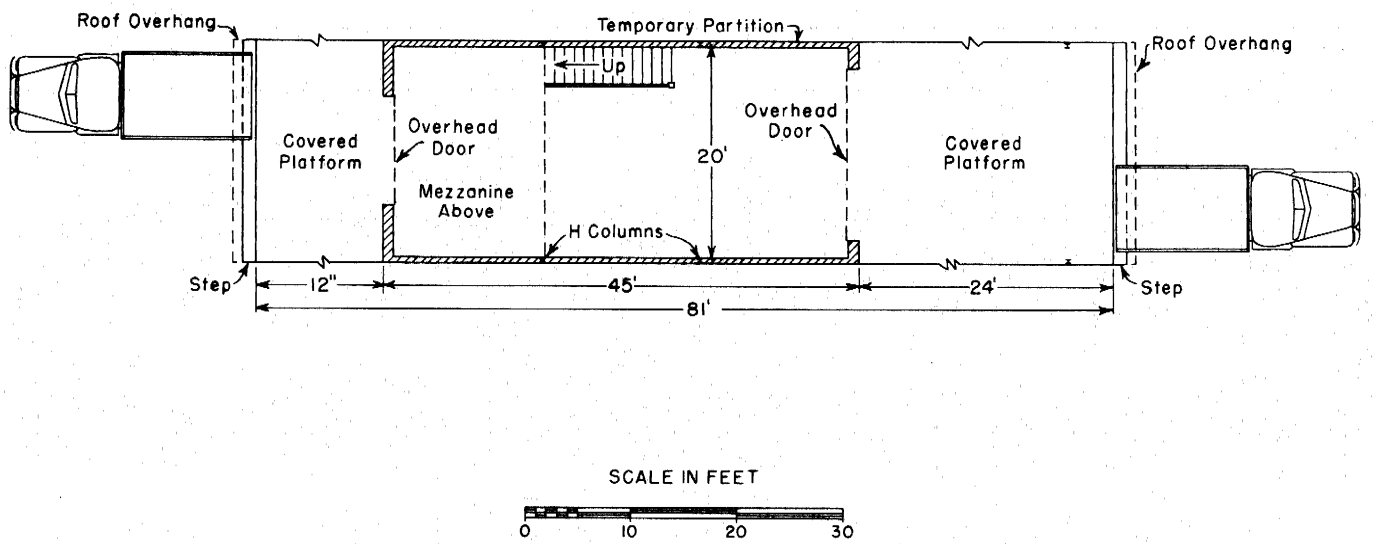


Figure 12.--Suggested floor plan for a wholesale store, 20 by 45 feet.

The same type and size of doors, ceiling height, partitions, and other features as recommended for brokers' units should be used in these buildings. The mezzanine office, however, could be reduced to 15 feet in depth. Toilet facilities would be located on the mezzanine. Both front and rear platforms could be approximately 45 inches high, with step arrangements to platforms as shown in figure 12. A ramp should be provided from the street to the platform in the rear of stores to permit delivery of products on low-type 4-wheel trailers from the wharves or warehouses at wharves.

Farmers and Truckers' Sheds

Sheds with display platforms will be needed to meet the needs of farmers and truckers who will want to sell their produce on the market. The sheds should be of center-post construction and have a roof 24 feet wide, with eaves 14 feet above street level. Beneath the roof a raised platform, 12 feet wide and 36 inches high, should be built along the entire length of the shed, the roof extending 6 feet beyond the platform on each side. Farmers and truckers would be able to back their trucks to one side of the covered platform and unload produce for display and sale. The opposite side of the platform would be used by buyers to inspect the produce and load their purchases. Not less than 10 feet of platform space should be allowed for each seller to permit easy parking and free movement between trucks. Figure 13 shows a suggested design for sheds of the type recommended.

Because of the lack of facilities available for farmers' use in the present markets of San Juan, it was not possible to determine the exact amount of facilities needed by farmers. It is known that about 24 truckers frequent the Rio Piedras market daily and about 18 the Santurce market. In addition, street and sidewalk space at the Rio Piedras market sufficient to accommodate 18 farmers can be used by them before 6 a.m. It is recommended, therefore, that in the initial construction 2 sheds be built containing enough stall space to accommodate about 60 farmers and truckers, and that space in an adjacent area be reserved for additional sheds when the need for them has been determined. In the meantime, open stall space could be used for any overflow of farmers or truckers coming to the market.

Where space would permit, sheds could be constructed in multiples of two, parallel to each other, with a center lane between them for buyers. The center lane should be not less than 60 feet wide and should be made a one-way lane for vehicular traffic. This width would permit buyers to park perpendicularly to the platform when picking up produce. The sellers' lane should be about 80 feet in width to accommodate the average length of farmers' and truckers' vehicles.

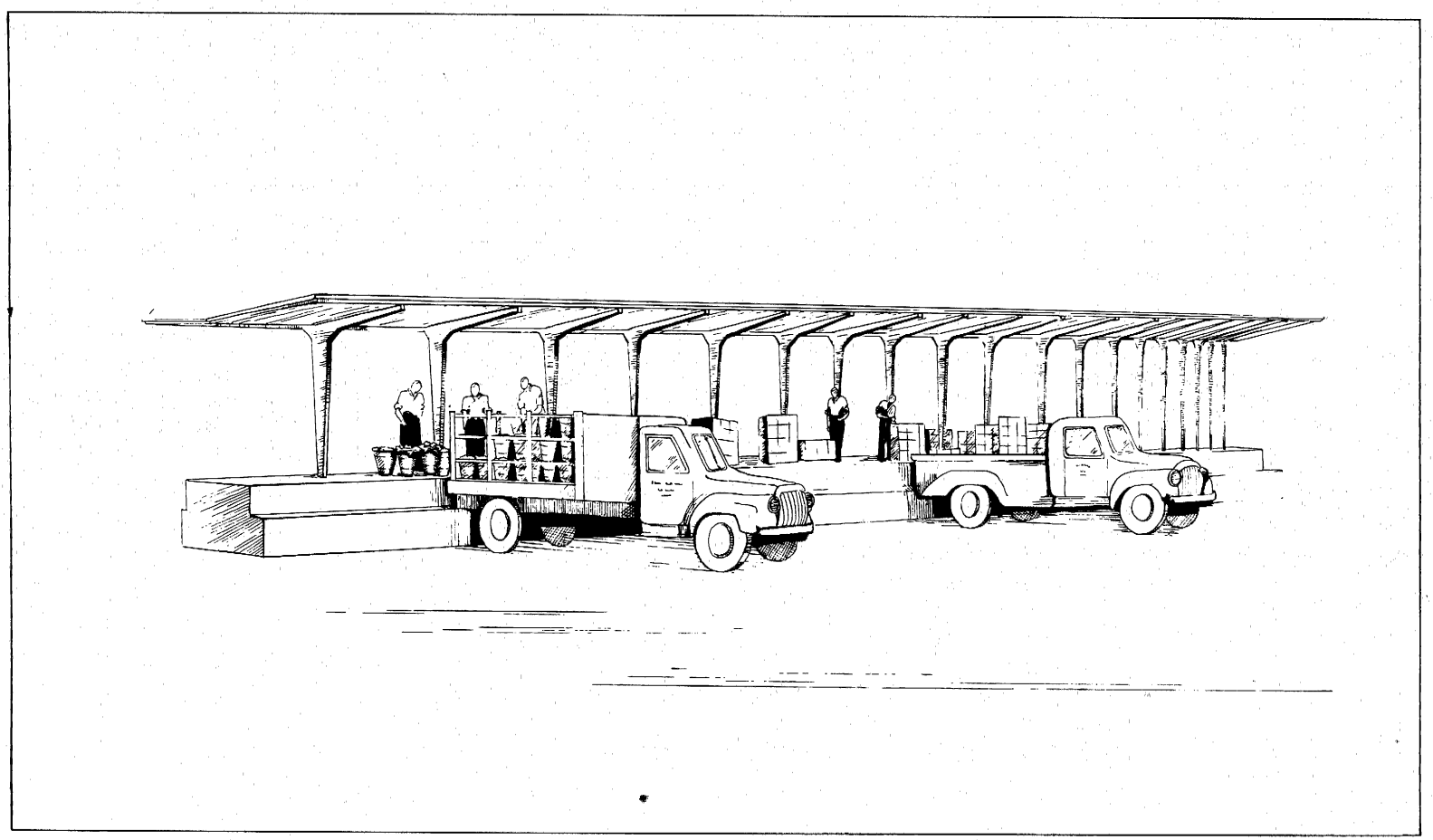


Figure 13.--Design for farmers and truckers' sheds.

Office Space and Related Services

Office space only was requested by 18 brokers. In addition, office space would be required by the management, inspectors and other Government officials, telegraph agencies, and other service organizations that are needed in the market for its successful operation. A meeting room would be needed in the market for use by the management, trade groups, farmers, and others to discuss market regulations, trade practices, and various matters of common interest.

It appears likely that a new wharf location would be required to permit the construction of all the kinds of market facilities needed to serve metropolitan San Juan. If so, passengers would have to be accommodated at the new location. Therefore space to accommodate passengers, including receiving rooms, ticket office, examining rooms, public rest rooms, restaurant, and space for related services, would have to be provided in the market area.

Three ways of providing office space for brokers and related services are: (1) By constructing an administration building especially for their needs; (2) by using vacant first-floor space in store buildings until funds are available for the construction of a separate administration building; or (3) by building a second floor over part of a wholesale building. Because of the necessity for having some space on the first floor at wharf level, it is recommended that a two-story administration building be built.

The 18 brokers requesting office space would need a total of about 4,800 square feet. The management would need about 800 square feet of space, including space for the directors and for a common meeting room. About 1,500 square feet of space would be required to provide offices for service agencies, 500 square feet for public toilets, 3,000 square feet for a restaurant, 3,000 square feet for ticket office, receiving rooms, and examining rooms, and about 3,000 square feet for hallways, or a total of about 16,600 square feet of floor space. A suggested layout of the first and second floors for this building is shown in figure 14.

The administration building should be adjacent to the warehouses at the wharves at one end of the wholesale buildings and have about the same depth as the wholesale building which it adjoins. When additional office space is needed, it could be provided by building a third floor over the office building or over the adjacent wholesale building.

954117 O—51——5

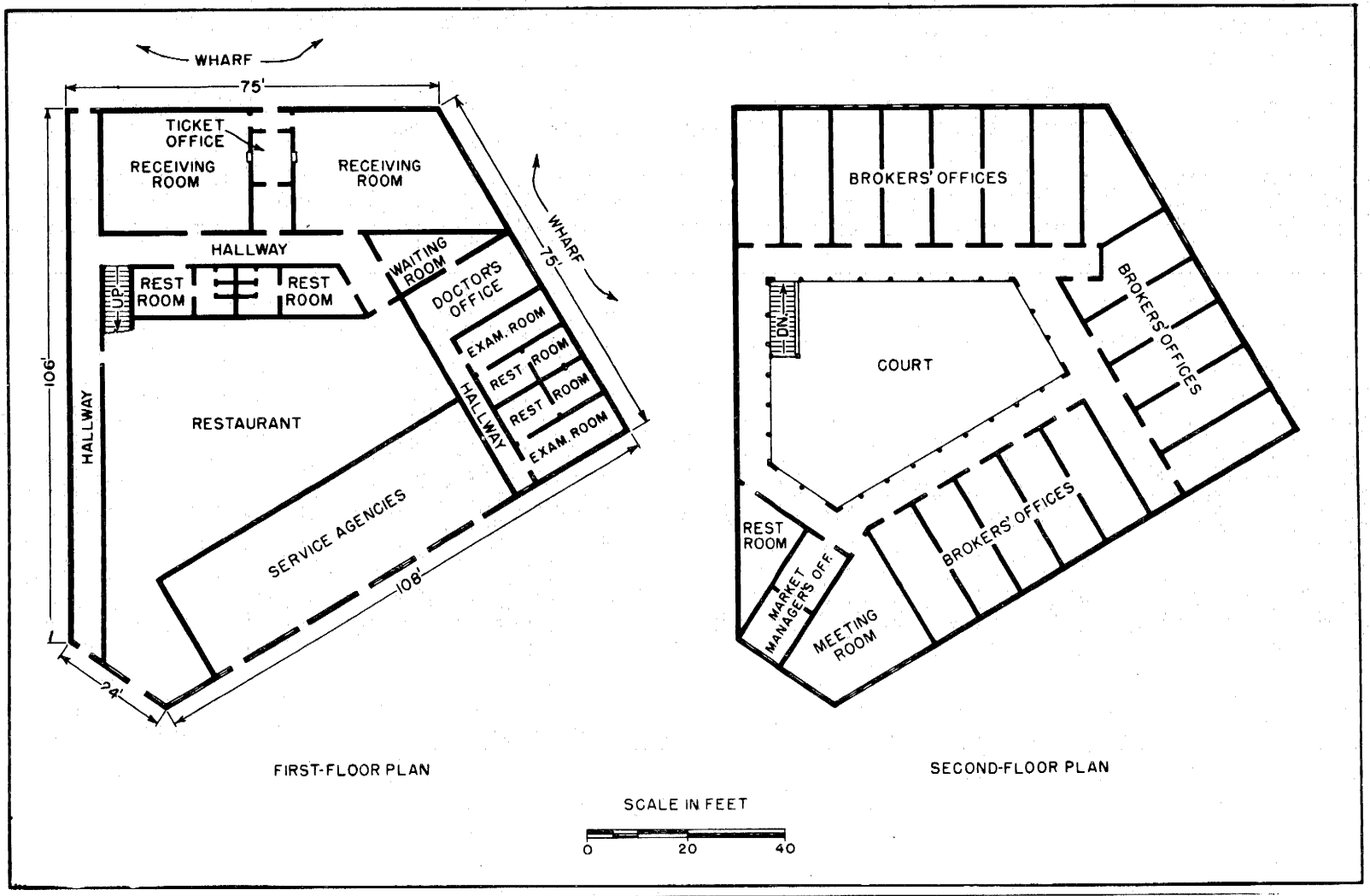


Figure 14.--Suggested layout for the first and second floors of the proposed administration building.

Other Facilities and Services

Other needed facilities and services would include a restaurant or cafeteria and public rest rooms in addition to the ones in the administration building, market employees' rooms, storage space for the market management, a filling station, and certain related facilities.

Restaurants or cafeterias on or near the market site are important for the convenience of operators, employees, buyers, farmers, truckers, and others associated with the market. If there are no restaurants in the immediate vicinity of the site selected for the market, it will be necessary to include space for housing such services in planning the market. The one in the administration building could serve the brokers, wholesale dealers, office help, and passengers. The second restaurant could be included in the retail market building which will be discussed later, and could be used largely by the market labor (labor employed by dealers) and by truckers, farmers, and buyers. Such a restaurant should contain about 700 square feet of space and its cost be included as a part of the cost of the retail market house.

In addition to the toilet facilities provided in the stores of brokers and dealers and in the administration building, it is recommended that a public comfort station be placed at one end of the farmers and truckers' sheds. A building 20 feet by 24 feet would provide two rooms of 20 feet by 12 feet, one for men and one for women. These rooms also could provide showers and lavatories.

Employees of the market management will need a room containing lockers and related facilities. Some storage space will be needed for janitors' supplies, and it would be desirable to set aside some of the first-floor space in the administration building for this purpose.

Because a large part of the receipts handled in the market arrive by truck and are distributed by truck, space should be set aside for a service station and related facilities, unless ample facilities of this kind are already near the market area. The actual construction and operation of the station should be left to a private firm on the basis of a long-term lease, and the rental for the space should be sufficient to amortize the investment and pay for the services rendered by the market. Such a station could include a garage for the repair and maintenance of motor vehicles that will frequent the market. It might be desirable to furnish pipe-line service to the service station from the wharves or other bulk area rather than to depend on tank-wagon delivery. In this event, the firm leasing the service station area might desire a substantial amount of space for servicing other points

in Puerto Rico. Therefore, before developing the plans, it would be necessary to consult with the firm that would operate these facilities regarding its needs. The location of the service station and related facilities should be adjacent to the principal highway so that it could service vehicles other than those of market customers without interfering with the market business.

Streets and Parking Areas

All primary thoroughfares in the market area should be 150 feet wide to permit a double row of center parking, one-way traffic on each side of the center parking area, and perpendicular parking at the platform of wholesale stores. Cross streets should be not less than 60 feet wide, and primary cross streets should be from 80 to 100 feet wide. The streets should be laid out in such a way as to permit ready access to the front and rear of all warehouses and so that all parts of the market area may be reached. Moreover, the streets should be so planned that when additional facilities are constructed in the future the original street design may be extended and adequate service rendered.

Ample parking space in the market is a requirement that must be fully met if the market is to operate efficiently and economically. In addition to the parking spaces provided in the center of streets, which would be used mainly by buyers, designated areas for the vehicles of brokers, wholesalers, and employees would be needed. Also, an area should be set aside for itinerant truckers and other people coming to the market to do business. Ample parking space should be provided in the retail market area, farmers and truckers' market, and at other locations. In laying out facilities, space should be included for increasing the number of parking spaces as additional facilities are built.

Unless ample parking space is available for all uses, vehicles will travel around market streets until a parking space is available, with resulting loss of time, congestion, and wear and tear on the market streets.

Space for Public Refrigerated and Dry Storage Warehouses

Because of the perishable nature of many commodities handled in a produce market, the availability of public refrigeration for such markets must be considered. There would be little justification for hauling perishable commodities under refrigeration for thousands of miles if cold storage space were not available after they arrived in the wholesale market. Although most dealers in perishables would maintain some refrigerated space in their stores, such space might not

not be sufficient to meet all their needs or the dealers might want long-term storage space in a public warehouse for certain commodities. The introduction of quick-frozen foods and the possibility of the further development of this industry in Puerto Rico may require at some time that a warehouse containing cooler and freezer space be erected in or adjacent to the market area. Also, at some time in the future a need may arise for cold storage space for holding locally produced fresh and frozen products for export.

The four public cold storage warehouses doing business in metropolitan San Juan have a combined capacity of 185,000 cubic feet of cooler and freezer space. These facilities have relatively small capacities and are not designed to permit their most economical use. Eventually, there may be a need for more cold storage space than is now available. For these reasons it is recommended that space be set aside in the market area for a modern public cold storage warehouse to be built when the need arises.

Dry storage space may also be needed in the market area because of the heavy volume of imported rice, beans, canned goods, and similar products that possibly could be procured at a more reasonable price at given seasons of the year than at other times. Accordingly, it is recommended that space be set aside in the market area for a dry storage building when it is needed. This storage could be operated by the person who would operate the public cold storage warehouse or by other private individuals or firms.

Although these storage facilities might be built by private firms, the management of the market should obtain a secure long-term lease from the firm on the land to be used. The rent obtained from such a lease should be sufficient to cover the cost of services rendered by the market and to amortize the investment. These warehouses should be adjacent to the wharves so that they could receive from or deliver direct to boats.

The market management should not attempt to build and operate a public refrigerated or dry storage warehouse, because very specialized knowledge and experience are required to operate this business profitably.

Fence

In order to permit the management to police the market area properly, maintain market regulations, and facilitate the collection of fees from farmers and truckers, the entire area should be enclosed with a heavy woven steel wire fence, at least 6 feet high, this to be placed on steel posts set in concrete. An adequate number of gates should be provided to allow for the orderly handling of traffic in and out of the market.

Storm and Sanitary Sewers

The rainfall of San Juan is in excess of 100 inches annually, sometimes being exceedingly heavy during a brief period. Therefore, to keep the market area free from water would require large storm sewers. Insofar as could be determined, it would be possible to use an outlet directly into the bay. Sanitary sewers would have to connect with existing city sewers.

Since San Juan is frost-free, the sewers in the market area need to meet only the minimum requirements set forth by the Puerto Rico Planning, Urbanizing, and Zoning Board--that is, sanitary sewers be three feet beneath the surface and storm sewers two feet. Storm sewers should be placed in the middle of the street and the streets be sloped away from buildings, so that garbage, dirt, and trash would tend to move away from buildings and cleaning and sanitary control thus be facilitated.

Paving

All streets needed in the market area to reach facilities in the initial development should be paved. Streets to be developed when facilities are expanded should be paved at the time the expansion takes place. Although the cost of laying concrete paving might exceed that of asphalt, it is recommended that concrete be used, since a cement plant and ample quantities of crushed stone, gravel, and sand are available in San Juan. Properly laid concrete streets would be more durable than asphalt streets.

Wharf Facilities

To place adjacent to the wharves the number of warehouses recommended herein, with four driveways to the wharves, will require a minimum of about 1,800 linear feet of wharf space. The driveways should be at least 40 feet wide. As stated previously, the five ships to be docked at these wharves would require 2,250 linear feet of space. Thus, the factor that will determine the total wharf space requirements in the market area is the number of ships to be unloaded at one time.

The wharf deck should be at least 10 feet above high tide to accommodate most of the boats that would unload. It should be 40 feet wide, including the 10-foot covered space adjacent to the warehouse facilities of the shipping lines. The entire wharf deck could be on piling, the bulkhead forming the building line as well as serving as the retaining wall for fill. A cross sectional view of the suggested design for the wharf is shown in figure 11.

With a knowledge of the amount of wharf space required, it is possible to give further consideration to the type of berth that should be provided. Two kinds of wharves are generally used, the parallel type and the type with perpendicular piers (fig. 15). The perpendicular type is prevalent in San Juan. 9/ The piers, and in most cases the adjacent warehouses, are built over the water, extending from 300 to 500 feet from the shore, and ships dock headed into the land.

In determining which type of wharf is better suited for use in San Juan, a number of factors will need to be considered: (1) The land available for development adjacent to deep water, (2) the structural cost of developing each type, (3) the operating efficiency of each type, (4) the suitability of the structure for expansion and enlargement, and (5) the maneuverability of the ships.

The perpendicular type would be more expensive to construct because the cost of constructing each pier from the wharf would be in addition to the cost of building the parallel wharf. The pier as shown in figure 15, is 100 feet wide by 475 feet long. Accordingly, each pier, which would serve two ships, would require 47,500 square feet. If two pier extensions were made from the wharf, it would be necessary to build 95,000 square feet of pier. These piers would accommodate four ships, which would require about 680 feet of space on the wharf paralleling the warehouses, thus leaving sufficient parallel wharf to accommodate three more ships. The pier system would require more dredging than parallel wharves. In fact, the initial dredging costs and the maintenance thereof would probably be doubled. The cost of building each pier of 47,500 square feet at $4 per square yard is about $21,000, excluding the cost of piling beneath such wharves, which would be about $450 per pile.

The piers could be increased in width to permit the building of warehouses on them, but the question arises of the cost of additional dredging and of building over water as compared with building over land. In San Juan parallel wharves will provide sufficient space for docking the number of ships that would bring supplies to the market now. If the number of ships visiting the market in the future should require more space, the construction of perpendicular piers would more than double the number of vessels that could dock at one time.

Rail Connections to Facilities

In spite of the limited rail facilities in Puerto Rico and the small volume of produce moving by rail, it is believed desirable to lay out the market in such a manner that rail connections could be

9/ The perpendicular type is generally at a 90° angle, but the same principle is involved if the angle is less than 90°.

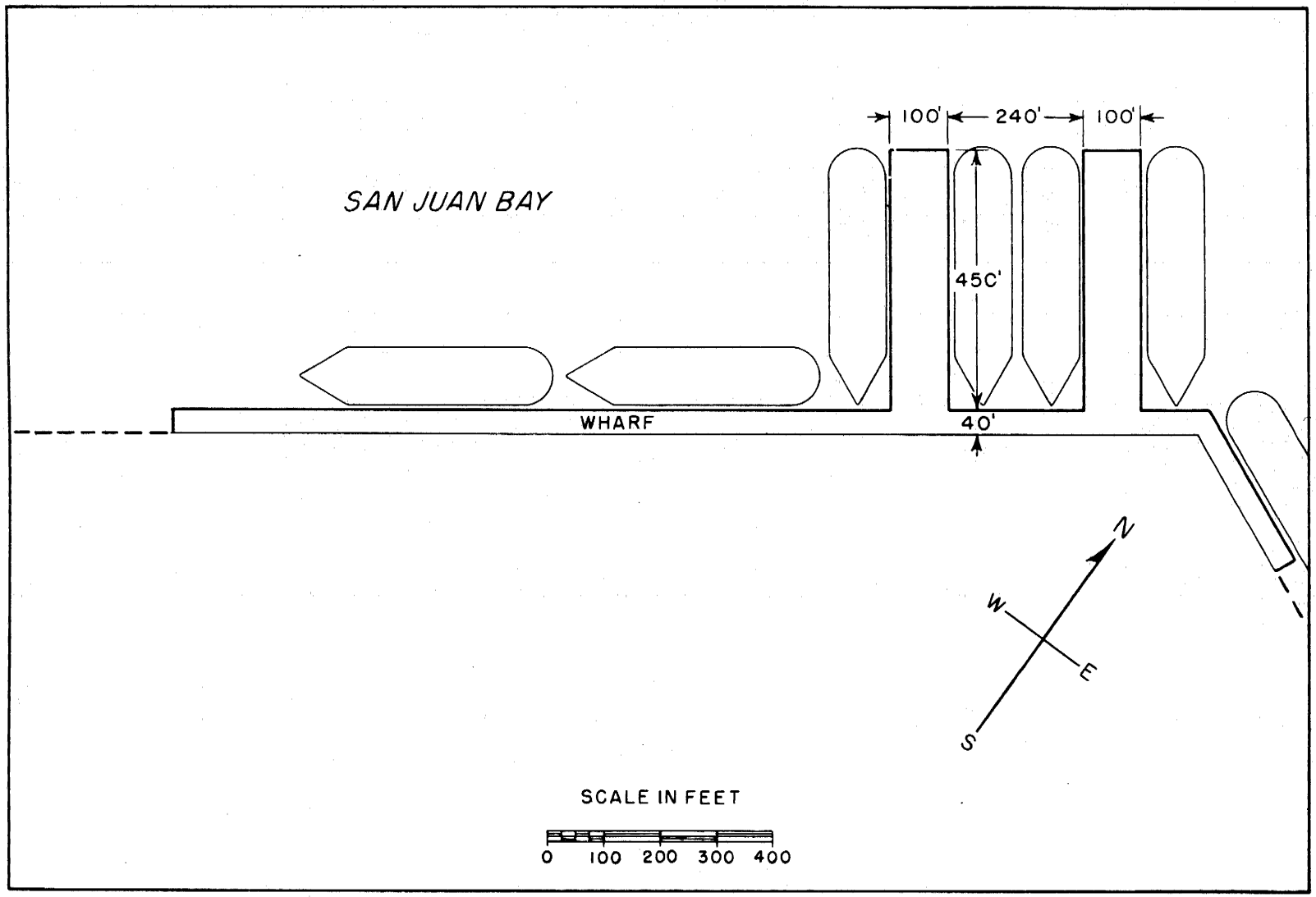


Figure 15.--Design for the type of wharf with perpendicular piers.

brought to the facilities at a later date should the need arise. Some changes might be made in the facilities and in the operations of the railroad to permit its economical use in the handling of produce. Also, since a large part of the products that would be handled on a new market would be rice, beans, canned goods, and other nonperishable products, full carloads could be shipped to dealers in areas serviced by the railroad for redistribution from such points. This problem will be discussed later in the report.

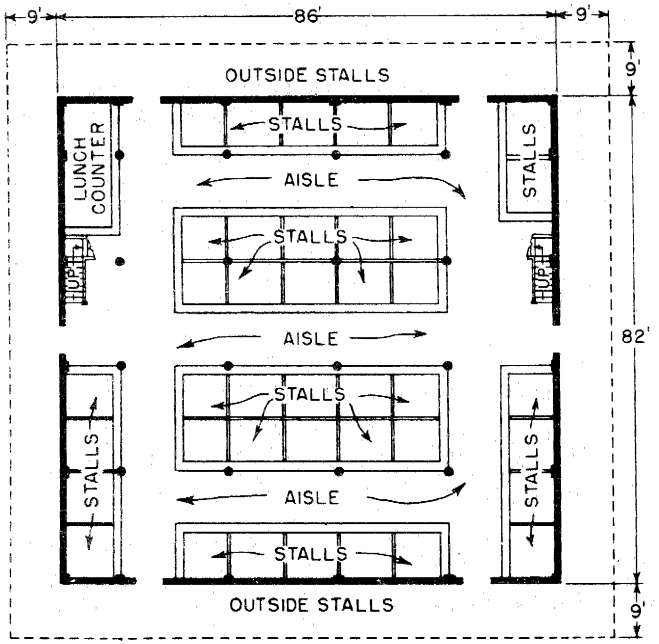
Retail Market Facilities

Although this study was designed primarily to find out the problems of San Juan with respect to wholesale facilities and distribution, it is obvious that the tradition and customs of the people of Puerto Rico demand that consideration be given to the retail market problems in connection with any wholesale market development. For this reason, it is suggested that limited retail market facilities be constructed in the wholesale market area.

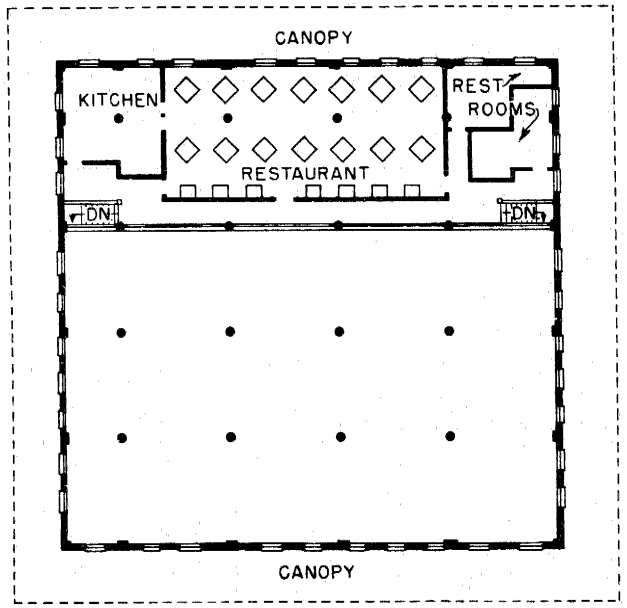
The building to be used for this purpose should be planned in such a manner that it could be converted at some future date to some other use. It should include space for not more than 40 retail dealers, a restaurant, and public rest rooms. Stalls should be approximately 8 feet by 9 feet, with steel netting partitions. Water connections and floor drains should be provided in each stall for washing produce and for other cleaning purposes. A layout of such a facility is shown in figure 16.

A building 82 feet wide and 86 feet long should be sufficient to meet current retail needs. The floor and sidewalk should be 8 inches above the pavement around the building, but the building, if it should be used later for wholesale purposes, could be about 3 feet above the level of the major street in the market to permit the installation of platforms.

The building should be of the same type as that recommended for brokers and wholesale dealers. A ceiling height of 18 feet would leave room for a mezzanine, where the restaurant, rest rooms, and storage rooms could be placed. Aisles 8 feet wide should provide access to all stalls in the building. Thirty-six outside stalls around the building are provided in the proposed layout on the assumption that they would be leased. These stalls could be protected by a canopy. Adjacent to the building should be sufficient parking space for cars and trucks of dealers and buyers.



FIRST-FLOOR PLAN



MEZZANINE-FLOOR PLAN

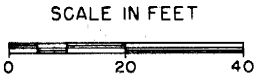


Figure 16.--Layout of a proposed retail market building.

Space for Expansion

In the type of market recommended for San Juan several types of expansion may be needed: (1) Additional facilities for handlers for whom facilities are provided in the initial construction; (2) facilities for handlers for whom provision is not made in the initial plans; and (3) space and facilities for additional related businesses that might want to locate on the market, such as prepackaging and processing plants.

Several factors may be expected to increase the need for facilities. The population of Puerto Rico increased 18.3 percent from 1940 to 1950 according to preliminary 1950 census data, and it probably will continue to increase. During the past 10 years, per capita consumption of food, particularly perishables, has also increased substantially. With the modernization and improvement of market facilities, a decline may be expected in the house-to-house sales by the pushcart peddler. In addition, the expected increase in the number of refrigerators in homes will permit consumers to purchase larger quantities of food than at present and to benefit economically by volume purchasing.

Facilities constructed initially should be so arranged that they could be expanded in the future simply by adding to them. Moreover, as additional facilities are constructed, the plan should provide for increasing the wharfage, warehouses, streets, parking areas, and other features necessary for the efficient servicing of the market area.

The people who plan and build the San Juan market should give careful consideration to the acquisition of sufficient area for the facilities needed now and for all possible future expansion of the market. For the following reasons, it would be better to overestimate the area required for expansion than to underestimate it: (1) The location of a new wholesale market in an area tends to increase land values there, so that adjacent land cannot be acquired when needed for market expansion except at extremely high prices. (2) The availability of unused land in a market tends to encourage all wholesale interests to move into it. (3) When once established, a market generally continues in that location for a long time. (4) By the consolidation of all market business in one market area (assuming all users pay rent), the overhead costs, such as for land, construction, maintenance, and management are distributed among a greater number of tenants and thereby the unit rental charges can be reduced. (5) Without sufficient land in the expansion area it is not possible to properly plan the present and future market. (6) In many instances the improvement of the expansion area, such as filling, may be done more cheaply, or perhaps without any cost, before the area is needed for development. (7) If more land is acquired initially than is needed, it can be sold later and the revenue used to help liquidate the investment.

Total Facilities Needed for Immediate Construction

The total number of facilities needed for immediate construction to meet the requirements of handlers who expressed a desire to move into the market and to provide adequate warehouse space for the shipping lines is as follows:

3 warehouses for 6 shipping lines, with a total of 213,269 square feet

20 store units for 12 brokers, 20 by 70 feet, with 16-foot front platforms

40 store units for 36 wholesale dealers, 20 by 70 feet, with 16-foot front platforms

60 store units for 53 wholesale dealers, 20 by 45 feet, with 24-foot platform in the front and 12-foot platform in the rear

60 stalls for farmers and truckers, 10 by 12 feet, to be placed in 2 sheds each 300 feet long

1 public toilet building at farm sheds, 20 by 24 feet

1 administration building containing at least 16,600 square feet of space to provide space for 18 brokers, the management, service agencies, public rest rooms, a restaurant, and ticket office, receiving rooms, and examining rooms for passengers

1 retail market building, 82 by 86 by 18 feet, containing 40 stalls 8 by 9 feet, restaurant, and public toilets, and 36 outside stalls

2,250 linear feet of wharf space, 40 feet wide

MARKET LAYOUT AND ARRANGEMENT OF FACILITIES

The layout and arrangement of the facilities described and space for future expansion in a manner that will conform to a definite pattern will depend upon the site selected, accessible streets, and location of wharfage. To determine the land area needed and to set forth the principles that should be followed in planning the market, figures 17 and 18 show a layout of the facilities needed now and the area regarded as adequate for future expansion on a site to be described in the following chapter.

A total of 65 acres is needed for the market development, 35 acres for the initial construction and a minimum of 30 acres for expansion. Any other site of a similar shape would need to have equal acreage for the facilities recommended.

The suggested layout provides a total of 2,130 feet of parallel wharf space along two sides of the market--1,830 feet on the front side, at which four ships could dock, and 300 feet along the other side, at which a smaller ship could dock. Additional wharf space could be provided, if needed, along the side of this market or by constructing perpendicular piers. The warehouse space for shipping lines is provided next to the wharves, and the stores of brokers and wholesale dealers are across a 15-foot aisle from these warehouses. This arrangement makes it possible to move products from the wharves to the ultimate receiver over the shortest distance possible. Highly perishable commodities can be moved direct to the store of the receiver or to public cold storage warehouses. Commodities for export may be handled through these same facilities direct from warehouse to ships.

The stores of smaller dealers handling a diversified line of commodities, including both imported and locally produced supplies, are placed in the interior of the market area, facing each other, with streets in the rear and front and ample parking space in front of buildings. This arrangement permits the efficient use of all facilities and the easy flow of traffic. It brings each operator's business to a point where such problems as labor supervision, loss of time in the movement of produce, and theft may be held to a minimum. Furthermore, it permits each operator flexibility of operation. Through the efficient use of proper handling equipment for the movement of produce and through the use of refrigeration in stores or in public cold storage warehouses, handling costs, such as for breakage, spoilage, and quality deterioration of produce, can be greatly reduced. Commodities can be moved from shipside to warehouses, stores, or to buyers' trucks by mechanical means such as four-wheel hand trucks, pallets, and skids.

The recommended layout will be beneficial to buyers and sellers who come to the market. For buyers, it will permit the assembly in one place of practically all the food and related products they need in their establishments. For sellers, it will prevent the rehandling of vast quantities of merchandise from the wharves to warehouses at some distance, as is the case in the present market. It will also prevent the entrance of nonmarket traffic on market streets, thus giving buyers and sellers in the market more space to park and freedom from congestion.

Farmers and truckers are located near the entrance where they can make sales to all types of buyers--wholesalers, retailers, and consumers.

The space set aside for the public refrigerated warehouse is adjacent to the wharves, which will permit the use of mechanical equipment to move commodities direct from the boat into the warehouse.

A most important feature in the market is the arrangement of the streets and parking areas. Under the suggested plan one-way streets are in front of all stores and warehouses, and parking space is provided in front of all warehouses and adjacent to principal streets. Off-street parking areas are available near the entrance and at other points. Ramps are provided for truck access to the wharf facilities.

The retail building, with its adjacent parking area, and space for the service station are near the entrance. This location permits access from the principal public street without interference with market business. Consequently, such facilities may be open for business at hours different from those of the wholesale market.

The administration building is placed near the wharf for the convenience of boat passengers and others using it. The building occupies the corner location, the irregular shape of which would not lend itself to use for warehouse purposes. It is adjacent to a connecting street, which location will permit the free flow of vehicular and pedestrian traffic not concerned with the remainder of the market activities. The two floors of the building will be about the same over-all height as the adjacent warehouse. This building can be expanded, first, by adding a third floor to it and later by building a second floor over the adjacent warehouse. Such expansion will provide a tremendous amount of space for future needs. However, a good policy to follow with respect to building offices and similar space in the market is to limit the building of such space to users who will be of benefit to the market business, rather than for revenue only.

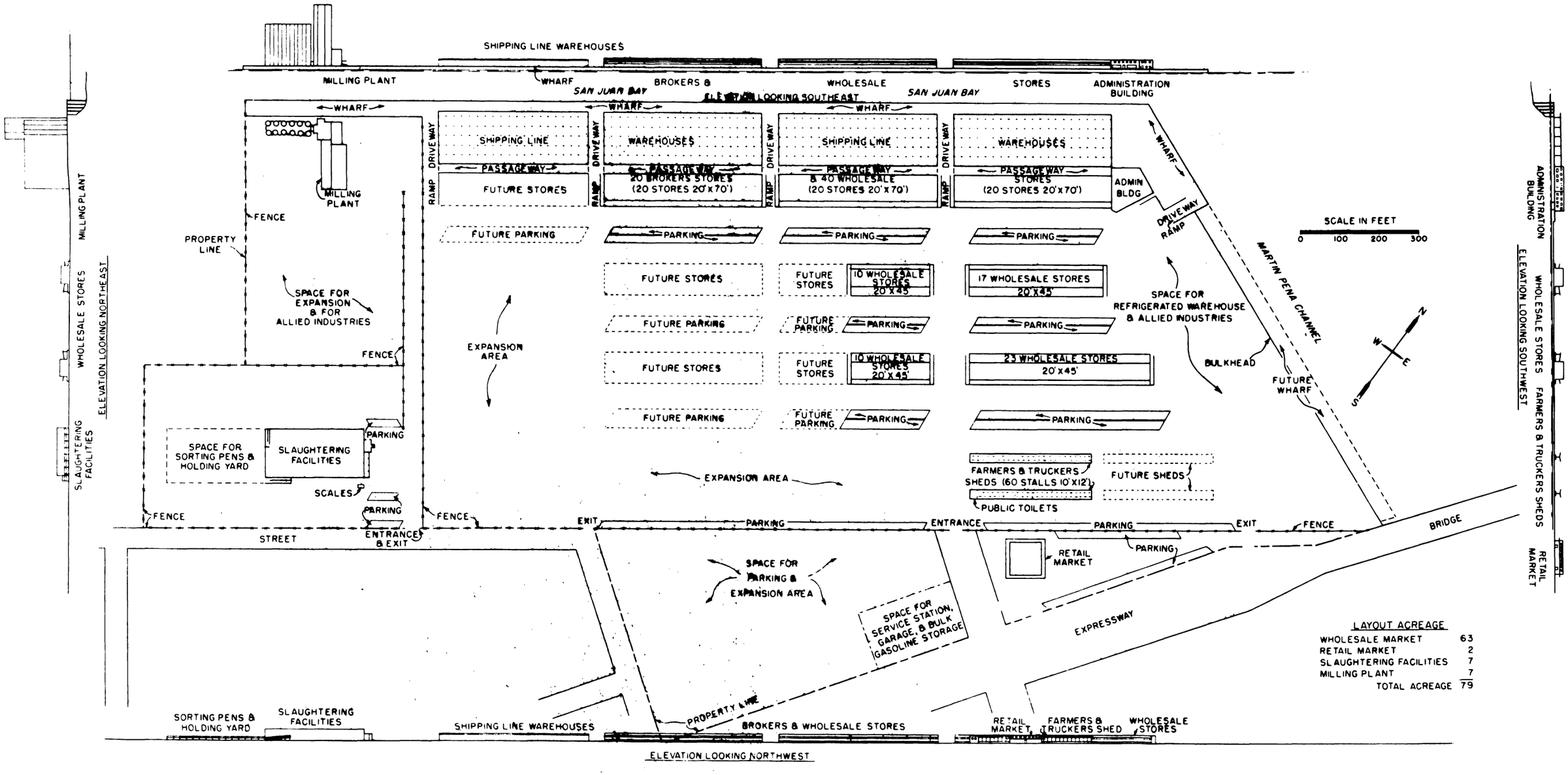


Figure 17.--Proposed arrangement of facilities for a wholesale market on a site southwest of Martin Pena Channel, San Juan, P. R.

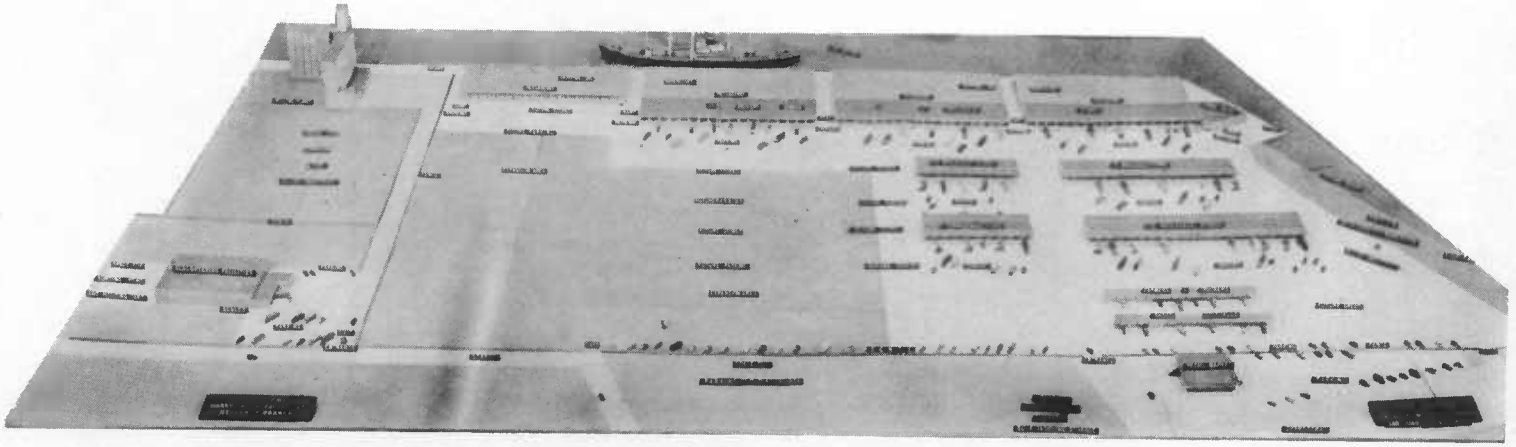


Figure 18.--Photographic view of a possible market layout on a site southwest of Martin Pena Channel, by use of scale models, San Juan, P. R.

The expansion area is so arranged that all kinds of the facilities recommended for immediate construction may be increased at a later date without disrupting the original arrangement of facilities in the market area. Also, as additional structures are built, the streets may be extended and parking areas increased to take care of the increased traffic.

954117 O—51——6

SELECTION OF A SUITABLE LOCATION

During the study of the San Juan market, consideration was given to the selection of a suitable site where all wholesale activities could be centralized. Very few of the brokers, wholesale dealers, or others concerned with the wholesale market business offered concrete suggestions in this regard. Because of the volume of boat receipts and shipments, however, a number of individuals suggested that the new market be as near as possible to the wharves, where boats could be unloaded directly into warehouses. This means that the market must be near water having a sufficient depth or at a point where dredging may be done to a depth sufficient to accommodate ocean freighters.

Factors to be Considered in the Selection of a Market Site

The people most directly concerned with the location of a new market are: (1) Buyers, both local and out-of-town, who come to the market for supplies; (2) sellers (both local and distant producers and shippers) who either bring or ship produce to the market; and (3) transportation agencies. In addition, the cities and municipalities of metropolitan San Juan have an interest in the location of the market because it affects zoning, traffic control, street and highway planning, and inspection for health and sanitation, and other public services. Likewise, agencies of the Insular Government have a definite interest in the location of the market because of their responsibilities for over-all planning for the entire Island.

In reaching a conclusion as to the most suitable place for a market the following eight principal factors should be considered:

1. Convenience to wharves. In 1949 more than 75 percent of the total receipts of food and related products in the San Juan wholesale market were received by boat. This large volume of boat receipts makes it essential that the site selected be adjacent to a wharf where ships may be unloaded directly into warehouses or buyers' trucks. The only location near San Juan suitable for the development of wharf facilities is on San Juan Bay.

2. Convenience to local buyers. About 55 percent of the produce handled is distributed within the metropolitan area to retail grocers, restaurants, hotels, and institutions. The ideal location for a wholesale market for the convenience of such local buyers would be at a point from which the average distance to their establishments would be the least, provided that suitable streets exist at that point.

The approximate geographical center for some 5,000 retail outlets in the metropolitan San Juan area would be immediately south of Martin Pena Channel near the intersection of the extension of Avenida Jose and De Diego, as shown in figure 19. This point is only a short distance from the approximate population center for metropolitan San Juan. 10/ If convenience for local buyers were the only factor considered, the market should be located at this point on Martin Pena Channel.

3. Convenience to out-of-town buyers. About 45 percent of all produce handled at wholesale is distributed to outlets outside the metropolitan area. According to wholesale dealers in the market, distribution is fairly uniform to all parts of the Island. Approximately 31 percent moves west; 15 percent, southwest; 30 percent, south; and 24 percent, east. With the exception of a small volume of produce moved by boat from San Juan to other ports, the entire distribution on the Island is by truck. This distribution pattern would indicate that the site most convenient for out-of-town buyers would be at a point about a mile east of Bayamon in the neighborhood of Roosevelt Road.

4. Convenience for motortruck receipts. Motortruck receipts of native products in the present wholesale market represent only a small part of the total business, but they are an important part of the market business. As the distribution system becomes modernized, the importance of local products should increase. Most of the native produce is hauled by independent truckers who come from every direction; farmers bring only a small part of the total. In fact, many of the supplies are brought to the market by the same trucks that haul imported supplies out of the city. Therefore, the point established as the most convenient place for out-of-town buyers is also the most convenient point for motortruck receipts.

5. A location that will avoid nonmarket traffic. The handling of produce necessarily involves the use of a large number of trucks because most of the merchandise is heavy and bulky. The normal movement of vehicles connected with the market business, even in a well-planned wholesale market, can be a serious problem. When other vehicles must move through the area, market traffic is seriously impeded. Therefore, it is important that a new market be in an area where it would be reasonably free from nonmarket traffic or where it could be fenced and nonmarket traffic entirely excluded. At the same time, the area should be accessible to major thoroughfares.

The movement of traffic in metropolitan San Juan is under study by the Puerto Rico Planning, Urbanizing, and Zoning Board, the Federal

---

10/ Based on data obtained from the Puerto Rico Planning, Urbanizing, and Zoning Board.

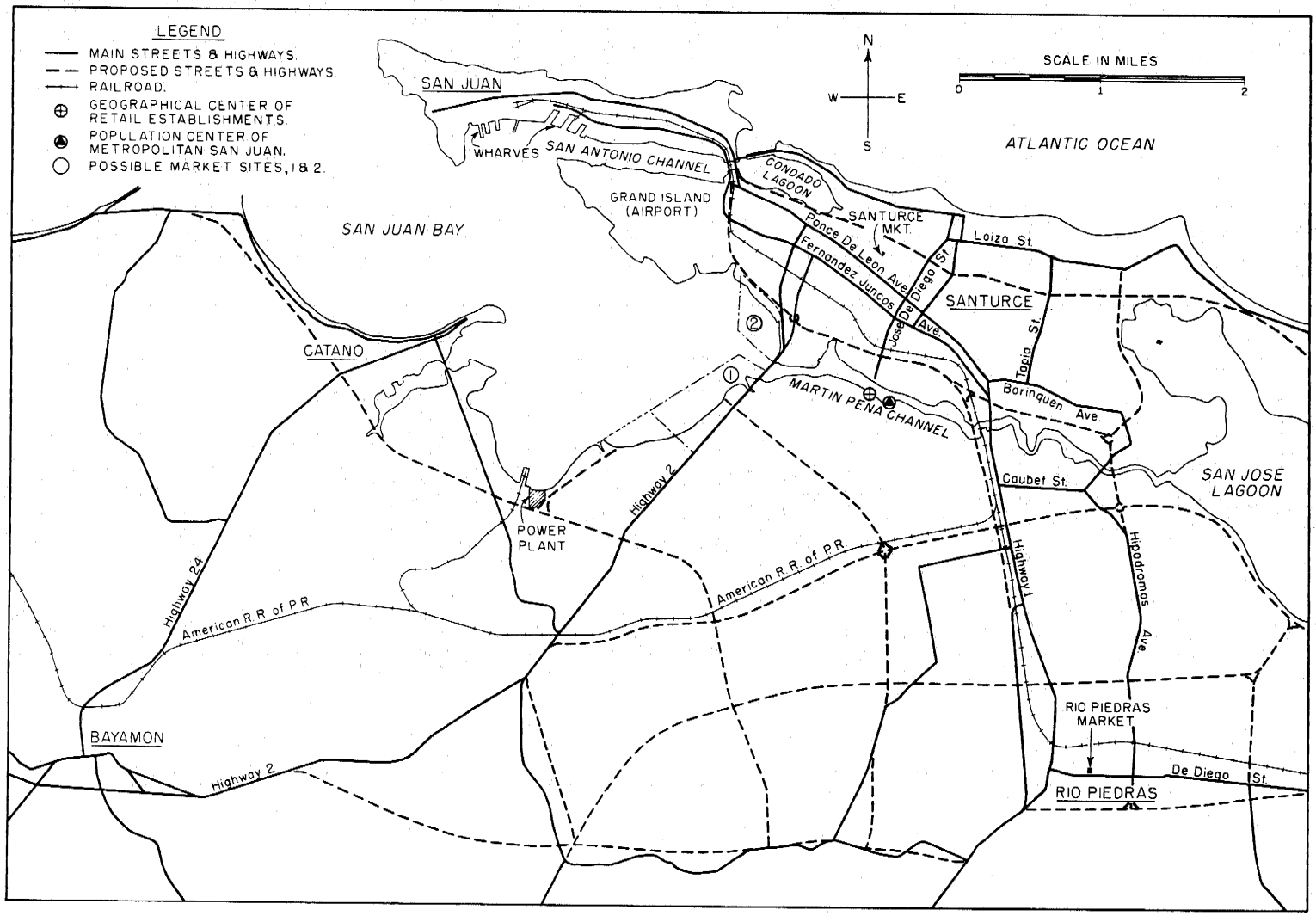


Figure 19.--Suggested market sites, present market areas, and geographical center of retail establishments of metropolitan San Juan, P. R.

Bureau of Public Roads, and other governmental agencies. Studies are being made and plans are under consideration for alleviating traffic congestion and improving parking in many areas. A system of circumferential highways around the south side of the city is almost completed. All these plans should be considered carefully in selecting a site for a new market.

6. Availability of land at a reasonable cost. The cost of land on which the market is to be developed, together with the cost of placing it in condition for construction, will have a direct bearing on the financing of the project and upon the amount of rental income necessary to amortize its total cost. It has already been shown that a large acreage and substantial wharf facilities will be needed. Therefore, it is essential that the land be obtained and wharves be built at a reasonable cost if the maximum benefits from the new market are to be realized.

7. Convenience for rail receipts or shipments. Although the railroad is currently hauling very little products moving into the market, with the consolidation of the market business it may be possible to make greater use of it than is now made in the transport of nonperishable commodities. Therefore, it would be desirable to locate the market at a point where trackage could be brought to it if it should ever be needed.

8. Convenience to labor supply. Convenience to labor supply for servicing the market must be considered because transportation costs are important to the average laborer, and certain parts of the area are not adequately serviced by public transportation at this time. Public transportation should be available to the entrance to the market.

Possible Market Site

Consideration was given to the utilization of the old wharf facilities and adjacent areas along the north side of San Juan Bay and in the south part of old San Juan. After studying the existing facilities in this area, it was decided that practically all of them would have to be razed in a market development. Because of land costs and the lack of adequate space in this area as well as its distance from the center of population, it was not given further consideration. A site north of San Juan on the Atlantic Ocean is impossible because of rock formation at this point.

In the course of the presentation of the preliminary report in San Juan during December 1950, it was suggested that consideration be given to the use of the present airport for a market development, since a new one is under construction. However, it is not known when the new

airport will be completed, or whether the old one will be available for another use. The old airport is owned by the United States Navy. It is built largely on land pumped in from San Juan Bay, and substantial commercial buildings, residences, and other developments are on it. From a preliminary survey it appears that few of the buildings could be used profitably for market purposes. The site is so situated on a neck of land extending into San Juan Bay that a bottleneck of traffic to and from the market area would result at Fernandos Juncos Street. It should also be noted that this site is surrounded by property zoned for light industry, and the market is not so classified by the Puerto Rico Planning, Urbanizing, and Zoning Board. For these reasons no further consideration is given to this site.

As shown in figure 19, only two sites adjacent to San Juan Bay offer a possibility for the development of an adequate market. One lies north and the other southwest of the mouth of Martin Pena Channel, and both border San Juan Bay.

These two sites are within the area that the Puerto Rico Planning, Urbanizing, and Zoning Board has recommended for development for industrial purposes. Its plan includes provision for streets, highways, and a new bridge over Martin Pena Channel. (See fig. 19.) Although the plan does not show it, the Puerto Rico Planning, Urbanizing, and Zoning Board anticipates relocating the railroad in the area southwest of the channel. The Government of Puerto Rico has begun to develop part of this site by building a power plant at the extreme southwest side. Moreover, some fill has been pumped from previous dredging operations into the area adjacent to this point, and additional fill has been hauled into the area. In the plans of the Board, the entire bay area, the part north as well as the part southwest of Martin Pena Channel, has been delineated and mapped, and plans have been formulated for dredging and building wharves. This report therefore is concerned with the selection of a section of an area that is already planned for development. A large part of the areas delineated is now covered by waters of the bay and Martin Pena Channel. Therefore, to locate a market with wharfside facilities will require the building of a bulkhead, wharves, and a substantial amount of fill behind the bulkhead.

Although there is sufficient land area available in either of the two sites, the site to the north of Martin Pena Channel is zoned for light industry, which would eliminate it from consideration unless the zoning ordinances were changed. The Insular Government owns practically all the site north of the channel and all of the site southwest of it. For these reasons only the site southwest of Martin Pena Channel is given further consideration.

This site, containing in excess of 800 acres, lies along Highway No. 2 to the mouth of the channel and runs southwest to the street approaching the new power plant. The entire area is free of buildings. The tract was formerly a swamp, but a part of it has been filled, since it is used as a refuse dump. Some of the area recommended for the site is covered by as much as 26 feet of water. Considerable additional fill would be needed to bring its level to about 10 feet above high tide.

The size of this tract makes it necessary to consider what part of it should be developed for market purposes. About 2 miles southwest of Martin Pena Channel is the new power plant, with wharf facilities. The bay at this point has been dredged and is accessible by boat. About 1,200 feet north of the proposed site is a dredged channel 30 feet deep and 400 feet wide. To develop the site immediately southwest of Martin Pena Channel would require dredging from this 30-foot channel to the proposed site.

In evaluating the location nearest to Martin Pena Channel in comparison with other locations in the 800-acre tract, it must be noted that this location is nearest to the geographical center of retail buyers, that it is on Highway 2 which is traversed by public transportation, and that out-of-town buyers and truckers hauling to the market would find it more convenient than any other site in this area. Therefore, other parts of the tract would not be as accessible as this one. Since the market will embrace most of the area available in the nearly rectangular tract next to Martin Pena Channel, there would be no need for traffic not related to the market business to come into the area. It could be easily policed and fenced. No thoroughfare would need to be maintained except for use of those connected with market business.

Insofar as could be determined, the cost of land at this location would not be greater than that at other points on the bay, but fill needed on any site would be an additional cost to the initial investment in the land. Since this area was used as a trash dump, less fill would be needed here than at other locations.

As pointed out previously, current plans of the Puerto Rico Planning, Urbanizing, and Zoning Board are to bring a railroad spur into this area.

On the basis of the foregoing, it is recommended that the area adjacent to Martin Pena Channel be used for the market in preference to any other location southwest of this channel.

MARKET DEVELOPMENT COSTS, OPERATING EXPENSES, AND SOURCE OF REVENUE

Estimated Cost of Site

The estimated cost of the land for the recommended site, including fill and grading, is shown in table 3. Although no one can determine the value of Insular Government property except that agency, a value of $1,000 per acre is assumed for purposes of this report. Real estate agents, the Puerto Rico Planning, Urbanizing, and Zoning Board, engineering firms in Puerto Rico, and other individuals aided in estimating the cost of acquiring and developing the site.

Table 3.--Estimated cost of land placed in condition to build facilities for the proposed market on the site southwest of Martin Pena Channel, San Juan, P. R.

Item	Unit	Total units	Unit cost	Total cost
		Number	Dollars	Dollars
Land	acres	65	1,000	65,000
Fill and grading	cu.yd.	1/890,435	.60	534,261
Total				599,261

1/ Based upon placing 65 acres in condition to build. Cost of fill might be reduced if the dredged material from the bay were placed on the site.

Cost of Buildings and Other Developments

The estimated costs of constructing the market buildings, paving and other recommended developments, as shown in table 4, are $4,146,773. These costs are based upon the estimated costs of labor and materials in the San Juan area for September 1950. 11/

Total Market Cost

The estimated cost of the land, including the cost of fill and grading, is $599,261. The cost of the buildings and other developments was estimated at $4,146,773, making a total of $4,746,034.

11/ Cost estimates used herein represent an average of estimated costs made available by the Puerto Rico Planning, Urbanizing, and Zoning Board, several local builders, an architectural engineer, and several others in San Juan.

Table 4.--Estimated cost of market buildings and other developments for a new wholesale market on the suggested site at San Juan, P. R.

Item or facility	Total units	Unit size	Estimated cost per unit	Total cost
	Number	Feet	Dollars	Dollars
Shipping lines' warehouses	1/	135x1580	-	2/1,106,000
Brokers' stores	20	3/20x86	12,000	240,000
Wholesale dealers' stores	40	3/20x86	12,000	480,000
Wholesale dealers' stores	60	4/20x81	11,500	690,000
Administration building (cu.ft.)	1	190,000	.80	5/152,000
Piling for buildings	-	-	-	600,000
Farmers and truckers' stalls	60	12x10	850	51,000
Retail market (cu.ft.)	1	82x86x18	.80	6/101,550
Public toilet building in farm sheds	1	20x24	-	7/2,500
Public toilet and locker room's fixtures in administration building	2	-	-	10,000
Floodlights and public address system	-	-	-	5,000
Paving (sq.yds.)	72,500	-	3.50	253,750
Storm sewers	-	-	-	28,000
Sanitary sewers	-	-	-	180,000
Fence (linear ft.)	3,500	-	3.50	12,250
Subtotal				3,912,050
Architect's fees (6 percent)				234,723
Total building and development costs				4,146,773

1/ Not divided into units. Can be sectionalized at the will of the shipping lines.

2/ Based on a cost of $7,000 per each 10-foot section. This figure includes cost of roof extending 10 feet over the wharf and 15 feet over the aisle on the opposite side of warehouse, making the total width of the roof 160 feet.

3/ Includes 16-foot front platform and mezzanine.

4/ Includes 24-foot front and 12-foot rear platforms and mezzanine.

5/ Includes partitions but not the equipment.

6/ Includes mezzanine, partitions, and outer arrangement.

7/ Includes the partitions.

There may be ways of reducing some of these costs. Fill and grading costs might be reduced by permitting free dumping by the city and others, and grading costs sometimes can be reduced by use of Government-owned equipment without charge. Paving costs might be reduced if the city or some other governmental agencies would assume part of the cost. This arrangement might be made, since the city now provides and maintains streets presently used for market purposes. The city or Insular Government could assist in developing streets at market entrances and exits and in improving those streets providing access to the market. Those who will undertake the building of the market should explore fully all possible ways of reducing construction and development costs.

Cost of Dredging, Wharf, and Bulkhead

The costs of the wharves and the dredging of the bay are not charges that should be levied entirely against a wholesale market development in San Juan. The wharves are public property and should be of service to passenger boat traffic and other public uses. Likewise, according to navigation laws, when the bay is once dredged, it is open for use to any ships. Because of the foregoing factors, the costs of these facilities are considered separately. Because of certain navigation regulations, any dredging and building of wharves and bulkhead will have to be undertaken by the Insular or Federal Government. The area to be dredged will include the area from the present 30-foot channel lying north of the recommended site to the market site itself (1,200 feet long by 400 feet wide) and along the front side of the market area and along the Martin Pena Channel side to a point 400 feet from the north corner of the site (2,130 feet long and 300 feet wide). 12/ Consequently, a total of about 1,120,000 square feet of the floor of the bay will need to be dredged to make the market fully accessible to ships.

Most recent surveys and soundings in San Juan Bay show that the areas where dredging will be needed are about 4 to 10 feet deep. On the average about 23 feet of soil must be moved to provide a 30-foot channel to the market area. On this basis, about 955,000 cubic yards of earth would have to be dredged and an additional 100,000 cubic yards would be moved in rounding the edges of the channel so dredged.

12/ The dredging for the 30-foot deep channel from the existing deep-water channel north of the site to the corner of the site would take care of 100 feet of the wharf frontage. An extra 100 feet is allowed on the Martin Pena Channel side of the market so that a ship can dock with its stern or bow extending beyond the end of the wharf. Therefore a total of 2,130 feet would have to be dredged.

As shown previously, about 2,130 feet of wharf 40 feet wide would be needed in the market area. At least the same amount of bulkhead would be required. Where no buildings are now planned along Martin Pena Channel, a simple rock wall could be used to retain earth fill.

The estimated cost of dredging, wharf, and bulkhead is shown in table 5.

Table 5.--Estimated cost of dredging, wharf, and bulkhead on the suggested site, San Juan, P. R.

Item	Unit	Total units	Unit cost	Total cost
		Number	Dollars	Dollars
Wharf	sq.yd.	9,466	4	37,864
Piling	pile	800	1/450	360,000
Bulkhead	linear ft.	2,130	150	319,500
Total		-	-	717,364
Engineering fees (6 percent)		-	-	43,042
				760,406
Dredging	cu.yd.	1,055,000	.50	527,500
Total cost				1,287,906

1/ Based on pile 45 feet in length in place.

Amortization of Investment Cost

The proposed market should be made self-liquidating by means of annual payments from market revenue. The length of the amortization period for such an investment depends on the length of the useful life of the facilities. For several reasons, it is possible to extend the financing of such a project over a long period and the financing of the cost of wharfage over an even longer time. First, the wholesale produce business is a stable enterprise and usually remains in a given location for many years. Second, the facilities recommended are of durable construction and should last, with only minor repairs and maintenance, for many years. The buildings also are flexible and can be converted, with only minor alterations, for use by different types of dealers. Third, since land generally does not depreciate in value over a period of years, it is possible in calculating the annual revenue needed to support the market to allow only for interest on the land and for amortizing the cost of the facilities constructed on it. An alternative to this approach would be to amortize both land and facilities, but allow a longer amortization period than would be necessary if only

buildings and other structures were being amortized. The annual revenue required for paying interest on the land and amortizing the facilities over a shorter period would be about the same as that required to amortize all the investment over a longer period.

For purposes of this discussion it has been assumed the entire investment would be amortized over a 40-year period. A 4-percent interest rate is used because it is not known whether the market will be financed by private capital or by the Insular Government. The latter could obtain money at a lower interest rate than that indicated.

The total cost of the development, including land and buildings but excluding dredging, bulkhead, and wharves, was estimated at $4,746,034. To amortize this investment over a 40-year period at 4 percent interest will require an annual payment of $50.52 per $1,000, or $239,770.

In addition to the market facilities, the cost of dredging, wharf, and bulkhead will have to be amortized. These costs, as shown in table 5, amount to $1,287,906. Presumably the operation of the facilities would be largely under the transportation authority of the Insular Government and would be operated along with other similar facilities now under its jurisdiction. There is no reason however why the investment cannot be amortized in 40 or more years. If liquidated in 40 years at 4 percent interest, the annual payment required would be about $65,065. The greater part of these costs is a direct charge against the market, but a smaller part of them is chargeable to passenger traffic and pleasure boats, fishing, and other kinds of ships that will stop at the wharf. For purposes of this analysis it is assumed that 90 percent of these charges, or $58,558, would be levied against the market and that the remainder would be collected from other users.

Estimated Annual Operating Expenses

It will be necessary to appoint an agency or group of businessmen to manage the market. Such an agency would be required to pay for maintenance, insurance, salaries, and other annual expense items. Estimates of annual operating expenses are shown below. They are based upon operating expenses as found in several markets in the United States, and adjusted as far as possible to conditions in San Juan.

Item	Estimated annual expense Dollars	
Salaries and per diem		
One market manager	7,500	
One assistant market manager	4,000	
Four market police	6,000	
One secretary-clerk	1,400	
One truck driver	1,500	
Four sweepers and shovelers	5,000	
One janitor	1,400	
Per diem and expenses of board members	1,000	
Total salaries and per diem		27,800
Other expenses and upkeep		
Depreciation on one truck	500	
Gasoline, oil, repair and truck upkeep	500	
Electricity	2,000	
Water	500	
Maintenance of facilities 1/	15,500	
Insurance	2,000	
Office supplies and printing	500	
Telephone and telegraph	400	
Miscellaneous expense	1,000	
Total other expenses and upkeep		22,900
Total expenses (excluding amortization and taxes)		50,700

1/ Based on ½ of 1 percent of cost of all structures and paving.

Taxes

It is not known whether or not the proposed new market would pay taxes on the same basis as any other corporation in San Juan, for the support of the services rendered by the taxing agency. If taxed the market corporation would be required to pay the tax rate for the municipality applied to the assessed value of the property. It is not known what the exact assessed value of the property would be, but it is understood that present assessed values are considerably below the actual sale value or cost of the property. Therefore it is assumed that the assessed value would be 75 percent of the cost of the market, not including land, 13/ fill and grading, streets, storm and sanitary sewers, and architectural and legal fees. The assessed value therefore would be 75 percent of $3,450,300, or $2,587,725. On the basis of the 1950 tax rate of $29.40 per $1,000 in Rio Piedras, the municipality in which the recommended site is located, the estimated annual tax would be $76,079.

13/ Land is not included for taxing purposes because the Insular Government owns it and presumably will continue to own it.

Total Annual Revenue Needed

The estimated total annual revenue needed to meet the cost of operating the market is shown in the following tabulation. In addition, sufficient revenue should be obtained annually to set up a reserve for contingencies.

Item of expense	Dollars
Amortization of market facility	239,770
Amortization of dredging, wharf, and bulkhead	58,558
Salaries and per diem	27,800
Operating and upkeep	22,900
Taxes	76,079
Estimated total annual revenue needed	425,107

Source of Revenue

The revenue from a market of the kind described would be obtained from rentals and fees charged individuals or firms for use of facilities and for space leased to other enterprises. On the basis of the annual cost of operation, plus a reserve for contingencies, it is believed that the revenue needed could be prorated to various groups operating in the market as shown in table 6. This allocation assumes that all buildings recommended will be built and that secure leases from reliable firms will be obtained before building commences. The reserve for contingencies should be sufficient, however, to allow from 5 to 10 percent vacancies and other charges.

The annual revenue required of the shipping lines amounts to $159,975, which sum represents a charge of about 40 cents per ton for the estimated 400,000 tons to be moved through the facilities.

The annual rental that would be levied on the 20 by 86-foot stores to be used by brokers and wholesale dealers would be $2,280 per unit. For this sum the broker or dealer would have the use of 1,400 square feet of inside first-floor space, 320 square feet of platform space, and 320 square feet of mezzanine office space. In addition, he would get other benefits which he does not now have. His patrons could back their trucks up to the store platform, where they could be directly serviced; they would also be provided parking space in the market area. Furthermore, he and his employees would be provided space for parking their cars.

Table 6.--Prorated annual rentals needed from facilities in the recommended market at San Juan, P. R.

Facility	Size	Annual rent-- Amount	Unit	Total rent
	Feet	Dollars		Dollars
Shipping lines' warehouses	135x1580	.75	sq.ft.	159,975
60 brokers' and wholesale stores at wharf	20x86	2,280	store unit	136,800
60 wholesale stores	20x81	1,980	store unit	118,800
Farmers and truckers' stalls				
60 covered	10x12	1/	stall	5,115
60 open	10x12	2/	stall	3,255
Retail market stands				
40 inside	8x9	144	stand	5,760
40 outside	8x9	132	stand	5,280
2 restaurants (estimated bid)				5,000
Office space				
18 brokers (sq.ft.)	4,800	1.80	sq.ft.	8,640
Others (sq.ft.)	1,500	1.80	sq.ft.	2,700
Passenger station				3,600
Space for service station (estimated bid)				4,000
Miscellaneous receipts				3,000
Estimated total annual revenue				461,925
Estimated annual revenue needed				425,107
Estimated reserve for contingencies 3/				36,818

1/ Rental estimated at 55 cents per stall per day with one-half occupancy on 310 market days.

2/ Rental estimated at 35 cents per stall per day with one-quarter occupancy on 310 market days.

3/ When the reserve fund reaches 25 percent of the total annual revenue needed, rents should be scaled down.

A dealer occupying a 20 by 81-foot store would pay an annual rent of $1,980, for which he would have the use of 900 square feet of inside first-floor space, 480 square feet of front platform, 240 square feet of rear platform, and 300 square feet of mezzanine office space. Each dealer would have similar additional benefits as a user of a larger store.

Rentals from farmers and truckers' sheds are estimated on the basis of an average charge of 55 cents per stall per day for covered stalls and 35 cents for open stalls. Truckers could be charged a higher rental than

the rates charged farmers, because truckers deal in a wider variety of products, use larger trucks, and do business on a more nearly wholesale scale than do farmers. Sometimes truckers use stalls for selling as well as for buying and assembling products.

The rental for stall space in the retail market is based upon an annual rental of $144 per stall inside the building and $132 for outside stands.

The restaurant space is based upon an annual rental of $2,500 for each restaurant. This charge, because of the service required, is slightly higher than is made dealers who use similar facilities. However, the leasing of the restaurant space should be on a bid basis, and the rental to the highest bidder may be higher or lower than that shown.

Rental for office space is based upon an annual rate of $1.80 per square foot. An office containing 250 square feet, for instance, would rent for $450 annually. This charge would cover janitor and other services.

The lease for the service station would cover space only. This space could be leased on a bid basis, and the firm with the highest bid would build its own facility. The lease would need to be on a long-term basis, because the lessee would be placing a permanent structure in the area. The building design and arrangement should be subject to the approval of the market management. The lease for a service station may be let on a flat annual fee or on a flat annual fee plus a percentage of the gross sales. In either case the rental from the space leased should be sufficient to amortize the investment in land and pay for services rendered.

Some income may be received from such other sources as advertising, rental of space for meetings, shows, and fairs, but no fees should be charged buyers for entering the market or for using parking space and facilities in procuring supplies. Everything should be done to encourage buyers to come to the market.

The Insular transportation authority makes a dockage charge at this time for boats that stop at its wharves. No income from such charges is included herein because (1) the charges for handling the products moving through the market would be assessed against the tonnage, and (2) the income from this source on products not moving through the market, and for pleasure ships, fishing boats, etc., will be needed to amortize the 10 percent of the cost of the wharves not assessed against the market.

No income is shown from the leasing of space in the market area for facilities that may be built in the future, such as refrigerated and other types of warehouses, because it is not known at this time what such income would be or when it would begin.

954117 O—51——7

ALTERNATIVE USES FOR LAND AND FACILITIES IN EXISTING MARKETS

In the relocation of a wholesale produce market, it is appropriate that consideration be given to alternative uses of land and facilities now being used for market purposes. This problem is of concern to owners of present market property. Experience in many cities has shown that there are opportunities, through the use of proper planning, for utilizing advantageously most of the land and some of the existing facilities when a market is moved. The mass movement of the market business to facilities in a new location makes available a substantial amount of property, which increases the opportunity for profitable redevelopment.

In San Juan most of the present market property and the areas where ships now dock are in the hands of private owners. The property used by the shipping lines is owned largely by those lines and partly by the Insular Government. Undoubtedly it will continue to be used as at present, except that most of the unloading and loading of produce and related products will be discontinued at that point. Removal of the produce business will make it possible for the shipping lines to handle, more economically, other types of merchandise than they now do--for example, sugar, automobiles, refrigerators, and other imports or exports. Most of the shipping lines need more warehouse and wharf space. The building of a new market would remove the need for them to spend money for such space. The private property used for handling produce in the area could be converted to many other uses. If an industry could be developed in the area of a type that could use multiple-story buildings advantageously, the rental return per square foot of land might be enhanced by converting the buildings to such industrial uses. In the long run apartments of four or more stories should give a greater return per square foot of land than were the buildings used for produce where first-floor use predominates. Through the use of zoning and proper planning the area might be redeveloped into a higher yielding rental area than is now the case.

The city of Santurce has its market, and near the market privately owned property is used for produce. Other privately owned facilities are scattered over a wide area toward old San Juan. The property owned by the city could be disposed of in several ways. The city could prohibit wholesaling in its market building and on public streets but continue the retail market operations. For a good retail market, off-street parking space would be needed, so for that purpose it might be necessary to tear down some of the poorer buildings now being used for wholesaling. An alternative would be for the city to convert its market property into a recreational center. In this event it should provide a parking area adjacent to the center.

The problem of redeveloping property in current use for market purposes at Rio Piedras is somewhat simpler than for the other market areas in metropolitan San Juan. Rio Piedras, in recognition of the market defects, has plans for rebuilding its retail market in a new location. The present market is in the central part of the city, where the principal department stores are and land values are high. The market building is old. In the Rio Piedras market, therefore, all market business could be discontinued at and near the present market. The city-owned land and buildings could be converted into parking areas, and streets could be widened. The opening of this congested area would make the remaining area a better place to conduct business. If the city proceeds with its plans to build a new retail market, it should zone the adjacent area for purposes other than wholesale produce market operations. The city, however, probably should delay such action until the new wholesale market is built.

Since the recommended market would be in the municipality of Rio Piedras, the city would receive tax revenue of about $76,000 annually. Therefore, there would be little need for it to build a new retail market for the purpose of obtaining revenue, because the amount that would be derived from the wholesale market would exceed any net amount it now obtains.

The problem of how to re-use the land and facilities currently in use for market purposes cannot be solved here. However, the above suggestions are made in order to show how the problem might be solved. The solution will be the responsibility of the Insular Government and of the cities and individuals involved.

WHO SHOULD BUILD AND MANAGE THE MARKET

A new wholesale produce market could be built, financed, and managed by: (1) A private corporation for profit, (2) a private nonprofit or limited profit corporation, (3) a public nonprofit corporation, or (4) a governmental agency.

Markets have been constructed, financed, and managed by private firms for profit. This type of corporation is not recommended for San Juan because the board of directors and management of such corporations generally do not engage in the market business, and experience has shown that generally most of these corporations are interested chiefly in revenue and not in the needs of those doing business in the market. Because, for proper functioning, dealers must be located in one area, wholesale market facilities, when once established and fully occupied, exist for a long time and are difficult to move. Under these circumstances a private corporation could increase rents without too much concern as to the possibility of tenants moving from the market. Also, the market management might put into effect undesirable rules and regulations or fail to operate the market in a satisfactory manner.

A private nonprofit or limited-profit corporation 14/ can be created to construct, finance, and manage a produce market. During the survey the type of agency that might build and operate a market in San Juan was explored. It is believed that a private nonprofit corporation could not be formed because of the lack of interest in such a method of financing among the various people doing business in the market. However, if this type of corporation were used, its charter should embody the following features:

(1) All interested groups operating on the market should be represented on the board of directors.
(2) Profits of the corporation owning the facility should be limited to a fixed amount or eliminated entirely.
(3) A continuing organization should be provided.
(4) Ownership of the corporation should always be retained by operators in the market.
(5) For the benefit of the city and community, taxes should be paid.
(6) If possible, the city or Insular Government should be represented on the board of directors.

14/ A limited-profit corporation is one in which earnings on the investment are fixed at a given percentage. For example, earnings may be fixed in the corporate charter at not to exceed 5 percent, or at any other rate of percentage.

A nonprofit public benefit market corporation is created by legislative action. This type of corporation offers many desirable features not found in most other types of management. Some of these features are:

(1) It permits all interested groups to participate in building, financing, and managing the market.
(2) It is definitely nonprofit-making because, when properly created, rents cannot exceed the amount needed to pay the cost of operation, amortize the investment, and maintain a limited reserve for contingencies.
(3) It establishes a continuing organization.
(4) It gives some representation on the board of directors to governmental agencies interested in the wholesale market.
(5) It does not place a burden on taxpayers of the community in which it is established.

Some markets have been financed, built, and operated by a city or other governmental agency. A number of cities in Puerto Rico and in the States operate public wholesale and retail market places. The chief problem of city financing and operation is that persons from outside the city, who are served by the market, may not receive full consideration because they have no voice in the city government. In addition, since the market services producers and consumers over a wide area, many city officials feel that they should not take the full responsibility for providing market facilities. Some cities have reached the limit of their bonded indebtedness and cannot obtain money to build a wholesale market, even though rents would amortize the loan.

Insofar as could be determined, appropriate legislation for the creation of a nonprofit public-benefit corporation has not been enacted by the Government of Puerto Rico. Because of the interest of that Government and of the people in the improvement of marketing and distribution, it is believed that it would be possible to enact the needed legislation for the creation of a market authority or nonprofit public-benefit corporation to undertake the building, financing, and managing of the market.

It should be pointed out that the Insular Government has authorized agencies, such as the Puerto Rico Agricultural Company and the Puerto Rico Industrial Development Company to perform certain functions, and it is believed that either of these two could build, finance, and manage the market. The use of an existing governmental agency would make it possible to put the plan into effect without delay, and the expense connected with the establishment and maintenance of another governmental agency could thus be eliminated. Of course, the responsible officials

would need to recommend and approve the project. With respect to a market authority, considerable delay in its creation might be encountered in the legislature. The plan for building, financing, and management could be the same whether existing governmental agencies or a new corporation were designated to do the job. The Puerto Rico Industrial Development Company has had experience in the building, financing, and management of more than 100 new industrial companies. Since a market project is closely related to agriculture, consideration might be given to placing the management in the hands of an agricultural agency. Under either method the ultimate owner of the market would be the Insular Government.

It would be expected that a market owned by the Insular Government could be financed largely through appropriations or the borrowing of funds for this specific purpose. Private funds might be obtained by the corporation with the guarantee of the Insular Government or of an agency of it. It would be desirable to secure from the users of the market a certain amount of the total funds required. This might be done by obtaining an advance in rental payment or its equivalent in surety bonds. If 6 months' rental were collected in advance, when leases are signed, about $200,000 could be raised.

Regardless of which governmental agency undertakes the market development, an advisory board of not more than 17 nor fewer than 9 members would be needed to aid the Insular Government in carrying out its responsibilities. From such a group the governmental agency managing the market could find out how to improve service on the market. This board, because of the island-wide service the market would give, could consist of several farmers, wholesale dealers representing various lines of commodities, and brokers, a retail dealer, a consumer, a transportation representative, and possibly a representative of the Insular Department of Agriculture and Commerce and one of the Agricultural Extension Service. Of course, the final decisions with respect to activites on the market would remain in the hands of the governmental agency in charge.

The members of the board or the governmental agency would not be able to give full time to details of the operation of the market. Therefore, they should employ a competent manager to carry out their wishes and act for them in managing the market. The management of the San Juan market would be a substantial business undertaking. The person selected as manager should be one who would be capable of making the market a success. His responsibilities would be much greater than the mere collecting of rentals and overseeing of employees. He should see that everyone doing business in the market receives full benefit from its operation. He should play a very important part in bringing in new business, in assisting producers in growing the type and quality of produce needed, in encouraging retailers to move seasonal surpluses, and in finding new sales outlets for the produce handled.

The market manager should also be responsible for liaison between all people on the market and other agencies that might be able to make contributions to its improvement and success. This responsibility would involve relationships with the city, Insular Government, retail organizations, and Federal agencies interested in the market, and with local groups and other organizations concerned with the wholesale produce business. He should make every effort to bring to the market new and improved technological developments as soon as possible. To do this, he would have to keep himself well informed on the subject of marketing and on all the new developments that might affect the market business.

POTENTIAL BENEFITS FROM A NEW AND MODERN MARKET

The most important reasons for developing a new wholesale produce market in San Juan, as in any other city, are to reduce the cost of distributing produce and to increase the volume and improve the quality of products reaching the consumer. An improved market would give producers over the entire Island greater opportunity to sell their products from their farms, which in turn would benefit the consumer and the entire economy of the Island. Before undertaking a market development it must be determined as accurately as possible what savings over the cost of present operations, if any, could be realized.

Possible Savings in Certain Marketing Costs of Sellers

In the course of the study special attention was given to those items of cost incurred by wholesale dealers, brokers, truckers, farmers, shipping companies, and others doing business in the market that are affected by the facilities for marketing. Each person interviewed was asked to furnish data on some of his annual costs. These are summarized in table 7. It should be emphasized, however, that these costs are not intended to show the total cost of doing business, since some of the important items, such as the cost of operating trucks and salesmen's cars, certain taxes, insurance, and many other expenses are not included.

In addition to the tangible savings discussed in this chapter, a number of other savings that cannot be measured with any degree of accuracy would be made. For example, the same volume of business as at present could be handled with fewer man-hours, through well-designed wharf facilities, warehouses, dealers' stores, and farmers and truckers' sheds when ample streets and parking areas are available. The installation and use of new types of handling equipment might well add to the savings in a new market.

Savings to Wholesale Dealers

The present rental of $156,780, as shown in table 7, is that reported by the 89 dealers for the space they now use. The estimated cost of rent in the proposed market amounts to $210,000. This amount represents an increase of $53,220, or 34 percent more than the rents they are now paying.

Cartage is a major cost in the handling of produce in the present market. Not all wholesalers maintained records of these costs, so complete data could not be obtained. About two-thirds of the 89 dealers reported a hired cartage expense of $155,693 for produce moved into

Table 7.--Estimated annual savings in certain present costs of 89 wholesalers and 30 brokers from operating in a modern market at San Juan, P. R.

Item	Estimated present annual cost	Estimated annual cost in proposed market	Estimated savings
	Dollars	Dollars	Dollars
89 wholesale dealers:			
Rent of stores and offices	123,120	210,000	
Rent of other warehouse space	33,660	-	
Total annual rent	156,780	210,000	-53,220
Cartage	233,540	77,845	155,695
Loss by theft	125,000	41,670	83,330
Loss by spoilage and deterioration	250,000	83,330	166,670
Subtotal	765,320	412,845	352,475
30 brokers:			
Rent of offices	81,330	8,640	
Rent of warehouse space	1/9,830	45,600	
Total annual rent	91,160	54,240	36,920
Cartage	33,750	11,250	22,500
Loss by theft	85,000	28,330	56,670
Loss by spoilage and deterioration	168,750	56,250	112,500
Subtotal	378,660	150,070	228,590
Estimated total savings	1,143,980	562,915	581,065

1/ Data incomplete.

their stores. If the remaining third had cartage costs in the same proportion, the total cost for all 89 dealers would be $233,540. On the basis of the average cartage cost per package of 7½ cents which dealers reported, this figure appears to be reasonable. Although the many commodities handled vary greatly in size and weight per package, very few packages exceed 100 pounds. For instance, a case of eggs weighs approximately 60 pounds; most cases of canned goods weigh around 50 pounds; and toilet paper, cigarettes, and certain other commodities are light in weight per package. If the weight of 100 pounds is used, the cost of cartage per ton would be $1.50. This figure is conservative, since most truckers operated on contracts from $2 per ton and higher in 1949. At the rate of $1.50 per ton, the total cost of trucking the 135,000 tons handled an extra time and at a higher rate in the present facilities as compared to the facilities provided for the 89 dealers would be at least $200,000, and this without allowing for the double trucking among stores and warehouses used by dealers.

In a consolidated market there would be a substantial reduction in cartage because all wholesale store facilities would be either next to the warehouses on the wharves or near enough to them so that all imported merchandise could be moved directly to dealers' stores by use of the trailer carts now in use by shipping lines. However, a small allowance should be made for the movement from brokers' warehouses, public cold storage warehouses, and large wholesale dealers' stores to the smaller dealers' stores that service buyers. On the basis of the data available on this intramarket movement, it is conservatively estimated that two-thirds of the present cartage cost, or $155,695 could be saved annually.

Because existing facilities of dealers are in several areas, on public streets, and where the business cannot be supervised properly at all times, loss by theft is a sizable cost of doing business. The dealers reporting such loss stated that an average of ¼ of 1 percent of the volume handled was lost. This loss, according to studies made in some markets in the States, is relatively low. As a matter of fact, the reported loss in San Juan was found to be less than half that found in some of these markets. It is believed that in many instances the loss is charged to the shipping companies; or this lower rate of loss may be accounted for by incompleteness of dealers' records. On the basis of the average loss of ¼ of 1 percent of the value of the reported volume handled by the 89 dealers, $50,000,000, or two-thirds of the total business done by wholesale dealers--the total annual loss by theft amounts to about $125,000.

In the new market each of the 89 dealers would be provided office and warehouse space in one building; additional space on the mezzanine would afford offices from which his business could be readily supervised. Loss by theft should be held to an absolute minimum. Although it is not expected that theft would be entirely eliminated, it reasonably may be assumed that two-thirds of the present loss by theft, or $83,330, could be prevented. In the stores of many dealers, where the market is policed, theft loss may be almost entirely eliminated.

Loss through spoilage and deterioration because of lack of proper facilities is a major item of the cost of dealers. The 89 dealers reported ½ of 1 percent loss resulting from such causes. It should be pointed out that many of the highly perishable items, such as meat, poultry, and eggs, that are imported have been in transit under refrigeration for long periods before arriving in San Juan. Consequently, the added exposure due to extra trucking, improper handling, and lack of good warehouse facilities is a serious hazard to the quality of the produce and increases losses by spoilage. On the basis of the reported loss of ½ of 1 percent, the loss on the $50,000,000 annual business of the 89 dealers would be $250,000. Again, this figure is lower than that reported in many cities in the States, and there is no doubt that some of the losses may be charged to the shipping line or to the original consignee, and that in many cases it is passed on to the buyer.

Since better warehouses and stores would be provided near the wharf for the 89 dealers, the loss through spoilage should be reduced substantially. Moreover, the products would be much less exposed to the continually warm weather, thus reducing the opportunity for spoilage. For these reasons it is anticipated that about two-thirds of the present loss by spoilage and through handling damage and discounts, or $166,670, could be eliminated in the recommended market. These annual savings could be increased if dealers adopted the use of pallets, skids, and wheel-type equipment, and installed cooler space in their stores for handling the more perishable items.

The cost of rodent or insect infestation is not shown in the report. In many instances weevils infest beans and other grains and rodents make holes in bags of rice, beans, and other cereals so that a pound or more of the product is lost before a bag can be sold. The cost of these losses is passed on to the retailer, and he, in turn, passes them on to the consumer by increasing the price. It is generally agreed, however, that the producer, wholesaler, and retailer also share in such losses.

It is estimated that the total annual savings for the 89 dealers for whom stores are provided in the proposed market would be $352,475, after allowing for the increased rent.

Savings to Brokers

Table 7 also shows the present costs, estimated costs in the proposed market, and estimated annual savings to be realized by brokers. The present rental for office and warehouse space is calculated on the basis of its cost per square foot being comparable to the cost of office space used by others in San Juan, and the cost per square foot of warehouse space being comparable to the cost of similar space used by the 89 wholesale dealers. In most instances brokers use warehouse space in more desirable locations and office space of better quality than was used by wholesale dealers.

The annual rental cost of office space used by the 30 brokers is estimated to be $81,330, and the annual cost of the warehouse space $9,830. The latter figure is not the absolute total, because many dealers failed to give complete information on the total amount of warehouse space used. The data on space used in offices are fairly complete. The rental needed from the 30 brokers in the proposed market for office and warehouse space at the wharves would be $54,240. This amount is $36,920 less than the estimated rental they now pay.

In the present market brokers who use warehouse space have cartage costs. It is estimated that the 30 brokers truck annually at least 22,500 tons of produce from wharves to their warehouses for redistribution. This tonnage applies only to the receipts on which a truckage charge is paid, and it does not cover the brokers' cost of trucking exports from the warehouse to the wharves. The cost of trucking the 22,500 tons at $1.50 per ton would amount to $33,750 annually.

In the new market it would appear that practically all of the present cartage cost between wholesalers could be eliminated, except the movement into and out of public cold storage facilities. On this basis it is reasonable to assume that cartage cost in the proposed market would be only one-third of such cost in the present market, or $11,250 annually. Thus, an annual saving of $22,500 in cartage cost should be realized. In all probability this cost could be reduced further by proper management and the use of pallets with mechanical trucks. The brokers could deliver produce direct to public cold storage from wharves and from such storage to buyers' vehicles, in this way practically eliminating the need for cartage on the products handled.

The business of brokers is subject to the same losses which prevail in the business of wholesale dealers. Because their offices are farther removed from the location where the products are handled, they give less supervision in most instances than do wholesale dealers. If it is assumed that the business the 30 brokers do on a rehandling basis,

which has a value of $33,750,000, is subject to the same rate of loss by theft as the wholesale dealers ($\frac{1}{4}$ of 1 percent), the annual loss would be about $85,000. It could be expected that loss by theft would be reduced to a minimum in the proposed market because brokers would have all their operations consolidated in one place. They should be able to reduce theft by an amount at least equal to that estimated for wholesalers. The estimated theft in the proposed market therefore would be about one-third of the present loss, or $28,330, which would bring the annual savings to $56,670

The physical facilities used by the brokers have the same general defects as those of wholesale dealers. Accordingly, loss by spoilage, discounts, and improper handling and facilities should be about the same. During the study brokers reported these losses at $\frac{1}{2}$ of 1 percent. On the basis of the volume of business not disposed of at docks direct to buyers, the value of which is $33,750,000, the annual loss on the volume handled would be $168,750. The annual losses by spoilage and through discounts and damages due to extra handling and improper facilities also should be reduced to a third of the present cost. The annual savings for these items therefore would amount to $112,500. This annual saving might be increased if brokers adopted the use of proper mechanical handling equipment and installed a sufficient amount of cooler space to store the volume of perishables handled.

The total estimated annual savings to be realized by the 30 brokers for whom facilities are recommended would amount to $228,590.

Savings to Truckers

A number of savings could be realized by the truckers who would do business in the market and by commercial trucking concerns hauling on contract. As previously stated, independent truckers haul products to the market and pick up products for transport to points on the Island.

It is estimated that in excess of 50 trucks daily haul products for delivery direct to the present markets about 300 days per year. The location of the recommended market near Martin Pena Channel would save truckers on an average of at least 10 minutes of travel time in getting to the market. Since the truckers visit one or more market places to pick up supplies for the return trip, there would be a saving in the loading of supplies for travel out of the city. Most of them pick up these supplies from wholesale dealers and brokers in old San Juan. They must travel a greater distance than if the market were on the south or east side of San Juan Bay, and they are generally delayed in traffic through the downtown area. It is estimated that on each trip truckers could save at least 20 minutes in picking up

their supplies and traveling out of the city. These 50 truckers therefore could save a total of 30 minutes per trip. On the assumption that the hourly value of both man and truck is $1.75, the loss of these truckers for 300 market days or 5,000 hours per year is $13,125.

The space provided truckers on the proposed new market for display and sale of products or for assembling products for transport to other points on the Island is a substantial improvement over what they are now using in the Rio Piedras and Santurce markets and on public streets. Although it was not possible to determine the actual rental for space in present use, it is estimated that it is at least $5,000 annually. In the proposed market a total annual rental return of $8,370 would be needed from facilities offered farmers and truckers--about two-thirds of it, or $5,600, from truckers and the remainder from farmers. Consequently, for the space offered it is estimated that the truckers (applicable largely to 30 of them) would be required to pay only $600 more a year than the rents they now pay. It has been estimated that truckers would save $13,125 for extra travel and time; therefore their net saving would be $12,525.

Savings to Farmers

It was not possible to determine the number of farmers coming to the various market places in metropolitan San Juan or the amount they paid for space and services in the sale and distribution of their products. Therefore, possible savings to farmers on the new market are not estimated in this report. It should be pointed out, however, that the farmer who brings products to the market daily would save time and travel in the city just as would the trucker.

A saving also could be realized by producers all over the Island on products delivered for export. By unloading the products on the south side of San Juan Bay rather than on the north side, miles of travel would be avoided. This saving would apply to pineapple producers, both of the canned and fresh product, and also to producers of other fresh and canned fruits and vegetables, all of which products are trucked to San Juan.

The greatest benefit to producers, of course, would be from the increased volume of sales of local produce. This factor should not be overlooked because it affects producers of all kinds of products in all parts of Puerto Rico. Undoubtedly many retail buyers who go to wholesale stores in San Juan to pick up shipped-in staple commodities would buy locally grown products for resale if they could do so without going to another market place. Consumers in Puerto Rico, as in other markets, enjoy fresh fruits and vegetables produced locally in season.

If supplies were available in the retail establishments near their residences, they would eat more of them, since they are usually lower in price. Moreover, restaurants, hotels, and similar institutions in metropolitan San Juan would probably use local products daily in larger volume. Locally produced oranges, grapefruit, and many other fruits are produced in Puerto Rico, and since they are tree-ripened and of good variety, their quality is excellent. There are no banana-ripening rooms in metropolitan San Juan, so most bananas are sold when they are green and never obtain a deep yellow color. An order for orange juice in a public eating establishment often brings a serving of canned orange juice produced in the States. Likewise, vegetables, root crops, and leafy-type vegetables are produced in abundance, but many additional supplies of these products are imported.

The proposed new market would consolidate in one location a large variety of locally produced products where buyers of all kinds would be able to obtain their requirements. Such outlets should encourage farmers to increase production and result in their finding wider sales.

Savings to Shipping Companies

The savings to shipping lines cannot be measured because of the lack of information on the rentals they pay for their present facilities and on their handling costs on the proposed market. However, some of the advantages and problems that these companies will encounter in operating on the new market are pointed out in following paragraphs.

Although the shipping companies are not sellers or buyers of the commodities handled in the market, they are very important factors in the hauling of about 75 percent of those commodities. Several shipping companies have practically no facilities in which to do business, and are operating in temporary facilities. The shipping lines with facilities find it necessary to pay overtime and make various temporary arrangements in order to handle their present volume of business. Although several shipping companies have questioned the extra cost of moving ships from one side of San Juan Bay to another, as would be necessary when the new market was operating, some of them are now moving their ships to two or more locations because of the lack of warehouse space at one berth to take care of their total tonnage. The greatest concern of the shipping companies with respect to the extra movement of ships is whether all the perishables and other grocery items that will move through the port of San Juan will be unloaded in the recommended market or whether some will be unloaded at the old wharves. If all the brokers, wholesalers, and others who indicated an interest in moving to the market actually do so, about 70 to 80 percent of the business in the proposed market would be assured.

The more efficient operating conditions in the proposed market as compared to the old one probably would induce the remaining dealers in these products to come there. In this way, the chief problem of the shipping companies might be worked out in a satisfactory manner.

Another problem that the shipping companies will face is one brought about by the commingling of lots of commodities in loading a ship. This problem is aggravated by the fact that in loading the weight must be distributed and deliveries of all kinds of products for shipment are received while the loading operation is being completed. Of course, shipping lines usually know 24 hours in advance of loading what the cargo will be. Many shipping lines have the same problem of lot commingling with respect to their unloads in San Juan, Mayaguez, and Ponce. Some lines have three stops in Puerto Rico as well as other stops in the Caribbean and Central American area. In order to reduce this problem the shipping lines are allowed additional warehouse space in the proposed market for supplies that must be lifted from the ship in order to get to the supplies consigned to the market. Furthermore, there is plenty of land available in the vicinity of the proposed market to which additional commodities, such as automobiles, tractors, lumber, and refrigerators, could be moved if insufficient space is provided on the wharves.

If plans for removal of the railroad line from old San Juan materialize (a part of it is now being removed), and if the warehouses for sugar, tanks for storage of molasses, and other industrial operations are moved to the south side of San Juan Bay as planned by the Puerto Rico Planning, Urbanizing, and Zoning Board, most shipping lines will have to stop near the proposed market. There is nothing new therefore in the suggestion that the movement of wholesale food and related products in and out of San Juan be conducted on the south side of San Juan Bay. Already there are facilities in this area for the handling of oil and army supplies, and the facilities of the Water Resources Authority are located there.

As pointed out earlier, the rental charge for the facilities of shipping companies during the first 40 years will amount to about 40 cents per ton of the products handled, or $160,000 annually. The present cost of handling a ton of merchandise (not including rent and certain other charges) ranges from 40 cents to $1.20. If the congestion in present warehouses could be reduced by shifting some of the products stored to the recommended market, more efficient operations would be possible in all areas. The day-to-day savings thus made might offset the objections to the move that would have to be made to service the new facilities.

Savings to Buyers

The proposed market would be of material benefit to the 5,000 retail outlets in the metropolitan area and to the thousands of wholesale and retail outlets over the entire Island. It would consolidate in one market area all the products needed by these buyers, thus saving them extra travel to several market places and time in making purchases. Also, they could compare prices and quality, which would result in some monetary savings. Of major importance to retail buyers would be the opportunity to offer a wider variety of products to consumers. It is not possible to place a monetary value on such benefits.

A market on the south side of the bay would save buyers miles of travel in heavily congested traffic areas. Although a few of them might be required to travel farther than they do now, buyers as a group should be able to save an average of at least 20 minutes of travel per day by the change in market location. It is estimated that in excess of 600 buyers come to the market daily, which means that in the 300 working days of a year they make more than 180,000 trips. If 20 minutes could be saved on each trip and the time of a buyer and his vehicle is valued at only $1.25 per hour, buyers could save 60,000 hours, or $75,000 annually.

Savings in Retail Market

No savings are expected in the retail market. The rental requested from those who would use stall space would be about the same as the rental they are now paying.

Estimated Total Savings to be Realized by Building the Proposed Market

The total savings from all sources, as shown in the following tabulation, are estimated to be about $650,000. These savings are over and above the costs of paying for the market, for interest and principal, and for maintenance and operation. Thus, it may be seen that the building of the proposed market would be a good financial proposition for Puerto Rico.

Savings to--	Dollars
Wholesale dealers	352,475
Brokers	228,590
Truckers	12,525
Buyers	75,000
Total estimated savings	1/668,590

1/ Not including savings which could be realized by the reduction in time of salesmen, officers, and administrative employees by the shortening of market hours.

Other Benefits

As has been pointed out, all of Puerto Rico is served by the market in San Juan, consequently, any benefits derived from building a market would be shared by everyone on the Island. The various governmental agencies would benefit because a new market would make possible the closing of several unsanitary market places in metropolitan San Juan and permit the municipalities of Rio Piedras and Santurce to get out of the wholesale market business, thus alleviating numerous traffic pressures on streets in the heart of these cities. For old San Juan, it would take out of the city much heavy truck traffic and permit the redevelopment of its important market area to a higher use. In all places it would facilitate maintenance of better sanitation, and the citizens could be expected to obtain better quality foods at more reasonable prices.

For the Insular Government it would consolidate in one place the problems of sanitation, inspection, and other regulatory services. It would aid the planning agencies, particularly the Puerto Rico Planning, Urbanizing, and Zoning Board, in solving the traffic burden on city streets and the over-all development of the area on the south side of San Juan Bay, which the Board has planned during recent years.

The building of a wholesale produce market is the first step in a general market improvement program for the territory of Puerto Rico. After solving the market problem in metropolitan San Juan, it will be possible to deal with the same problem in other cities and towns on the Island. If a modern wholesale market were built in San Juan, the pattern established there would spread throughout the Island, and many of the new developments could be accomplished with little or no governmental aid.

PART II

SLAUGHTERING AND MEAT-PROCESSING PLANT

PRESENT AND POTENTIAL SUPPLIES OF MEAT ANIMALS FOR SLAUGHTER

Puerto Rico has for many years imported meat to supplement its inadequate local supply. Tables 11 to 16 show the volume and value of meat and meat products imported during 1949. The people of Puerto Rico, however, are accustomed to and prefer locally killed meat.

Cattle are the Island's most important source of meat; hogs rank second. Some goats and sheep also are produced for slaughter. The only concentrated production of cattle for beef is in the south and southwestern part of the Island, where rainfall is low. Most of the beef slaughtered is derived from dairy or dual purpose cattle. Census data for 1940 show 299,734 cattle and calves on farms and 43,672 not on farms; 97,306 hogs and pigs on farms and 108,938 not on farms; 42,861 goats and kids on farms and 68,559 not on farms; and 3,488 sheep and lambs on farms and none not on farms.

About 90,000 cattle and calves were slaughtered in Puerto Rico in 1949. Of this total, about 72,800 head were slaughtered in public abattoirs, 15/ the remainder on farms and in privately owned abattoirs. Most of the large cattle, such as oxen, bulls, and heavy cows were killed in the abattoirs adjacent to larger cities.

An estimated 230,000 pigs or more are farrowed annually, of which more than 75 percent are slaughtered and used for "roast pig." Most of the rest, the mature and heavy hogs, are butchered in public abattoirs. In 1949 about 42,700 were slaughtered in public abattoirs.

More goats are maintained by families off farms than on farms, and these are kept primarily for milk. About 50,000 are slaughtered annually, about 90 percent of them on farms and 10 percent in public abattoirs.

The production of sheep and lambs is relatively unimportant. Only about 3,500 are reported on the Island, these being largely in the southwestern part. Very few of the slaughtered sheep and lambs move into commercial channels, because the natives prefer goat meat to mutton and lamb.

All but one of the 77 municipally owned abattoirs in Puerto Rico reported slaughtering meat animals in 1949. The number and carcass weights of these animals are shown in table 8. Since the abattoirs are owned by a Government agency, fairly adequate records are maintained.

15/ According to a survey of the 77 public abattoirs in Puerto Rico made by the Insular Government in January 1950 as a part of this study.

Table 8.--Number of animals slaughtered and carcass weights, by type, reported by 76 municipal abattoirs in Puerto Rico, 1949 1/

Type of animal	Number	Carcass weight per head	Total carcass weight 2/
		Pounds	Pounds
Cattle and calves	72,800	238	17,326,400
Hogs	42,700	96.4	4,116,280
Goats and kids	5,000	24.2	121,000
Sheep and lambs	37	55	2,035
Total all types	120,537	-	21,565,715

1/ A survey of the slaughter records for all municipally owned abattoirs was made by a representative of the Insular Department of Agriculture and Commerce during January 1950 as a part of this study.

2/ Adjusted for less than 1 percent of incompleteness of abattoir records.

The total carcass weight of the 72,800 cattle and calves slaughtered in public abattoirs in 1949 was 17,326,400 pounds, or an average weight of 238 pounds. With a dressing yield of 50 percent, the average live weight would be 476 pounds. This figure may be somewhat low, because it is believed that the weight of some edible products are not always included in the reported carcass weight. Of the number of cattle and calves slaughtered in these establishments about 30,800 were bulls, 5,000 oxen, 18,000 cows, and 19,000 calves. All but 2 of the 77 public abattoirs reported slaughtering cattle and calves.

The total carcass weight of the 42,700 hogs was 4,116,280 pounds, or an average of 96.4 pounds. With a dressing yield of 60 percent, the average live weight would be 161 pounds. As for cattle and calves, it is believed that the reported carcass weight may not include all the products of the hog; therefore the live weight may be somewhat larger. It is not known what percentage of the hogs slaughtered were mature, but it is believed that most of the kill was heavy hogs. A few pigs are slaughtered at public abattoirs for individuals for use as "roast pig." Most of the sows, boars, and heavy hogs are sold for slaughter at public abattoirs because they are too large to kill on farms. Farms are not equipped to handle a large volume of meat at one time. All but one of the 77 public abattoirs reported the slaughtering of some hogs and pigs.

Forty-four of the public abattoirs reported slaughtering 5,000 goats and kids in 1949, having a total carcass weight of 121,000

pounds, or an average weight of 24.2 pounds. With a dressing yield of 40 percent, the average live weight of the goats slaughtered would be about 60 pounds, which would indicate that a substantial number of those slaughtered were kids.

Eight public abattoirs reported slaughtering a total of only 37 sheep and lambs, with an average carcass weight of about 55 pounds, or a total of 2,035 pounds. On the basis of a dressing yield of 40 percent, the average live weight of all sheep slaughtered amounted to 137 pounds.

With an adjustment made for some incompleteness in the records of the public abattoirs, such as a lapse of recording in certain known periods, the reports show a total slaughter of 120,537 meat animals, with a total carcass weight of 21,565,715 pounds. In addition, about 15,000 hogs and 6,000 cattle were slaughtered in 6 privately owned slaughtering plants.

Under the present system of slaughtering practically no byproducts, with the exception of hides, are being utilized. In 1949 about 60,000 cattle and calf hides were exported, bringing a return of $360,000. It is estimated that an additional 20,000 hides were used on the Island. Some hides were wasted entirely. Since hides are not properly removed or cured, they bring only a small return.

In the past most of the cattle have been raised on farms in small numbers, one to three per farm, except for the large herds on the southern slope of the Island and the oxen herds maintained by large land owners. Currently, with the progress made to improve the diet of Puerto Ricans through the consumption of larger quantities of milk, a program has been started to improve the quality of dairy herds and to increase the number of milk cows per farm. The Insular Government has inaugurated an artifical insemination program, which is supplemented by an improved feeding and pasture improvement program for dairy animals. As a result of these programs, more beef will be available, but it will come from culled cows, heifers, bulls, and veal calves from dairy herds.

Improvement in hog types has been under way for some years, and at present most of the hogs are of a hardy breed and are good meat producers. Further improvement may be expected in the future.

Hogs are produced generally throughout the Island, but in the mountains, where coffee is the predominant crop, their numbers are smaller. Some relatively large herds of hogs are produced near the large cities and military bases, where available garbage makes feeding economical. Most of the hogs produced in Puerto Rico are from farms that maintain one or two sows, that farrow twice each year. Some pigs

are sold at weaning time, but the majority of the weanling pigs are placed in fenced lots or pens and fed garbage and root crops. Some molasses and byproducts from distilleries are fed. This feed is supplemented in a limited way by imported grains and mixed feed and locally grown grain, chiefly corn. For the most part, however, grains are fed to chickens and work stock oxen, mules, horses, and donkeys. By the introduction of balanced rations, and with full utilization of the feeds available on farms, a substantial gain in weight per pound of feed can be accomplished, as well as an increase in the number and size of hogs produced.

A serious loss of pork and lard results from the slaughter, for "roast pig," of approximately 75 percent of the pigs, or about 172,300, having an average weight of about 70 pounds. Because of the small size of these pigs and the method of roasting over open flame, practically no lard and waste products are recovered.

Pork slaughtered from native hogs in Puerto Rico is supplemented by large quantities of imported pork, lard, and processed meat products. About 50,000,000 pounds of lard were imported in 1949. With the production of legumes, the salvaging of waste products from processing, and the provision of facilities for handling heavy hogs, there is a strong possibility that the production of pork and lard from the hogs now farrowed could be increased substantially in about a year.

With the improvement of pastures, breeds, and production techniques, the number of goats and the supply of milk and meat could be increased.

It is not anticipated that the production of sheep and lambs will be maintained; on the contrary, it is possible that the number will decline. Sheep are not efficient producers of meat except on land extremely marginal in character, and goats will equal or exceed sheep in meat productivity on such land. Very little marginal land is available and officials of the Insular Department of Agriculture and Commerce do not believe it would be desirable to encourage sheep production.

In addition to the meat animals produced in Puerto Rico, the Virgin Islands and certain other islands of the West Indies have cattle for export in excess of their needs for fresh meat. These islands import cured and processed meat, because they do not have facilities for processing their own surplus animals. Customarily they export the animals in live form. A good slaughtering and meat-processing facility in San Juan would be a means of disposing of the islands' surplus animals and of increasing production. Their economy would be improved in this way.

PRESENT MARKETING PRACTICES AND SLAUGHTERING FACILITIES FOR LIVESTOCK AND MEATS

Since, in the production of practically all meat animals, the practice of feeding is to obtain maximum weight with the least amount of concentrates, such as grain (carbohydrate) and high-protein feeds, the animals offered for sale in Puerto Rico, except some heavier hogs, do not carry a high degree of finish. Producers depend largely on pasture for finishing cattle, calves, and goats, and on table garbage and root crops, which generally are in plentiful supply, for finishing hogs. Of course, some locally grown and imported corn is fed to hogs. Also, manufactured mixed feeds are fed in limited quantity. The meat animals, therefore, do not carry much external or internal fat or muscular (marble) fat.

Marketing Live Animals

Farmers with meat animals for sale make sales in two ways. They sell them to an independent buyer, who usually owns a truck, or they take them to one of the market places. The market places in general use are the public markets, previously described as being near the central part of the cities and towns near the "plaza," or certain vacant lots in or near many cities and towns, where weekly or biweekly sales are made. In any event, the farmer makes his own sale to the buyer, since the auction method of sale is not in use.

Farmers may come to cities and towns, on any market day of the week, with cattle, calves, goats, kids, sows, pigs, and sheep and lambs, and tether the animals on the side of the street in the vicinity of a public market. All kinds of buyers come to these markets and purchase animals direct from the farmers at the prices agreed upon by farmer and buyer. Some pigs, kids, goats, calves, or other small animals are sold to individuals for slaughter for family use. Independent buyers may procure animals, generally the larger animals, for slaughter on their own account and for resale to retail dealers. Also, independent buyers (commonly called speculators) may purchase animals for resale at some other market place. In addition, some farmers and landowners come to the market to buy weanling pigs, kids, and other animals for further feeding or for breeding purposes.

The sale of live meat animals on private land, usually near or in cities and towns, is a relatively common practice, and most of the larger meat animals and dairy stock move from farms in this manner. Representatives of the Insular Government estimated that there are about 18 such locations on the Island. Sellers are charged from 10 to 25 cents per animal for use of the lot. Retailers, speculators, truckers, and farmers buy dairy cows, heifers, calves, and other animals. Larger numbers of animals are offered for sale at some of

these open lots than at any other type of market on the Island. Dairy cows sell on the basis of the number of quarts of milk they produce each day.

Slaughtering Facilities

The public abattoirs perform an important and essential function in providing fresh meat to consumers daily and a market place for meat animals produced in Puerto Rico. Also, a few cattle from the Virgin Islands are slaughtered in these abattoirs. Although they serve an important function, the facilities and methods of operation used are a hindrance to the maintenance of sanitation and good health. The abattoirs are of poor design, improperly equipped and operated, and they do not afford proper sanitation. None has facilities for the utilization of byproducts, edible or inedible, and none maintains personnel experienced in the proper handling of the animals. Most of the animals slaughtered are inspected on the hoof to determine whether they are suitable for slaughter, but this inspection is made by a person who has not been trained. None of the abattoirs maintains trained people to inspect carcass meat except for a superficial inspection of livers. Under this type of operation the possibility of human infection by parasites and other organisms is tremendous. The only thing that prevents a serious outbreak of disease among Puerto Ricans is the fact that all meats are cooked well done.

The abattoirs vary greatly in size, shape, and design. They are primarily "hulls" of buildings, with a killing floor, a hoist, and a carcass rack. The carcass rack is generally in a room off the killing room. Windows or doors are not screened for protection against flies or other insects, and there is no cooler and chilling equipment. Most animals are killed and skinned on the floor in the killing room. The usual practice is to kill beef animals by the "pitting" method, an ancient method whereby the animal is stunned by the severance of the nerve at the base of the skull, which retards bleeding. The blood remaining in the flesh of the animal tends to add softness to the meat and hastens bacterial reaction, contamination, and spoilage.

The blood from slaughtered animals generally runs into a drain, sometimes into a nearby open ditch, creating odors and a breeding place for insect and bacterial forms of life. Likewise, the contents of the stomach, intestines, and other organs of the animals are dumped into ditches or on hillsides, sometimes within a hundred feet of the abattoirs. In some instances, these places of disposal are within the limits of the city, near schools, residences, and playgrounds. There are no regulations covering the method of kill, handling for sanitation, and offal disposal.

Since no cooler or chilling space is available at public abattoirs, many of them operate 7 days a week in order to provide fresh meat to retailers and consumers. Many retailers, particularly those in public markets, do not have cooler space, so it is necessary for them to obtain meat from the abattoirs daily. The lack of cooler and chilling rooms is a factor that contributes to the rapid deterioration of meat in retail establishments and in consumers' homes.

Rendering facilities are not available in the public abattoirs. Pork fat is either left on the hog or sold at a very low price; in many instances, it is a part of the waste. Fortunately, cattle, calves, goats, and other animals have little fat for trim and rendering when slaughtered. However, there is considerable waste of inedible fat, bone, and flesh that could be salvaged if rendering and related facilities were available.

The method of skinning cattle and calves at most abattoirs is very inadequate and inefficient. The majority of the hides are cut and not properly cleaned. Green hides are generally sold to one of three dealers. One dealer in San Juan bought the bulk of the hides produced on the Island in 1949. This dealer cured about 50,000 hides that year. The poor quality of the hides is evidenced by the fact that the return from their sale was less than 35 percent of the price they should have yielded. For example, the 60,000 hides exported, which were about 70 percent of the hides produced on the Island, brought only $360,000. If these hides had been properly removed and cured, they should have been worth about $1,000,000. In addition, about $100,000 worth of hides was in all probability lost completely. Therefore, if proper skinning and curing methods were used, the economy of the Island would be enriched by about three-quarters of a million dollars.

In summarizing, it is obvious that public abattoirs in many locations should be improved or abandoned. Those that continue to operate should adopt proper and modern killing methods and provide facilities for the handling of meat from animals in an efficient, economical, and sanitary manner.

The six known privately owned slaughtering places in Puerto Rico primarily slaughter large cattle and heavy hogs, some of which are produced on the farms of the slaughterers. Several of the larger plants do a limited amount of processing and curing, but the facilities used for these purposes are very crude and are not inspected for sanitation. The slaughtering facilities are of about the same design as the public abattoirs. Several of the larger ones have some cooler space, smoking and cutting rooms, and equipment for sausage

manufacture. None of these plants is inspected by the Insular Government or by other governmental agencies, and in many of them the quality of the meat and sanitary conditions of handling and processing are highly questionable.

Fresh, cured, and processed meat from these privately owned plants is distributed mostly to retailers, some of it going to wholesalers. Because of the limited quantity of sausage and other processing products, the demand for them exceeds the supply. Most of the meat is sold to retailers at the slaughtering plant, and the remainder is delivered to retail establishments. At least two of these slaughterers are also importers of meat.

In two or three of the privately owned plants fat from hogs is rendered into lard, the skin of hogs is cooked for sale as a product called "chicharron," and certain other waste products are recovered. However, full use of waste products in these plants is not achieved, as it could be done in modern facilities.

Distribution of Meat

Before the animal is killed, the meat is sold to a buyer. In most instances the retail buyer picks up the carcass meat at the abattoir in his own truck; otherwise, it is delivered to him by the slaughterer. The pigs for roast, kids, calves, and other small animals slaughtered for individuals for family use are picked up by the owner.

Because of the location of the public abattoirs throughout the Island, meat moves from them only short distances. Since it is not chilled (animal heat is not removed) nor transported in cooled trucks, the meat could not be carried any great distance, because it would spoil before delivery.

For the wholesale distribution of the meat slaughtered in public abattoirs, no special cuts are offered. The buyer takes a front or hind quarter of an animal, or the head, liver, or some other organ. Meat is cut by use of the machete, a knife about 30 inches long with a 3- to 4-inch blade. The number of cuts available to the customer is limited. Certain cuts, such as the "filete" and "loinillo," bring higher prices, usually 20 to 30 cents more per pound than the round steak locally called "masa." Meats not good for steaks are sold for making stew (carne de quisor) and at lower prices than the round steak or masa brings. Chunks of meat are cut off the quarter for the customer, who takes whatever the next cut of the quarter may be.

Many retail stores in the country areas and small villages and most meat retailers in the public market places do not have cooler or freezer space. The meat offered for sale is generally hung at the rear of the store in the open, with no protection. In some instances the animal's head is hung up by the retailer to show its age. A young animal head is supposed to show that the dealer is handling good meat. Any meat left at the end of the day's sales is generally deteriorated to the extent that it cannot be held over for sale the succeeding day. Some retailers are beginning to install cooler space in their establishments, finding that they can make substantial savings in meat, and some consumers are learning the difference between well handled and poorly handled meats.

With the exception of the small amount of processed and manufactured meat products from the private plants and the very small quantity processed on farms from farm-slaughtered animals, Puerto Ricans are dependent upon imports, obtained largely from the States. These imported products are generally seasoned and cured to meet the tastes of the people in the States, which are different from those of the Puerto Ricans. Therefore, only limited quantities of processed meats seasoned to their tastes are available.

DEFECTS IN THE MARKETING SYSTEM FOR LIVE ANIMALS AND IN SLAUGHTERING FACILITIES

The defects in the present system of marketing live animals and in slaughtering facilities in Puerto Rico are a result of a number of factors. Most of the defects are a result of the evolution in the economy from the time the Island was a mere outpost, with few inhabitants who adopted and have maintained the customs of their native land, until today, when it is a densely populated country, with an economy of its own yet one that is tied in with that of a major industrial country--the continental United States. Such factors as tropical climate, limited land area, the use of a large part of the available land for the production of sugar for export, and the dependence of the Island on an always-available supply of meat from the United States and other countries have had a definite influence on the development of the present marketing system and the type of facilities used for slaughtering meat animals.

Deficiencies in the Present System of Marketing Live Animals

A primary defect in the present system of marketing live animals is the lack of adequate market places for the handling of live animals or for the service of buyers. At the public market places, there are no facilities except curb side space on public streets. Buyers must come to these places and take the chance that supplies of meat animals will be offered for sale. No shed or roof is available for the protection of the buyer or the seller. Likewise, no facilities are offered to sellers and buyers on the open lots scattered about the Island.

Under the present system, where there are many small market places, the seller may bring his animals to a market and find no buyer for his class of livestock, particularly for heavy cattle--oxen, bulls, or cows--and heavy hogs. This situation is aggravated by the fact that there is no way of concentrating these animals for supplying the public abattoirs in larger cities, where most of the heavier animals can be handled. The public abattoirs in the smaller cities and towns slaughter chiefly light-weight animals, since this meat is preferred and the meat of one small animal is sufficient to meet the needs of the town or village for one day. As a matter of fact, the places where heavy cattle and hogs can be slaughtered properly are limited. Therefore, the prices paid for such animals are generally lower than for animals of lighter weight.

Lack of Slaughtering and Processing Facilities

The lack of at least one modern slaughtering, meat-processing, and packing plant in Puerto Rico has a far-reaching effect on meat animal production, live animal marketing, the salvaging of many products, public health, and the general economy of the Island and adjacent territories. The existing slaughtering facilities are unsanitary, uneconomical, and unhealthful.

The lack of adequate and modern slaughtering facilities is a retarding influence on the feeding of cattle and hogs to heavy weights. The major reason for the high percentage of pigs slaughtered for "roast pig" is custom, but many of the pigs are killed at 50 to 90 pounds because of the lack of facilities to handle the heavier hogs profitably by processing and manufacturing them into lard, sausage, and related products. Therefore, when a pig reaches a weight of 50 pounds or so, the producer looks for someone who will buy it for roasting. If the pig reaches a weight of 90 pounds or more, it becomes more difficult to sell it and heavy reductions in price occur.

It is estimated that in excess of 20 percent of the pigs currently raised on farms, excluding sows, boars, and other mature hogs, might be brought to heavier weights for slaughter in a modern facility if one were available. On this basis, it would be possible to slaughter about 45,000 to 50,000 hogs annually without increasing the number of sows kept or pigs farrowed. If this number of hogs were slaughtered in a modern plant, the supply of fresh, cured, pickled, and processed meats (manufactured sausage and similar products) might be sufficient to encourage consumers to buy more slaughterhouse meat and roast fewer pigs. Moreover, with an ever-available place to market heavy hogs, farmers producing pigs would be encouraged to feed them to heavier weights in order to obtain the increased income that would follow.

The potentialities of increasing the number and slaughter weight of cattle and calves are not as great as those for hogs. However, the lack of proper facilities for handling cattle and calves has encouraged the practice of slaughtering them before they reach a mature weight. The public abattoirs in small towns and villages slaughter small animals because the meat from such animals is sufficient to meet the daily consumer needs in that village. Thus, many small animals are killed regardless of whether the owner has pasture and other feeds for finishing the animal to a more mature weight. Because of the lack of facilities for cooling and curing meat by aging, a preference has developed for the meat of small

animals. While the present average slaughter weight is 476 pounds, it could easily be brought to about 600 pounds, if proper facilities were available on the Island. This increase in animal weight could be expected by the improvement in pasture and feeding practices.

Another serious deficiency at present is that of proper facilities for handling byproducts from slaughtered animals. On the basis of a kill of 72,800 cattle and calves annually at public abattoirs, at average weights of about 500 pounds, the loss in meat scraps and tankage exceeds 750 tons annually. 16/ If this product were valued at only $75 per ton, 17/ its worth would be $56,250. If all these animals were slaughtered in good slaughtering facilities, these products could be salvaged.

The lack of proper slaughtering facilities and equipment causes a large loss in the value of hides. A large part of this loss is attributed to lack of "know how" in skinning and curing. It is assumed that no plant would be built unless people with proper skill were employed.

Very few goats, kids, sheep, and lambs are slaughtered off farms because of the customs of the people and the lack of facilities for handling these animals. As a matter of fact, people in Puerto Rico have little opportunity to buy locally produced goat meat, lamb, or mutton from retail establishments. If they want this type of meat, they have to buy the animal and kill it on their own premises. If a satisfactory slaughter facility were available, offering a good market for these animals and a constant supply of dressed goat meat or lamb and mutton, Puerto Ricans could be supplied with these meats through their retail stores.

16/ In 1949 in the United States tankage and meat scraps amounted to 4.32 percent of the live weight of cattle, calves, hogs, sheep and lambs slaughtered. This figure was calculated from the figures on tonnage and tankage reported on page 43, "Feed Statistics," December 1950, and the figures on weights of animals slaughtered on pages 365, 377, and 394 of, "Agricultural Statistics 1950," both published by the U. S. Department of Agriculture.

17/ The wholesale price for tankage in bulk in Chicago during the latter part of 1950 was about $120 per ton, according to quotations published in the National Provisioner. In Puerto Rico it is expected that the price of such tankage would be substantially less than in Chicago because of competition with similar products from other areas.

THE KIND AND AMOUNT OF SLAUGHTERING AND MEAT-PROCESSING FACILITIES NEEDED IN PUERTO RICO

There is a dire need for at least one modern and efficient slaughtering facility in the neighborhood of San Juan, and for a system of inspection of live animals and meat produced for consumption. An inspection program cannot be undertaken on a workable basis until the defects in existing slaughtering plants are corrected.

The facilities needed in San Juan for slaughtering livestock and for properly handling meat and meat byproducts would require a multiple unit plant equipped to perform a number of operations and a certain amount of space for holding live animals. In addition, it would be necessary for anyone who built and operated a slaughtering plant to establish a number of buying stations throughout the Island in order to assure a constant flow of live animals to the slaughtering plant. Such a constant flow will be necessary if the plant is to operate on a continuous basis with a sufficient volume of business to make the operation profitable.

Yard space with related facilities would be needed for holding live meat animals from the time they are delivered until they are slaughtered. It is estimated that enough space should be available to hold about 1,000 cattle, 1,500 hogs, and some goats. 18/ In addition, sorting pens and driveways would be required. On the average it would require about 60 square feet per head of cattle and calves, and 20 square feet per head of hogs, goats, and sheep, including driveways and space for feed and water facilities. On the basis of these requirements and the estimated number of animals to be held, slightly more than 2 acres would be needed for pens, driveways, and scales. Equipment in all pens should include running water and feed troughs. All feed troughs in pens should be placed adjacent to the alleyways, which should be not less than 10 feet wide. Some of the pens should have roofs to give protection to the animals to be held for a long period. It would be desirable to pave some of the pens and runways to avoid the accumulation of mud and to aid in cleaning the manure from pens and in maintaining sanitation.

18/ Pens with this capacity would hold about one week's supply of hogs and two weeks' supply of cattle. This holding capacity is larger than normal in the States, because there are no other holding yards or market places comparable to those maintained in the States from which supplies could be obtained to permit continuous slaughtering operations. Holding capacity for cattle is proportionately larger than for hogs because of the flexibility in marketing cattle and the expected mass volume receipts of live animals by boat.

It was suggested by certain Government officials that a livestock market place be built adjacent to the yards of the slaughtering plant. This addition is not as important as providing market places throughout the Island for assembling live animals for shipping to San Juan. If a market place were built adjacent to the slaughterhouse yards, the live-animal scales would serve the market as well as the slaughtering plant.

The slaughtering facility should include space for a two-bed cattle slaughtering operation with a capacity of about 60 head per day, or a minimum of 24,000 per year; space and equipment for killing about 200 hogs per day, or a minimum of 45,000 per year; 19/ chilling or freezing rooms, or both; power equipment; edible and inedible rendering space and equipment; smokehouse space and equipment; sausage manufacture and canning space and equipment; hide-curing rooms; and office space. To accommodate the foregoing facilities, a building would be needed having at least 50,000 square feet of floor space, of which about 28,750 square feet would be on the first floor and the remainder divided between the basement and second floor. If funds were available for a larger area of first-floor space, the second floor could be eliminated. The basement would be used for curing hides and rendering fat. Ample parking areas should be provided near the plant for vehicles of officials, laborers, and customers. This layout, including the plant with parking space, driveways, platforms, and some area for expansion of the building, would require about 2 acres. In addition to the 5 acres needed initially for the yards, parking areas, and building, at least 2 acres should be procured for future expansion. A total of 7 acres, therefore, would be required to meet present and future needs.

19/ It is suggested that slaughter space and equipment be provided at the beginning for only the minimum number of cattle, calves, hogs, and pigs that are expected to move through the slaughtering plant. Additional space and equipment can be provided as needed.

ESTIMATED COST OF DEVELOPING THE FACILITIES RECOMMENDED AND OPERATING EXPENSES

The type of building, yard development, and equipment needed in San Juan for slaughtering live animals and processing meat would differ somewhat from the type of facilities found in the States. It must be a complete unit if it is to operate efficiently, because there is no other nearby place to perform any of the recommended operations.

The total cost of the slaughtering plant will consist of the cost of land, yard equipment, drainage, and the building and equipment of the plant.

Estimated Cost of Land

The meat and related products produced by this plant would be distributed through normal channels, to be sold through retail stores and consumed in restaurants, hotels, and other institutions. The buyers of the products of this plant would be the same as the buyers who would patronize the wholesale market facility described in Part I. For this reason, the slaughtering and meat-processing plant should be built near the wholesale market, as shown in figure 17. If it were not located near the wholesale market, buyers would have to go to another location to pick up locally slaughtered fresh and processed meat, warehouse space would have to be provided in the market for the sale of meat, or the meat would have to be delivered to buyers' establishments. For these reasons, it is recommended that the slaughtering and meat-processing plant be built adjacent to the wholesale market.

The slaughtering plant need not be on the wharves, because most of the live animal receipts would come by truck and the live cattle imported by boat could be driven the short distance from the wharves into the yards. No large quantity of meat and meat products is expected to be exported, although if the plant is operated under Federal inspection, it might sell to ships in port and to dealers in the Virgin Islands and other nearby islands. It is not expected that these sales would amount to any large volume or that a large cartage expense would be involved.

There are a number of areas in and near the proposed wholesale market area where the recommended slaughtering and meat-processing plant can be located. If the market is established southwest of Martin Pena Channel, the plant with related facilities should be built immediately to the southwest of the wholesale market, as shown in figure 17.

954117 O—51——9

In arriving at the cost of the 7 acres of land required for present and future needs of the slaughtering and meat-processing plant, the same considerations are involved as for the land needed for the produce market, as discussed in Part I. The Insular Government owns the land, which, for this purpose, has been valued at $1,000 per acre. To develop a two-story building, with basement, will require more fill than is needed in the development of the wholesale market. It is estimated that the cost of making sufficient fill on the site would be approximately $11,000 per acre, making the total cost of land and fill $12,000 per acre, or for the 7 acres to be included in the site, about $84,000.

Estimated Cost of Developing Yards and Yard Equipment

The estimated cost of the equipment and facilities that would be needed in the yards would be about as follows:

Item	Cost
Scale house	$2,000
Scale	5,500
Fence--exterior over-all inclosure, 2,000 ft. @ $3.50	7,000
Interior pen fencing, 6,000 ft. @ $5	30,000
Paving about ½ of yard space, 6,000 sq. yds. @ $3.50	21,000
Storm sewers	10,000
Sanitary sewers	29,500
Total cost	$105,000

The cost of storm and sanitary sewers calculated above includes an allowance for the amount required to serve the plant as well as the yards.

Estimated Cost of Slaughtering and Meat-Processing Plant and Equipment

The cost of building and of equipping a plant in Puerto Rico might be expected to be greater than in the States because of the need for transporting the equipment to Puerto Rico, as well as the specialists for installing it. The cost of the original construction would likewise be greater because of the need for planning the facilities in such a manner that a section or unit or the entire plant could be expanded at a future date without excess costs or disruption of the initial plan. A survey of the need for a slaughtering plant and meat-processing facility was conducted by an engineering firm in 1944 for

the Puerto Rico Industrial Development Company. Costs of building materials and equipment have increased considerably since 1944, but at that time it was estimated that a plant relatively comparable to that now recommended would cost approximately $1,127,900. This estimate included about $355,000 for a building and facilities for a small soap factory, cost of land, yards, and certain other equipment not recommended for construction or use in this report. On the basis of the company's estimates, a plant comparable to the one proposed herein would have cost about $772,900 in 1944.

To construct a building of the kind now recommended, including 50,000 square feet of floor space, and to place the equipment therein, provide piling under the building, and pave the street and parking area it would cost about $1,161,000 20/ on the basis of costs prevailing the latter half of 1950. This would provide a complete unit, ready to operate, including office and automotive equipment.

Total Cost of Slaughtering and Meat-Processing Facilities and Equipment

A summary of the total estimated costs of providing slaughtering and meat-processing facilities and equipment follows:

Item	Estimated cost
Cost of land and fill	$ 84,000
Cost of developing yards and yard equipment	105,000
Cost of buildings, equipment, parking area, etc.	1,161,000
Total cost of slaughtering facility	$1,350,000

Some small reduction in these costs might be realized by planning the initial development in such a manner that a part of the land, particularly that part procured for future expansion, could be filled when the need arises. Moreover, the fencing and paving of a part of the yards could be delayed, thereby reducing the initial costs. Also,

20/ This cost is based upon estimates made in 1950 by the slaughterhouse operator who acted as advisor on this study and his engineers, and is about 50 percent higher than the estimated cost for similar facilities recommended in the 1944 survey. The index of building cost for the United States increased 55 percent between 1944 and 1950, but it is believed that the cost of labor and materials available in Puerto Rico probably has not increased as much as in the States.

it is understood that a small amount of slaughtering-plant equipment has already been procured by the Insular Government. If this equipment could be used in the proposed plan, the estimated costs would be reduced. Every possible means should be explored in order to reduce costs. Of course, the facility should not be constructed until a private firm with knowledge of the business has agreed to participate in financing and operating it. In this manner, it would be to the interest of the operator as well as to the Insular Government to build at the lowest possible cost.

Amortization of Investment

The cost of the proposed slaughtering plant should be made self-liquidating regardless of who operates it. The investment, therefore, should be amortized from revenue from the slaughtering operations. The length of the period of amortization depends on the length of the useful life of the facilities.

Because of the limited size of Puerto Rico and the adjacent islands, the survival of the plant will be dependent to a certain extent upon actions of the Insular Government and the municipalities in regard to inspection and operation of the existing public abattoirs. Moreover, it would not be desirable under present conditions to construct more than one major plant on the Island because of the limited supplies of animals. If two plants were built of the size recommended, in all probability neither plant could operate profitably, and one or possibly both might go out of business.

If care is exercised to control the number of slaughtering facilities constructed in Puerto Rico and proper inspection and control of the handling of meat in other facilities on the Island are initiated, one plant could be successful, if properly managed. Although management will be discussed in the following chapter, it is assumed that it would be good, that control over numbers of plants constructed would be exercised, and that a program of inspection and supervision of slaughtering operations would be instituted in other parts of the Island. For the purpose of illustration, the annual interest and principal payment that would need to be made to liquidate the cost of construction, including land, it is assumed that the facility would be liquidated in a period of 25 years at an interest rate of 4 percent. Thus, to liquidate $1,350,000 would require an annual payment of $64.01 per $1,000 invested, or a total annual payment of about $86,414.

Taxes

It is believed that regular taxes on the equipment and facilities, or certain funds in lieu of taxes, should be paid by the management. 21/ The amount of taxes would be based upon the assessed value times the applicable rate in the municipality. If the facility were located as shown in figure 17, the 1950 Rio Piedras rate of $29.40 per $1,000 would be applicable. It is not known what the exact assessed value of the property would be, but it is understood that present assessed values are considerably below the actual sale value or cost of the property. Therefore, the assumption is made, as was done in the case of the wholesale produce market, that the assessed value would be 75 percent of the cost of the market, not including fill and grading, streets, storm and sanitary sewers, and architectural and engineering fees, or 75 percent of about $1,125,000, making the assessed value $843,750. On this basis the estimated annual tax would be $24,806.

Annual Operating Expenses

It is assumed that the expenses of actual operations of the slaughtering plant would be paid by the operator to whom the plant is leased and that the only operating expense that would fall on the owner of the plant would be that of maintenance of the property. For purposes of determining the amount of revenue that would be needed to cover the cost of the slaughterhouse, it is assumed that these maintenance costs would amount to 1 percent of the total cost of the slaughtering facility, excluding the cost of land and fills. This percentage allowance for maintenance is higher than that allowed for the wholesale produce market, because the owner of the slaughtering plant would own a considerable amount of equipment, the maintenance of which costs more than the maintenance of the type of buildings found in the produce market. On this basis it is estimated that the annual maintenance costs would be about $12,000.

Source of Revenue

On the basis of the preceding figures, the total annual expenses for amortization, taxes, and maintenance of the slaughtering and meat-processing plant are estimated to be $123,220. The revenue to cover these expenses, of course, would have to be derived from the rental charge made in the lease of the facility to the operator.

21/ Land is not included for taxing purposes because the Insular Government owns it and presumably will continue to own it.

WHO SHOULD BUILD, FINANCE, AND MANAGE A SLAUGHTERING AND MEAT-PROCESSING PLANT

The type of management placed in control of the slaughtering plant concerns citizens of the entire Island, adjacent insular areas, the Virgin Islands, and a number of other islands of the Caribbean. As has been stated, such a plant in San Juan would receive live animals for slaughter from the Virgin Islands and the Dominican Republic, and perhaps from other nearby islands. Moreover, the plant might receive certain cuts of chilled and frozen meat for processing and manufacture from the slaughtering plant now operating at Ciudad Trujillo, Dominican Republic, or from the States and Argentina. In addition, supplies from a plant in San Juan should go to the Virgin Islands and neighboring islands, as well as to the entire Island of Puerto Rico.

A slaughtering plant is a unit operation, although it carries out many kinds of processes. In considering who should manage the facility, it is necessary to take the view that one individual or one firm would assume managerial responsibility of the entire operation. Although this may appear easy to accomplish, the facts of the case are: First, that it will be difficult to obtain a qualified and experienced individual or firm in Puerto Rico to assume the responsibility because the Island now lacks any such operations and for that matter so does most of the Caribbean area. Consequently, it will be necessary to obtain an operator from the States or some other country who has been in the business long enough to know all the problems of livestock and meat handling, from the farm through the facility to the retail store. Second, because only one plant is planned for the Island, the individual or firm selected to manage and operate it would want a close working agreement with the Insular Government on many details yet to be worked out and with respect to problems of instituting inspection and control over the slaughter in public abattoirs, prices and charges, and the building of competitive facilities.

It is assumed that U. S. Federal inspection would be used in the recommended facility. This inspection is necessary if the plant is to service the Virgin Islands, the ships in port, and army and naval bases located in Puerto Rico. The Insular Government is interested in the training of personnel to inspect and grade animals and meat from slaughtering facilities about the Island. Such training in Puerto Rico could be done only in the recommended plant because there are no other plants where training could be carried on. Moreover, if the Insular Government is to institute inspection of meat animals and the products therefrom, the recommended plant could serve as a pilot

plant for the experimental aspects of this work. If the plant were thus used, the Government would need to have a close working agreement with the management placed in control of the facility.

The determination of who should build, finance, and manage the slaughtering facility would be the responsibility of the Insular Government unless some private individual or firm undertook to do so on its own responsibility. On the basis of past experience, it is not believed probable that an individual or firm will undertake the necessary expenditure in the immediate future. The expected volume of animals for slaughter is not sufficient to induce a national slaughterer or packer from the States to open such a business in San Juan. Moreover, such operators are more interested in increasing the volume of meat products packed in the States or in Argentina, in existing facilities, which have ample capacities, than in attempting to develop a new plant in Puerto Rico, where conditions would be substantially different from those in the States.

In view of the foregoing, it is the general conclusion that the Insular Government will have to share in the responsibility of financing and building the plant. The construction should not be started until a competent individual or firm is found to operate the plant and participate in its construction and financing and a satisfactory operating agreement is reached. The one who is selected to operate and manage the facility should be well qualified, because of his experience, to give helpful counsel with respect to the construction of a plant having the greatest efficiency of design and equipment.

Under any of the possible types of management, it would appear that the Insular Government would need to aid substantially in financing the construction of the slaughter facility. In no event should this assistance be a direct subsidy. In the initial period of operation the Government might forego the payment of principal for 2 or 3 years and adjust taxes downward, as it does when new industries are established under the Industrial Development Company. The determination with respect to the use of Insular funds for the building of this kind of facility would be the responsibility of the Government of Puerto Rico. It is believed that there are two agencies of the Government with authority to undertake the development; namely, the Puerto Rico Industrial Development Company and the Puerto Rico Agricultural Company. The former has had broader experience in the development and management of new industries, since it has established more than 100 such industries during the past 7 years. Moreover, a few years ago this company developed a plan for constructing a plant, almost as here recommended, but because it failed to interest

a suitable operator, the project did not materialize. On the other hand, the fact that a large part of the operation of a slaughtering facility relates to agriculture and the farm itself might indicate that the Puerto Rico Agricultural Company is the right agency to undertake the project. Regardless of which agency assumes the responsibility of carrying out the recommendations, however, the same determinations will have to be made and operational problems solved.

The type of contract between the development agency and the management firm cannot be determined at this time because the requirements of either are not known.

BENEFITS TO BE DERIVED FROM THE DEVELOPMENT OF SLAUGHTERING FACILITIES

There would be no reason for recommending that a new and modern livestock-slaughtering and meat-processing facility be built in Puerto Rico if it could not be shown that such an undertaking would benefit the economy of the Island. With respect to Puerto Rico and many parts of the Caribbean area, the plant would be a means of instituting measures for the improvement of the health, sanitation, and general welfare of the people. In addition, it would make it possible for consumers to obtain better quality meat, possibly at lower prices, and give livestock producers an opportunity to receive full value for the animals they produce.

Furthermore, the economy of Puerto Rico is based on substantial imports of meat and meat products, and it would be greatly benefited by any increase in the animal products that can be grown, processed, and manufactured on the Island.

In previous sections of this report it has been shown that many farmers are required to sell their pigs at from 50 to 90 pounds because facilities are inadequate to handle the heavier hogs on a profitable basis.

Although it will not be possible to eliminate the use of roast pig by Puerto Ricans, if a ready market were available for heavy hogs, it is believed that an increasing proportion of the hogs produced would be finished to higher average live weights.

A total of about 90,000 cattle and calves were slaughtered in Puerto Rico in 1949. If the public abattoirs in the metropolitan area of San Juan were closed and a modern slaughtering facility built to replace them, it has been estimated that at least 24,000 relatively heavy cattle and a few calves, with an average live weight of at least 600 pounds, could be slaughtered in the proposed plant. In 1949 in excess of 12,000 cattle were slaughtered in public abattoirs and private slaughtering places in metropolitan San Juan. It is estimated that about 4,000 could be obtained from the Virgin Islands and an undetermined number from the Dominican Republic and other nearby areas. To reach an annual slaughter of 24,000 head, 8,000 head would have to be obtained from other markets in Puerto Rico. Of course, if good assembly markets were established, substantially larger numbers of animals might be obtained from Puerto Rico.

From the slaughter of the 24,000 cattle and calves, the economy of the Island could be improved as follows:

If 100 additional pounds were placed on the present average weight of the 20,000 animals produced on the Island, the increase in live weight would be 2,000,000 pounds, and the income from this source would be increased by about $400,000, this computation being based upon 20 cents per pound for live animals. In considering the possibility of such an increase it must be remembered that many cattle are slaughtered at light weights because the daily consumption of meat in towns and villages is limited to the yield in meat of this size of animal. Producers are obliged to sell the animal at a lighter weight regardless of whether pasture or feed are available to bring the animal to a heavier weight.

From the slaughter of 24,000 cattle and calves with an average weight of 600 pounds, it is estimated that about 430 tons 22/ of meat scraps, tankage, bone and blood meal, and other animal food products would be recovered. In addition, a good slaughter facility with rendering equipment would provide an outlet for these byproducts from public abattoirs. As a matter of fact, the municipalities owning the public abattoirs and their operators indicated that a good rendering facility was needed in Puerto Rico to provide a sanitary means of disposal for such wastes and a source of added revenue. If only two-thirds of the tankage and meat scraps of the remaining 50,000 cattle and calves slaughtered in public abattoirs (with an average live weight of 450 pounds 23/) were recovered, about 320 tons would be obtained. Therefore a total of 750 tons of these products, with a value of $56,250, would be recovered. The collection of these wastes from public abattoirs could provide a return load for refrigerated trucks that would be making regular trips to the cities delivering chilled and processed meat products.

The hides of cattle and calves make up about one-third of the value of all byproducts to be obtained from the slaughter of cattle. 24/ On the average the hide of the live animal is about 7 percent of its weight. 24/ The proposed slaughtering plant is expected to handle primarily large cattle, which will move to it because they are not wanted in public abattoirs. It is estimated that the average

---

22/ Based upon a 6 percent yield of these products, of which 4.32 percent (United States average) is in tankage and meat scraps and 1.68 is bone and blood meal. Condemnation of livers and other vital organs, as well as whole animals procured for slaughter, would be much higher in Puerto Rico (the tropics) than the United States average.

23/ It is estimated that the average live weight of cattle slaughtered may average less than the present 476 pounds since greater numbers of heavy animals will be killed in the proposed plant.

24/ Pages 76 and 77 - "The Meat We Eat" by P. Thos. Tiegler, Professor of Animal Husbandry, Pennsylvania State College, State College, Pa. 1944.

weight of all cattle slaughtered will be at least 600 pounds and the average weight of the green hide will be 42 pounds. 25/ The November 1950 prices, at Chicago, which are somewhat lower than current prices, were 36 cents per pound for hides of 41 to 42 pounds weight and 65 cents per pound for calf skins. 26/ Although it is not known what will be the proportion of calves to the number of cattle slaughtered, it may be reasonable to expect that the average price of green cattle and calf hides may average about 40 cents, or $16.80 per hide, making a total of $403,200 for the 24,000 hides.

Based upon the approximate return of $360,000 reported for the 60,000 hides exported in 1949, 27/ the average return per hide was only $6. On the basis of their average weight of 46 pounds, they brought a return of only slightly more than 13 cents per pound. These data show that only the hides from large animals were exported and that they were in very poor condition. It would appear therefore that without any allowance for the cost of transportation from the East Coast port to Chicago, the hides were discounted by about $10.80 each. On 24,000 hides the improvement in method of skinning, curing, and preparation would result in an annual increase in return to the economy of Puerto Rico of about $259,200 (not considering any increase in cost of curing and handling). Furthermore, a good slaughtering plant would be equipped to pick up the hides from the animals slaughtered in public and private abattoirs in the remainder of Puerto Rico. If it is assumed that 24,000 cattle are slaughtered in the proposed plant, 4,000 of which are imported, in excess of 60,000 would still be slaughtered in public and private abattoirs. If one-half of these hides, 30,000, could be procured for curing and processing in the proposed plant, with the weight of hide maintained at about 42 pounds and the value discounted by only $2 28/ for improper skinning, there would be a gain of about $8.80 per hide, or a total of about $264,000 on 30,000 hides (making no allowance for additional curing and handling costs). The total annual benefits from the improved methods of handling wastes and hides during the slaughtering operation, therefore, would be about $523,200.

25/ These estimates were confirmed by the continental advisers who aided in this study. Because the animals to be slaughtered will be largely grass fed, their hide yield per total live weight may be greater than the average in the States.

26/ Market quotation of the National Provisioner November 18, 1950 issue.

27/ Report No. FT800, "United States Trade In Merchandise and Gold and Silver with United States Territories and Possessions (except Alaska and Hawaii) U. S. Department of Commerce, Bureau of the Census, published April 1950.

28/ Although the operator of the proposed slaughtering plant could help to improve skinning methods, the advisers point out that some discount may still be made.

It has been estimated that about 172,300 of the pigs farrowed, with an average live weight of about 70 pounds, were slaughtered for roast pig in 1949. Also, it has been estimated that with a good live animal slaughtering and meat-processing plant available farmers would be encouraged to feed at least 20 percent, or 34,500, of these pigs to an average weight of about 200 pounds to increase their income. One hundred and thirty pounds more live weight would be added to 34,500 hogs, or a total of 4,485,000 pounds. If this additional weight is valued at 20 cents per pound, farmers would receive $897,000 more return for their hogs than they are now receiving.

To slaughter about 45,000 hogs annually in the proposed slaughterhouse, about 10,500 head could be obtained from the heavier sows and stags now being slaughtered in public abattoirs. If it is assumed that these will average only 250 pounds each, a total live weight of 2,625,000 pounds will be slaughtered from this source. This weight, added to the weight of the 34,500 hogs slaughtered at 200 pounds, makes a total live weight of 8,925,000 pounds moving through the facility. If the lard yield were only 10 percent of the live weight, 892,500 pounds of lard would be obtained, which at 20 cents per pound would be worth $178,500.

In the slaughter of the 45,000 hogs, some inedible fat, tankage, meat scraps, bone and blood meal, and other wastes would be recovered. At least 178 tons 29/ could be obtained, which at a value of $75 per ton would be worth $13,350. This figure makes no allowance for any wastes that may be picked up from public abattoirs for rendering. The total recoverable value of lard and wastes from the slaughtering of 45,000 head of hogs therefore amounts to $191,850, not including $897,000 for the weight added to hogs on farms.

It has been suggested that soups could be manufactured in the slaughtering plant from trimmings from cuts of meat. The native Puerto Rican is a heavy consumer of pasteles and hallacas, which are made from mixtures of meat, cornmeal, native vegetables, and certain other products. Although these products are produced in several small plants on the Island, the output is so costly that few people can buy them; therefore they are exported to New York where they are consumed largely by the Puerto Rican population. They could be produced in the slaughter facility, where many of the basic raw materials for making them are available or could be procured from the proposed wholesale market. It would seem, therefore, that a plant of the kind recommended could produce these products in sufficient volume from low-cost materials so that they could be sold at a price that consumers on the Island could afford. In the course of the presentation of the

29/ See footnote 16.

preliminary report of this project in December 1950, it was found that a firm in Rio Piedras at present manufacturing these products and canning pigeon peas and other vegetables and fruits was interested in relocating its plant in the recommended market area. If the plant were located in the market area near the slaughtering facility, there would be no need to include substantial canning equipment, and construction costs in the building estimates and over-all costs for building the proposed plant could be reduced by a small amount.

The employment of local labor in the handling of live animals and in the slaughtering, processing, and manufacturing of meat and meat products would materially improve the economy of the Island. The exact number of employees that would be required for these operations has not been fully determined, but it probably would exceed 200.

The benefits of the recommended slaughtering plant to producers are many. According to the 1940 census, more than 31,000 farmers in Puerto Rico reported cattle on their farms. The value of the proposed increase in weight of animals to be slaughtered in the recommended plant would be realized by the producers. Likewise, the major part of the increase in hide value would be returned to the producer. Since the producer is also a consumer, the increase in efficiency, sanitation, and quality of meat and meat products would benefit him as well as the other people of Puerto Rico.

PART III

GRAIN STORAGE, FEED-MIXING, MILLING, VEGETABLE-OIL-EXTRACTING, AND RELATED FACILITIES

It has been pointed out that certain valuable byproducts from the processing of meat animals could be made available for manufacture into livestock feed. Likewise, many other products produced in Puerto Rico, not hitherto discussed, are being lost, and production of other desirable crops is discouraged because of a lack of facilities on the Island for the full utilization of them or their byproducts. If facilities for handling these byproducts are not made available, a large part of these products will continue to be lost or production may be lessened.

The economy of Puerto Rico throughout its history has been based largely on the production of sugar for sale on foreign markets and the use of the return from sugar for the purchase of food and other products. The production of most other crops, particularly food crops, has been subordinated to sugar. With an ever-increasing population and with mechanization requiring less labor for the production of sugarcane, there has been a tendency to encourage labor to grow more of the foods they consume. Even so, more and more laborers of the sugar industry are becoming burdens on the Social Security system.

The matter of producing more food for local consumption, by the full utilization of existing production or by the increased production of many crops, is of utmost concern to the Government of Puerto Rico because in the production or processing of the commodities to be used on the Island, labor would be employed and the products produced would enhance the economy. The establishment of grain storage, flour-milling, feed-mixing, and vegetable-oil-extracting facilities would make possible the production and processing of products for the consumption of humans as well as of animals.

From the standpoint of producing feed for the livestock and poultry on the Island, there are immense possibilities for improvement. The 1940 census reports 343,406 cattle and calves, 206,244 hogs and pigs, 111,420 goats and kids, 3,488 sheep and lambs in Puerto Rico, and 1,751,292 chickens. Although the census data are the best available, the nature of poultry production is such that the actual total number of chickens may exceed the reported number. These animals and fowls are fed from pasture, locally produced products, and imported feeds. Although grazing in Puerto Rico extends throughout the year, during the season of low rainfall supplemental feeding is needed. Since most mature cows are used for producing milk, the need for supplemental feeding extends into the rainy season when the pasture is very watery.

Hogs and poultry, of course, can utilize pasture in only limited quantities and require grain and concentrated feed or its equivalent.

On the basis of about 25,000 sows, each sow producing annually 10 pigs under a 2-litter system, in excess of 230,000 pigs are brought to weaning age. Currently, the weanling pigs are fed table garbage, root crops, and some grain until the time they are slaughtered for use as roast pigs or as mature hogs. On the basis of the minimum requirement of 250 pounds of concentrate, grain and protein feed having at least 36 percent protein (a part of which is animal protein) should be fed each pig slaughtered for roasting, or a total of 28,750 tons. For those hogs that are brought to 200 pounds in weight or larger, an additional 520 pounds of this type of feed should be fed to each one. It is known that this type of feeding is not practiced and that feed having protein content of 36 percent, a large part of which is animal protein, is not being fed to hogs.

It is estimated that there is about a 10-percent death loss before slaughtering. Since most of the pigs are slaughtered for use as roast pig, this rate would appear to be heavy. Likewise, it appears that the death loss of cattle and calves on farms is large. The extent to which the lack of proper feeding of animals is responsible for the heavy loss is problematical.

The results of research work carried on at the Agricultural Experiment Station in Rio Piedras indicate that most heifers do not breed until they are 2 years or older. In some cases there is a complete failure to breed. It is the belief that a large part of this failure may be accounted for by a lack of proper feeding and balancing of rations. If proper rations and feeding practices were instituted and animals, on the average, could be bred 3 months earlier, at least 20 percent better utilization of the heifer stock would result. Experience in the States and elsewhere, also indicates that some of this loss could be attributed to a lack of proper feeding. Moreover, an increase in supplemental feeding to cows should increase the production of milk and make up some of the Island's deficient milk production.

According to reports covering imports in Puerto Rico in 1949, about 30,000 tons of corn and other grains, as well as about 60,000 tons of mixed feeds and animal feed materials, or a total of 90,000 tons, were received. In addition, it is estimated that less than 10,000 tons of mixed feeds were manufactured on the Island, containing one-fourth local products, chiefly cottonseed meal, and the remainder being imported grains and raw feed products. Thus, probably less than 100,000 tons of feed (except locally grown corn) are currently being fed animals and fowls on the Island. A limited quantity of the Island's receipts is exported for use in the Virgin Islands.

Although Puerto Rico is not a bread-grain producing area, it is a consuming area for many cereals and products milled from grains. There are no milling and only a limited amount of facilities for feed mixing and for vegetable oil extracting in Puerto Rico, the Virgin Islands, and certain other areas of the Caribbean. Such facilities are needed in Puerto Rico in order to utilize the products of the Island, to make products adapted to the tastes of Puerto Ricans, to utilize labor and wastes from other agricultural processes, and to save on freight charges by making it possible to import grains in bulk rather than in bags.

AVAILABILITY OF PRODUCTS AND BYPRODUCTS FOR PROCESSING

Field corn is produced on the Island. Although it is generally believed that the production of corn is a less profitable use of land than other food crops, the fact that in excess of 550,000 bushels are produced annually 30/ would indicate that the production of corn might continue and, under certain circumstances, when it fits into a well-planned cropping system and through the use of mechanical equipment, that it might increase. In addition, about 22,000 tons are imported annually, more than 14,000 tons of which come from the Dominican Republic. Because there are no facilities at dock side to handle bulk corn, the corn is imported in bags of 100 pounds each and therefore takes a higher freight rate per bushel.

Sea-island cotton is grown on the Island. This cotton is ginned, and the lint cotton shipped to the United States. Part of the seed is crushed in an old hydraulic-type mill and the oil exported, and the remainder except that used for seed is fed to animals. Because of these practices the cottonseed now produced on the Island is not economically utilized. The possibility of increasing the production of sea-island cotton is unquestionable. That which is produced is very long in staple and has very little competition in the quality cotton markets of the States, since it receives a premium price over Egyptian cotton. The main problem in increasing production is the adoption of fertilization and of mechanization and improved ginning. The present lint cotton yield from seed cotton is less than 28 percent.

Coconuts are grown generally around the outer part of Puerto Rico and in neighboring islands. Two plants, one manufacturing shredded coconut and the other coconut milk, are capable of utilizing all coconuts not exported as such. A waste pulp byproduct recovered in this process has a limited amount of oil in it. Part of this waste is fed to cattle, and the disposal of the remainder presents a problem. These wastes would yield some edible and nonedible oil and the residue would be very suitable for livestock feed. Because it takes a number of years to bring a coconut tree into production, there is little possibility of increasing production of coconuts in the immediate future except by obtaining a higher yield per tree.

The people of Puerto Rico eat substantial quantities of rice, but the bulk of it is imported from the States. A limited amount of rice is produced in Puerto Rico, largely on family size farms, none of which enters into commercial channels. The production is in small plots, and its cultivation and harvest is done by hand. Because of low yields it does not appear feasible to expect any substantial increase in the acreage or production. All imported rice, amounting to about 271,000,000 pounds in 1949, is received in bags and has already been milled.

30/ According to the 1940 U. S. Census.

954117 O—51——10

Soybeans and peanuts are grown on the Island in limited quantities. Experimental results show that very good yields of these crops can be obtained in certain seasons, but the lack of proper mechanical equipment for their seeding, cultivation, and harvesting has not encouraged production. With the establishment of good cropping systems and greater use of mechanical equipment, the production of soybeans and peanuts may show some increase.

If a slaughter facility is built and if it handles the estimated volume of animals discussed in Part II, about 928 tons of animal protein byproducts from the slaughtering operation would be made available for conversion into livestock and poultry feed. Unless this byproduct, with an estimated raw value of about $69,600, can be utilized properly in a good feed mill, much of this value would be lost. In this way, the people of Puerto Rico would lose the benefit of this desirable raw material as well as the opportunity of giving employment to labor that would be required for the additional processing, and farmers would not have the advantage of the additional feed made available for increasing livestock and poultry production.

In the canning and processing of pineapples there is an estimated 4,500 tons of waste material, containing sugar, protein, and fiber. Many of the owners of the canning companies have recommended that a mill be erected to dry and mix the waste into cattle feed. Although this waste alone could not support a mill, its use, together with that of other materials produced on the Island and of imported materials, in the manufacture of feed would justify such an establishment. If the pineapple industry could realize 1 cent per pound for the waste material, the annual return would amount to $90,000.

One totally unused waste, except for fertilizer, is the pulp from the coffee bean. As the coffee is picked, the pulp is separated from the berry at a stationary plant. In some of the coffee producing countries of Central America, it has been found that the coffee pulp can be fed to cattle and certain other animals. When carrying 10 percent moisture, the pulp contains 9 percent protein, 60 percent carbohydrates, 10.5 percent crude fiber, and 9.8 percent minerals, largely calcium and phosphate, according to reports from Costa Rica. Whether or not this waste can be recovered and used economically in the manufacture of feeds will depend upon the possibility of drying the material and assembling it in sufficient quantity for transporting it economically to a central feed mill. This analysis of coffee pulp shows that, when dried, it has a feeding value of about 88 percent of that of corn. 31/ It is estimated that in excess of 4,000 tons of

---

31/ F. B. Morrison, "Feed and Feeding," page 1116, 1949; Corn No. 2--8.6 percent protein, 3.9 percent fat, 2.0 percent fiber, 69.3 percent carbohydrates, and 1.2 percent minerals.

this material in dry form are available at the principal centers where the coffee berry is separated from the pulp.

A great potential supply of feed for dairy animals, beef cattle, goats, horses, and to a limited extent for pigs, if the molasses produced in the milling of sugarcane. This product is a readily digestible carbohydrate, produced in large quantities. In 1949 it sold at a price of from 2 to 5 cents per gallon. With the exception of the molasses used in making rum or alcohol on the Island, the bulk of the supply is shipped to the States, where it is used largely for making feed or in the feeding of livestock. In many instances, the molasses is mixed in feeds that are shipped back to Puerto Rico. Molasses may form as much as 20 percent of dairy feeds, or 400 pounds per ton of feed. Thus, in the preparation of feed for dairy animals in Puerto Rico, a large quantity of molasses could be used in this mixture. Moreover, the addition of molasses enhances the palatability of livestock feeds.

In connection with the waste of the sugarcane mills, large quantities of bagasse, or cane stalk pulp, that is not used on the Island, are available. About one-half of it is burned by the mills to furnish power, but the remainder is available for other uses. Although it is expected that part of this byproduct will be used in the manufacture of cardboard boxes and paper products, a substantial tonnage could be used as a carrier for molasses mixed with vegetable proteins and minerals to be fed to cattle. This type of feed would make a good maintenance ration at a low cost. Experimental work has been done in connection with the use of bagasse and molasses, through which it has been demonstrated that cattle can be maintained on this mixture in the Virgin Islands.

A number of other wastes in processing establishments about the Island are not being utilized, including the pulp and seed from the processing of guavas, mangoes, and many other fruits. If these products could be assembled and transported economically to a central feed mill, their use would increase the supplies from local sources and reduce the need for imports. Any seed of a fruit, vegetable, or cereal contains protein, carbohydrate, fat, and minerals. All of these products are constituents of feed, and it is desirable to explore the possibility of using them in feed whenever they are concentrated in a sufficient quantity at one place. The possibility of extracting both edible and inedible oils should not be overlooked in exploring the use of seeds.

DESCRIPTION OF PRESENT FACILITIES AND THEIR DEFECTS

There is only one large organized feed-mixing plant in San Juan, and there are three small plants in Puerto Rico. The latter are equipped for small batches of material, and some have grinders for corn. The Puerto Rico Agricultural Company operates a small mixer on Vieques Island to supply its own needs. This facility and its equipment are designed to mix imported feeding materials in one-ton batches for use in the company's farm operations at this point. About 1,200 tons of feed were mixed in this plant in 1949.

The present facilities for mixing feed and crushing cottonseed for oil are antiquated and inadequate. The buildings were not designed for these purposes and are situated about 3 miles from boat docks. About three-fourths of the raw materials and supplies used in manufacture must be hauled from the docks by truck over narrow streets through heavy traffic and unloaded into a warehouse that does not have modern handling equipment. This extra handling increases the cost of feed by at least $1 per ton.

The facility at San Juan has an old hydraulic press, which does not recover more than 80 percent of the oil of cottonseed. Because of the impurities it leaves in the oil recovered, the oil is discounted on the market at least 20 percent. For each 100 pounds of cottonseed crushed there is a total loss of about 6 pounds of oil, which is worth about 90 cents. In the crushing of an estimated 600 tons of seed, an annual loss of about $10,000 occurs. In this calculation no allowance is made for a lower value for the meal because of its higher oil content. Because of the increased oil content in the meal, it becomes rancid more readily before reaching farmers. A 20-percent reduction on the price of cottonseed oil, due to improper crushing, would result in the decrease in oil value of more than $12,000. These losses in value are reflected in the price farmers receive for cottonseed, and they affect the economy of the entire Island.

The plant is equipped with an old-type mixer, where ingredients are measured by hand. Proper knowledge of the analysis of the material going to the mixer is not possible. There is no laboratory in the plant for analyzing the product. The Agricultural Experiment Station at the University has the only laboratory for the analysis of these materials, but there is no authority for it to do this work. Throughout the plant extensive use of labor is made where mechanical equipment in a well-designed plant could do the job more accurately and efficiently.

The product from the plant is sold largely through retail grocery and feed stores scattered about the Island. Orders are taken by a corps of salesmen, and distribution is by truck.

There is no facility on the Island equipped to mill corn, wheat, and other products for human consumption and to use the byproducts for producing feed for livestock. Products, such as flour and corn meal, are imported as finished products. Brokers and large wholesale dealers import them, together with animal feeds and other products, from the States and from other countries. The principal sources of supply are from eastern seaboard ports of the States; some supplies come from Gulf ports. Corn, peanut meal, and limited quantities of other products come from the Dominican Republic. All these products are shipped in bags to Puerto Rico, where brokers and large wholesalers distribute them to other wholesalers. A large part is delivered to retailers at boat docks in San Juan and over the entire Island. Truckers from all parts of the Island handle some of this volume, either on their own account or for some broker or dealer.

Most of the imported products are produced in the north central part of the United States and move through one or more terminals in transit by railroad to the coastal ports. Thus, certain brokerage, handling, and railroad freight charges are added to the cost of the products before they are placed on boats and hauled to Puerto Rico. Since no grain is delivered to San Juan in bulk, no freight rate on bulk grain has been established from the States. The rate on bagged grain and feeds is 58 cents per hundredweight from United States ports to San Juan. The freight rate on flour, corn meal, and similar products is 63 cents per hundredweight, plus a landing charge of 5 cents per hundred, or a total of 68 cents per hundredweight. The scheduled freight rates for hauling these products in bulk from the United States to Europe run about 40 cents or less per hundredweight. It is understood that the freight rate to Puerto Rico, if established, would be somewhat less. In any case, at least 18 cents per hundredweight on bagged grains and feeds and 28 cents per hundredweight on wheat could be saved by shipping them in bulk. When nonscheduled ships are used for such transport, the rate on bulk grain may be considerably less.

Because of the lack of proper facilities for the storage of supplies and the processing of grains and other feeds in San Juan, the sellers and buyers are forced to buy on a hand-to-mouth basis, which prevents them from buying large quantities of products in seasons of harvest when prices are generally lower. For example, the price of corn in Chicago in January may be $1.25 per bushel, whereas from July to September it may be much more. Savings in price of as much as 15 cents per bushel could be realized on wheat and corn procured and held

for future use by the building of storage facilities in San Juan. This saving might be increased if purchases could be made from the crops harvested along the eastern or southern seaboard of the States, where the price for the product at such locations is generally Chicago, Ill., price less freight.

At seaport docks in the States, in transit, and at the San Juan docks, the humidity is higher than it normally is in the grain-producing areas, and the grain therefore absorbs some moisture. When bagged merchandise is stacked from 10 to 30 bags high, there is little opportunity, if any, to use a drier to remove the added moisture. Although the feeding to livestock and fowl of grain carrying a slight mold is not always harmful, its value as a feed has been reduced by the extent of the mold content. Under certain circumstances the feeding of grains and feeds having a heavy mold and rancidity causes livestock and fowl to become ill, and sometimes mature female stock will lose their young. Bulk grain is moved into and out of the ships by power or gravity conveyors. In moving it out of the ships at port, the product is "turned" or otherwise exposed to the atmosphere so that foreign materials can be removed. If the grain is found to contain a percentage of moisture too high for safe storage, it can be run through the grain drier. In addition, insects can be removed and the grain treated for weevil and control of other insects as it is placed in storage. The handling, drying, and full treatment of bagged grain and mill feeds are not possible under present methods in San Juan.

It has been estimated that from 3 to 6 percent of the value of feed and feed grains is lost because of spoilage and insects. This estimate is based upon the samples taken during the study and the inspection of the product in bags in Puerto Rico. On the basis of an estimated 90,000 tons of these products imported at a value of only $80 per ton ($4 per hundredweight, which is slightly under the price of corn), the total value of these products is $7,200,000. If 3 percent of the value of these products could be saved by the building of proper facilities in San Juan, a total saving of $216,000 could be realized.

By the milling of corn, wheat, rice, and other products in Puerto Rico, several advantages would accrue to the people. Employment would be provided to people of the Island, fresh supplies could be delivered daily to retail outlets, and the product could be milled to meet the tastes of Puerto Ricans. All byproducts--seed coat, germ meal, and other materials--could be utilized in the manufacture of feeds for animals. The flour, meal, and other cereal products could be fortified with the proper vitamins and in the proportion necessary to meet the needs of people living in Puerto Rico and adjacent areas. In

packaging these products, materials produced in Puerto Rico could be utilized. It is expected that cellophane will be produced on the Island; there already is a plant for manufacturing fiber cartons. One advantage of using cellophane packages for these products is the prevention of contamination. Many retail stores sell these products from the original 100-pound bags, as imported. Each buyer usually dips his hand into the bag to draw out the rice or other products when a purchase is made. The product is contaminated and is a hazard to the health and welfare of the people.

QUALITY OF FEEDS SOLD IN PUERTO RICO

In the course of this study, 35 samples were obtained of various grades and kinds of feed from 7 different manufacturers, including the organized plant in San Juan and six in the States. These samples were analyzed by a member of an advisory committee aiding in this study and a Midwest laboratory of one of the land grant colleges. It was found that the feed produced locally more nearly met specifications than any of the feeds sampled. Many of the imported feeds failed to meet specifications with respect to protein, carbohydrate, and fat content, and many had a higher fiber content than their guarantee stipulated. A very large percentage of the feeds analyzed were nothing but maintenance rations, having a low percentage of digestible protein, carbohydrates, and fats and a high percentage of fiber.

Most of the feeds analyzed were mixtures for dairy animals. The samples obtained of chicken mash and hog feed were considerably lower in food value (particularly animal protein) than is normally recommended to supplement starchy feeds, such as root crops or corn. Much of the material included in the feeds analyzed was screening from the processing of cereal grains and seeds. The feeding value of the screening was so low that it was not worth the freight cost from eastern ports of the United States to Puerto Rico. In fact, in most instances, the feed value of the screenings was no better than bagasse.

In March 1950 the authors and a representative of the advisory committee, who is a feed and milling specialist, surveyed a number of market places and sampled some corn, oats, and other products offered for sale. All samples of feed and grain showed from 5 to 20 percent damage from mold, insects, and other causes. All samples of oats were light in test weight and showed mold and other damage. None of the grain sampled would pass as grade U. S. No. 1 or No. 2. Most of it was sample grade or lower. From the laboratory analyses and sampling of feeds used in Puerto Rico, it would appear that they are not well suited to the needs of the animals. Without quality control and guaranteed product it is not possible for livestock and poultry producers to balance rations properly.

KIND AND SIZE OF FACILITIES PROPOSED FOR IMMEDIATE CONSTRUCTION

Any facility built in San Juan to handle grain and other feeds would need to be located near water and dock facilities in order that ships may be unloaded directly from boat into the storage or processing part of the plant. Consideration also should be given to the availability of railroad trackage to the facility for the direct receipt by rail of molasses and other products produced on the Island. Since the products to be handled through the facility are of a less perishable nature than most other market products, they could be distributed by rail.

On the basis of the minimum needs for storage space and economy of development and operations, it is recommended that storage facilities be developed at dock side for 300,000 bushels of bulk grain with such layout and equipment for moving in and out and between storage that the capacity might be increased to 1,000,000 bushels. In addition to the bulk storage space there should be elevator legs, a head house, and elevator equipment.

A feed mill (building and equipment), with a capacity of 40,000 tons annually, for grinding, mixing, and other processing connected with a head house, should be provided. This plant would include automatic bagging machinery of the latest design and warehouse space for the storage of manufactured products. The expected output is about 40 percent of the tonnage now being consumed. With the introduction of feed manufactured to meet the needs of livestock and fowl of Puerto Rico, fortified with the proper kinds of vitamins and minerals, the consumption may be expected to increase. Also the building of a modern slaughtering facility which will provide a ready and good market for meat animals of heavy weights and the use of supplements with native feeds may increase the demand for mixed feeds. Therefore, it would be desirable in designing the initial plant to arrange it so that its capacity could be doubled or tripled.

It is proposed that milling space and equipment for handling up to 1,000,000 bushels of wheat and 500,000 bushels of corn annually for milling into flour and meal be constructed. Because the flour to be obtained from this volume of wheat would meet only about one-third of the consumption requirements of Puerto Rico, it would be necessary to design this facility so that its size could be more than doubled to meet future requirements.

A modern vegetable-oil-extracting plant should be built in conjunction with the storage, feed-mixing, and milling facilities, of sufficient capacity to handle at least 10,000 tons annually. The

machinery should be of latest design and equipped to deliver the largest percentage of oil of good quality. This will require the use of a building with expeller unit 32/ and boiler installation and related machinery. This plant should be capable of handling all cottonseed, copra, peanuts, soybeans, and palm nuts to be made available on the Island and from neighboring islands. In connection with this installation, there would be a need for storage tanks, pumps, and related equipment.

A good grain and feed drier should be installed with a capacity of about 400 bushels per hour when reducing moisture 5 percent. Such a drier is needed to control moisture and insect infestation of grain handled and to dry waste products to be obtained from various plant operations, such as pulp from pineapple canning facilities.

The foregoing equipment would need to be adjacent to the docks so as to handle imports and exports direct. If a factory were developed for the manufacture of edible oil products, soap, paints, and various other products, it should be near the boat docks. Such a location would permit the plants to utilize locally produced products as well as such imports as could be purchased from some other islands at a price which would permit a profit on processing in Puerto Rico.

In addition to the dock facilities, railroad trackage, building, and other facilities recommended to be included in the over-all plan, parking space, streets, and space for certain other services will be needed. Space for expansion should be included in the original design of the layout, as shown in figure 17.

The wharf space required for servicing the facilities to be built initially should be of sufficient length to accommodate one ship, or about 450 feet. 33/ The wharf should be about 40 feet deep from water line to edge of the buildings, and should be constructed according to plans shown in Part I.

32/ The solvent method possibly would be preferred over the expeller method, but this determination could be made by the firm who will ultimately operate the plant.

33/ This space, together with the wharf space proposed for the wholesale produce market in Part I, is sufficient for berthing six ships at one time. The six shipping lines servicing San Juan have seven ships arriving within a 24-hour period each week. It is believed, however, that six berth spaces will be ample in the beginning, since three lines carry only limited quantities of products to the market and one line could haul in one ship, instead of two ships as done at present, the products destined for San Juan.

About 4 acres are required for the initial construction; the actual area needed will depend somewhat on the amount of street space to be included. For facilities that may be needed in the future, at least 3 acres should be provided. If land is readily available, 4 or 5 acres should be reserved for future expansion and for the inclusion of a soap and edible-oil-processing factory or of any other allied industries.

COST OF DEVELOPING THE FACILITIES RECOMMENDED AND OPERATING EXPENSES

Estimated Cost of Land and Its Location

The facility must be at a point where boats can come to wharves for loading and unloading. In previous parts of this report it was suggested that the site southwest of Martin Pena Channel be used for the development of a terminal produce market and a slaughtering and meat-processing facility. The problems relating to the cost of land, filling, and dredging were discussed. It is proposed therefore that the feed-mixing, milling, and processing facility be as near as possible to the wholesale market facility, as shown in figure 17, because the buyers that come to the wholesale market also are buyers of the products to be derived from the recommended milling and feed-mixing facilities. Moreover, if the two projects are developed together, some savings in construction and development costs may be realized, and some features of the development, such as streets and wharves, may be coordinated.

At this location buyers can be serviced, cost of development may be held to a minimum, and railroad service could be brought from the proposed railroad line to be located in the general area.

The Insular Government owns the land, which, for this purpose, has been valued at $1,000 per acre. Since the feed-mixing and milling plant would be developed entirely on fill, the land cost for this facility would be about the same as that for the slaughtering and meat-processing plant, as shown in Part II. The total cost of land and fill therefore would be $12,000 per acre, or $84,000 for the 7 acres needed for these facilities.

Cost of Facilities and Equipment

Whether or not the buildings, equipment, and other facilities needed should be built will depend partly on their cost. It was possible in the course of this survey to obtain the layout and design of most of the facilities recommended and good estimates of the costs of constructing them from a firm in the States that at present is constructing similar facilities in certain parts of Central America. The itemized estimates of cost are shown in table 9.

Total Cost of Land, Facilities, and Equipment

The estimated cost of the land, including the cost of fill and grading is $84,000. The cost of facilities and equipment was estimated at $1,761,899, making a total of $1,845,899.

Table 9.--Estimated cost of construction, equipment, and other developments for a grain storage, feed-mixing mill, and vegetable-oil-extracting plant in San Juan, P. R.

Item	Size or capacity	Total cost
		Dollars
Grain storage bins and 110,000 bushel storage in related facilities	300,000 bu.	185,000
Head house and feed mill building (annual capacity)	40,000 tons	100,000
Feed mill machinery (annual capacity)	40,000 tons	70,000
Flour mill and cleaning house		130,000
Flour storage		70,000
Flour mill machinery		330,000
Warehouse		40,000
Corn mill machinery		110,000
Boiler house and stack		35,000
Expeller building		30,000
Boiler installations and expeller unit		40,000
Expeller machinery		240,000
Oil tanks, pumps, etc.		30,000
Elevator machinery		120,000
Drier equipment		50,000
Paving @ $3.50 per sq.yd.	6,000 sq.yds.	21,000
Piling for buildings and storage		100,000
Storm and sanitary sewers		5,000
Fence @ $3.50 per linear foot	900 ft.	3,150
Total		1,709,150
Architect and engineering fees on $879,150 @ 6 percent 1/		52,749
Total cost of buildings and equipment installed		1,761,899

1/ Costs of machinery and equipment which do not require any designing are excluded.

Cost of Dredging, Wharf, and Bulkhead

The cost of building a wharf and dredging has been discussed in Part I of this report. It was pointed out that in practically all cities where such facilities exist, the major portion of the cost is borne by a governmental agency. The same situation would be true with respect to the wharf and dredging required for the placement of a milling, feed-mixing, and vegetable-oil-extracting plant.

For purposes of this report, it is assumed that these facilities would be adjacent to the wholesale produce market, discussed in Part I. It would be necessary to dredge the distance of the wharf, 450 linear feet, plus 100 feet more so that a ship could dock with its stern or bow extending beyond the end of the wharf. The dredged area should be 300 feet wide. Therefore about 140,000 cubic yards must be dredged. 34/

The cost of building a wharf and a bulkhead would be at the same rate estimated for the wholesale produce market. All these costs are shown in table 10. It should be pointed out that these costs would be greater than those shown if the grain storage, feed-mixing, and related facilities were built at any other location.

Table 10.--Estimated cost of dredging, wharf, and bulkhead on the suggested site, San Juan, P. R.

Item	Unit	Total units	Unit cost	Total cost
		Number	Dollars	Dollars
Wharf	sq.yd.	2,000	4	8,000
Piling	pile	170	450	76,500
Bulkhead	linear ft.	450	150	67,500
Total		-	-	152,000
Engineering fees (6 percent)				9,120
		-	-	161,120
Dredging	cu.yd.	140,000	.50	70,000
Total cost		-	-	231,120

34/ On the average, about 23 feet of soil must be moved to provide a 30-foot channel.

Amortization of Investment

Facilities of the kind recommended, properly developed and managed, will last for a long period. Similar facilities in the States have operated for an average of more than 30 years. For purposes of figuring the amortization charge required to liquidate the investment in land, buildings, and equipment--$1,845,899--it is believed desirable to use a shorter period as was done for the slaughtering facilities. On the basis of a 25-year period, at 4 percent interest, an annual interest and principal payment of $64.01 per $1,000, or a total of $118,156, would be required.

In order to liquidate the $231,120 investment in wharves, bulkhead, and dredging on a 40-year basis, with interest at 4 percent, as was done in Part I, an annual payment of only $11,676 is required. It is doubtful whether it is necessary to liquidate the cost of the wharves in the period specified because these would continue to be the property of the Insular Government. Full payment might be expected on the bulkhead, since the edge of buildings and other facilities would rest on it. The cost of dredging is normally not a liquidated expenditure.

Taxes

It is believed that regular taxes on the equipment and facilities, or certain funds in lieu of taxes, should be paid by the management. 35/ The amount of taxes would be based upon the assessed value times the applicable rate in the municipality. If the facility were located as shown in figure 17, the 1950 Rio Piedras rate of $29.40 per $1,000 would be applicable. It is not known what the exact assessed value of the property would be, but it is assumed that the assessment is 75 percent of the cost of the facilities not including fill and grading, streets, storm and sanitary sewers, and architectural and engineering fees, or 75 percent of $1,683,150, making the assessed value $1,262,362. Thus, the annual tax on these facilities would be $37,113.

Annual Operating Expenses

As in the case of the slaughtering plant, it is assumed that the expenses of actual operations would be paid by the operator to whom the plant is leased and that the only operating expense that would fall on the owner of the facility would be that of maintenance of the property. For purposes of determining the amount of revenue that would be needed to cover the cost of the grain storage, feed-mixing,

35/ Land is not included for taxing purposes because the Insular Government owns it and presumably will continue to own it.

and related facilities, it is assumed that the maintenance costs would be one percent of the total cost of these facilities excluding the cost of land and fills, piling, storm and sanitary sewers, and architectural and engineering fees. This percentage allowance for maintenance is the same as that for the slaughtering facilities, but higher than that for the produce market because the owner of these facilities would own a considerable amount of equipment which costs more to maintain than the type of buildings found in the produce market. On this basis it is estimated that the annual maintenance costs would be $16,042.

Source of Revenue

The total annual expenses for amortization, taxes, and maintenance of the grain storage, feed-mixing, and related facilities are estimated to be $182,987. The revenue to cover these expenses would have to be obtained from the rental charge made in the lease of the facility to the operator.

WHO SHOULD BUILD, FINANCE, AND MANAGE THE FACILITIES

Consideration was given during the survey to the problem of who should build and manage the grain storage and related facilities. No one was found who would put up the capital and make the investment required to build the facilities.

It is known that the Puerto Rico Industrial Development Company at one time offered to undertake the development in cooperation with a substantial grain handling firm in the States and that plans similar to those recommended herein were developed, but ultimately this firm declined to accept the responsibility for the investment. It is believed that it now would be possible through negotiation to obtain a competent and experienced firm or individual to cooperate with the Insular Government in this undertaking. It should be pointed out, of course, that the Insular Government should determine, first, whether such a development is desirable, and, second, how much money can be spent for that purpose. These determinations should be made on the basis of the benefits to be realized from such a development.

Since there are no experienced operators of like facilities in Puerto Rico or, for that matter, in many parts of the Caribbean area, the Insular Government would have to look to the States for such operational experience. In any event, the planning or building of the facilities should not be started until such time as competent management is obtained, and the Insular Government should review the final design and equipment with the selected management to make sure that they will do the job most economically under the system such management will adopt. The firm selected to construct the facilities should be one with experience in constructing such buildings and in placing and operating the equipment to be included. The determination of the arrangements with the operating firm would be the responsibility of the Insular Government.

Regardless of the final financing and operational plan carried out in getting the facilities into operation, the Insular Government must retain an interest in the enterprise from the standpoint of inspection and maintenance of standards with respect to both human foods and animal feeds produced in such a plant. Since the plant might well serve the Virgin Islands and certain other areas of the Caribbean, as well as ships in port, the inspection and health standards should be at least as rigid as they are in comparable plants in the States. Although the recommended plant is designed to produce the highest quality of products, such quality can be assured only if the plant is operated in an efficient manner. The plant will have to cooperate fully with the Insular Government and local agencies in developing foods to meet the tastes of Puerto Ricans and feeds

954117 O—51——11

properly fortified and compounded to meet the requirements of animals on the Island, and in exploring the possibilities of improving existing foods and of using products from farms in Puerto Rico for processing into new kinds of foods.

The same principles apply to the selection of the operators of the milling and feed-mixing facilities as of the slaughtering and meat-processing plant. If the proper individuals or firms and enough experienced operating personnel to form a skeleton organization could be obtained for both plants, such a staff could be used by the Insular Government and local agencies as advisers and to aid in bringing about improvements in many other fields of endeavor. It would be impossible to import all the personnel needed, so many natives would have to be trained to perform certain functions. Since the Insular Government is not equipped to do this work, these firms could assist it in doing so.

The foregoing factors, which are important to Puerto Rico and to other Caribbean areas looking to Puerto Rico for guidance, tend to limit the type of individual or firm that could be selected. Consequently, some difficulties might be encountered in the finding of an individual or firm that would undertake the operation and management of the facilities. However, it should be pointed out that neither the Insular Government nor any other governmental agency should undertake the development with a view to government management because without the "know-how" and experience such a venture would surely fail.

It is generally agreed that the major portion of the financing, if not all, will need to be provided by the Insular Government. This practice has been followed in the building of many industrial plants in Puerto Rico during recent years. Two agencies of the Government--the Puerto Rico Industrial Development Company and the Puerto Rico Agricultural Company--probably could build and finance the development provided the proper authorities approved. It makes little difference which agency does the job if the people of Puerto Rico approve and the Insular Government recommends it. Because of the factors already considered, it is believed that by government financing, both the people and the Government will ultimately be better off than if outside private capital were used. By maintaining local interest in the development many intangible advantages can be expected.

In addition to the problem of financing the structural costs, land, and other features of the development, the operator and management must be able to obtain substantial credit from local banks. Bank credit for an operation of the kind described may exceed $1,000,000. If such an operation is to be carried on successfully and the greatest benefit derived from it, arrangements must be made for the necessary credit.

Although it is not possible to set forth all the problems that may be encountered in establishing the proper kind of management and arrangements for financing, the foregoing discussion points out some of the major obstacles and presents some suggestions for their solution. The final determination with respect to meeting these problems can be made only when the Insular Government finds an individual or firm that is willing to discuss the entire undertaking with a view to accepting the responsibility of operation and management.

BENEFITS TO BE DERIVED BY BUILDING THE FACILITIES

The building of grain storage and related facilities would be of material benefit to Puerto Rico in that they would provide storage of sufficient capacity to keep consumers from being dependent on a day-to-day supply of food and feed. To be free of such dependence is equally important to any country in time of war or when world supplies are less than world demand. These facilities would provide a dependable source of milled and manufactured products that are fresh and processed to meet the tastes of Puerto Ricans. Still another advantage would be that they would save dollars on the products imported. The major portion of this saving would be paid to labor employed in the operation. Although a monetary value cannot be placed on many of the benefits that would accrue, they are worth consideration in a period when great political, economical, and industrial changes and advancements are being brought about throughout the world. Some of the benefits that can be measured, however, are:

1. As pointed out in connection with the handling of produce in the present market, there is extra trucking from boat docks to warehouses and from warehouses to wholesale stores. Also, there is extra trucking on the feeds and grain arriving by boat that are trucked to the present inefficient feed-mixing plant. It is estimated that at least one extra trucking charge is made on half of the imported receipts, or on 45,000 tons, and that if the charge of 5 cents per 100 pounds is applied, the total charge would be $45,000. In some cases where the commodity is trucked twice, the charge is doubled. It also should be pointed out that with each trucking and handling there is some loss of feed from the bags, due to breaking, tearing, and other causes.

2. Probably one of the greatest savings that could be realized is from importing feed grains in bulk, rather than in bags. These savings would result from the differential in freight rates. This same saving would apply to the grain imported for milling into flour. On the basis of present imports, there are about 50,000,000 pounds of corn, oats, grain sorghum, and other grains for feed imported in bags. It is estimated that a saving of about 18 cents per hundredweight of the cost of freight could be made if these imports were in bulk rather than in bags. Thus $90,000 could be saved on the imported feed grain. If the proposed flour and corn meal mill were built to mill the 1,500,000 bushels of grain, and if a saving of 18 cents per hundred pounds were realized by receiving this quantity in bulk instead of in bags, a saving of about $160,000 would be realized. This estimate covers only the 1,000,000 bushels of wheat and 500,000 bushels of corn expected to be milled in Puerto Rico. If the additional 10 cents differential for flour freight cost per hundredweight were applied to the 1,000,000 pounds of flour milled from the corn and wheat, additional savings of $45,000 would be made.

3. As has been pointed out, the present method of crushing and extracting oil from cottonseed is antiquated and inefficient. The loss of oil that is not obtained by the present hydraulic crusher is about $10,000 annually. The loss in price and value by the 20 percent discount on the oil recovered is estimated to be $12,000 annually. Therefore, the total measurable loss in oil and value of oil recovered is estimated to be $22,000 annually. In addition, a loss occurs in the value of the cottonseed oil meal due to the higher oil content which makes the meal become rancid, and the feed in which it is mixed spoils more readily. No attempt will be made to evaluate this loss in dollars.

4. Because of the lack of adequate storage facilities, it is not possible for Puerto Ricans to benefit from the lower prices of grains during seasons of harvest in producing countries, such as the United States, Canada, and Argentina. If the capacity to be built, even if only sufficient to store 300,000 bushels, were filled during one season of production, either with bulk corn or with wheat, at least 15 cents per bushel could be saved on the yearly average price of these products, or a total saving of about $45,000. Of course, some of this saving in price would be offset by the cost involved in holding the grain.

5. Since all products received in San Juan are in bags and there are no drying facilities for conditioning grain for feed that has accumulated too much moisture in transit or at docks, a considerable loss occurs from mold, insects, and other causes. If it is assumed that a minimum of 3 percent could be saved on the 40,000 tons to be handled in the proposed plant, valued at $4 per hundredweight, or on a total value of $3,200,000, the savings would amount to $96,000.

6. It was pointed out in Part II that there are various reasons why a slaughtering plant is needed. One of those reasons is to make possible the recovery and use of the animal byproducts valued at about $70,000. A feed-mixing facility must be developed if savings through the use of these byproducts are to be fully realized. No value is placed on the animal feed recovered from the slaughtering facility because its value is shown for the facility delivering it. If the 4,500 tons of byproducts from the pineapple canning plants, valued at $90,000, are to be used, a drier and feed-mixing plant will be needed. Likewise, a feed-mixing plant will be needed, together with oil-extracting machinery and driers, to recover fully the wastes from coconuts and from other products being processed or to be processed on the Island.

The total dollar savings that could be realized are shown below. Although these savings may seem large, the value of many of the items

included has been reduced by as much as 40 percent of sample findings. If the plant were operated in an efficient manner, producers of corn and other feeds would always have a good market for their products. Under all circumstances, a producer would have an opportunity to sell to the plant, and the prices offered would and should be published daily, basis (f.o.b.) delivery in San Juan for a certain grade and quality of product. The potential benefits to producers of corn and other products are immeasurable because they would affect the entire Island as well as neighboring islands.

Item	Dollars
Cost of extra trucking from present docks	45,000
Savings in freight on bulk versus bagged grains	
For animal feed	90,000
For flour and milling	205,000
Savings from modern crushing plant on cottonseed	
Increased delivery of oil	10,000
High price on oil delivered	12,000
Savings from purchase in season of harvest	1/45,000
Losses in present market due to mold and insects	96,000
Returnable value from pineapple waste	90,000
Total	593,000

1/ Not allowing for cost of storing for the longer period.

The estimated annual savings to be made by the development of grain storage, feed-mixing, milling, and related facilities total $593,000. The annual principal and interest, taxes, and other charges on the facilities, including those for wharf and dredging on the suggested site southwest of Martin Pena Channel, amount to $182,987. Thus, an annual gain to the Island of nearly $400,000 could be realized through the development of the facility. It should be recognized that not all of this saving would accrue to farmers and consumers, but they certainly would share in it. A part would go to the operators of the facility.

SUMMARY OF BENEFITS TO BE REALIZED FROM ALL OF THE PROPOSED DEVELOPMENTS

The three parts of this report show the estimated costs, by items, for the various proposed developments and the possible savings to be realized therefrom. To construct the facilities will require an estimated expenditure of about $9\frac{1}{2}$ million dollars, and the annual savings that would result over and above the cost of amortizing the investment are estimated to exceed 2 million dollars. Although it is not anticipated that all of these savings would accrue to the various kinds of distributors, dealers, or farmers, it is anticipated that they will benefit the economy of the Island as a whole. Savings in distribution costs brought about by the improvement in market facilities and distribution practices are generally believed to accrue to consumers, middlemen, and producers. The competitive nature of the middlemen in a centralized market prevents them from retaining all the savings which accrue to them. The major part of the savings, therefore, are passed on to the consumers or back to producers.

A market of the kind recommended would be of material benefit to farmers in Puerto Rico, since it would provide a market place for many farm products for which no market is now available. It would concentrate in one market place--within 5 or 6 hours reach by all farmers on Puerto Rico--enough supplies to attract buyers from all parts of the Island and some distant areas. Farmers in Puerto Rico are in a favorable position in that the entire Island is frost-free, and the soil is relatively fertile and responsive to good fertilization and cultural practices. They are able therefore to produce practically any commodity in any season of the year, and in winter to furnish supplies to the States and other parts of the world where such products cannot be grown in that season and where there is a tremendous purchasing power. On the other hand, if the farmers in Puerto Rico had a good market place and fully supplied the local market so as to feed the $2\frac{1}{4}$ million people in Puerto Rico with the products from their farms, there would be little need to consider the export market. The proposed market would provide a place for farmers to compare quality and prices and improve the packaging and handling methods. No standard containers are used or grading done for products offered for sale. The market should result in substantial benefits to the farmers raising heavy hogs, cattle, goats, and other animals and fowl. It would make available to them higher quality feeds, mixed and blended, to meet their specific needs. It would provide an outlet for the waste products from farms and processing plants. This would enhance the returns to the producers of pineapple, coconuts, cotton, and other products. Modern facilities for

handling hides would benefit each producer of cattle and goats. The improvement in income to producers would increase their purchasing power and thus enhance the whole economy.

Although the proposed facilities would greatly benefit brokers and dealers in the market by reducing their costs of operation, their losses through spoilage and deterioration, and their working hours, it also would improve their opportunity to give better service to the buyers in the distribution area. Although the wholesaler has many problems to solve in the distribution of commodities to retail buyers, it is the ultimate buyer who needs to be given first consideration. For buyers, tremendous savings could be realized by the consolidation of all these activities in one market area. It would mean that on one trip to the market they could buy in the shortest time and with the least amount of travel all commodities required in their retail stores, restaurants, and other outlets.

The market would benefit the shipping companies servicing San Juan in two ways. First, they could handle in excess of 400,000 tons of food and related products in one location in the most efficient manner by the adoption of palletization. As a result of moving this tonnage from their present wharves and warehouses they could more efficiently handle the large tonnage remaining to be handled at the old wharves and warehouses. It would permit these companies to adapt palletization in the old location and so reduce their cost of operation.

Taxes on the facilities and taxes on the income earned from the additional labor required would benefit Puerto Rico materially. The estimated municipal taxes on the facilities alone amount to a total of $138,000 annually.

The moving of the markets to the present location would benefit the cities in which they are now located and other governmental agencies. It would ease the problem of traffic control, street repair and upkeep, and many other problems of such cities and governmental agencies. The new market would increase the expenditures and responsibilities of the Transportation Authority and possibly the Puerto Rico Industrial Development Company, but these added burdens would be offset by the fact that all costs would be liquidated from revenues from the users in the market. The question has been raised as to whether certain facilities now owned by the Transportation Authority would not be rendered useless by the proposed development. If that should happen, such facilities could be written off; they could be replaced by the facilities recommended because the Government would own most of them when they were liquidated. It should be remembered that progress in any line cannot wait on the liquidation

of something that is outmoded or inefficient. For instance, the adoption of the use of trucks in cities could not wait until horses died. Moreover, neither could the use of airplanes for transporting people and freight be delayed because railroads and ships were available for that purpose. It is assumed therefore that if there are wharves in the old port area that will not be needed when the development is made, they can be charged off. In many instances some may already be charged off from the standpoint of depreciation and taxes.

The recommendations made in this report for new marketing facilities in San Juan may seem revolutionary to many people, but to spend any considerable sum of money in repairing or modifying existing facilities would not solve the problem. It therefore seems prudent to have a plan for completely adequate wholesale marketing facilities for farm and related products in San Juan in order that various portions of the plan may be carried out from time to time as conditions permit. It is known that several kinds of food handlers, warehouse operators, and canners are at present interested in obtaining better facilities for the conduct of their business. With the adoption of a complete plan for new marketing facilities, it is possible to go ahead with the construction of the various segments. The Marketing and Facilities Research Branch will be glad to assist the Government of Puerto Rico and trade, farm, and other groups with any problems that may arise in building the facilities recommended in this report.

Table 11.--Shipments of food and related products from the United States to Puerto Rico by types--1948 and 1949 1/

Type of product	1948			1949			Average 2 years	
	No. head	Quantity (Pounds)	Value (Dollars)	No. head	Quantity (Pounds)	Value (Dollars)	Quantity (Pounds)	Value (Dollars)
Meat animals								
(Live) cattle (breeding)	130	131,700	56,180	195	160,341	78,900	163	146,020	67,540
Cattle (unclassified)	29	17,947	9,670	13	12,300	5,500	21	15,124	7,585
Hogs	6	540	210	5	1,310	525	5	925	368
Meat and meat products								
Fresh, frozen, canned		36,184,455	13,056,377		42,920,629	12,139,403		39,552,542	12,597,890
Poultry (Live)		127,803	216,915		235,498	304,284		181,650	260,599
Poultry products									
Fresh, frozen, canned		969,454	618,488		1,091,355	571,656		1,030,405	595,072
Eggs--shell 2/		2,728,218	1,433,416		3,342,185	1,561,191		3,035,402	1,497,304
Eggs--frozen, dried, pres.		490,818	215,106		657,685	334,367		574,252	274,737
Dairy products									
Milk and cream (condensed and evaporated)		22,681,743	3,739,963		20,267,920	3,116,912		21,444,832	3,428,424
Dried whole milk and milk solids		12,796,483	6,585,326		14,478,216	6,970,307		13,637,350	6,777,817
Butter, cheese, other dairy products		6,993,665	3,694,165		7,678,456	3,615,091		7,336,060	3,654,628
Grain and cereal foods									
Rice milled		271,900,795	27,464,851		283,889,013	21,925,406		277,894,904	24,695,129
Wheat flour		110,033,000	6,604,541		108,870,200	5,568,704		109,451,600	6,086,623
All other cereal foods		19,516,987	1,427,557		21,487,592	1,260,866		20,502,289	1,344,212
Feeds--hay, grain, dairy and poultry feeds		113,200,158	5,730,320		126,486,054	5,291,349		119,843,106	5,510,835

Table 11 continued:

Type of product	No. head	1948 Quantity	1948 Value	No. head	1949 Quantity	1949 Value	No. head	Average 2 years Quantity	Average 2 years Value
		Pounds	Dollars		Pounds	Dollars		Pounds	Dollars
Fats and oils									
Lard, including neutral		49,023,313	11,549,412		48,911,264	6,788,342		48,967,289	9,168,877
All other		6,294,001	2,007,479		6,888,537	1,502,327		6,591,269	1,754,903
Fish and sea food products									
Sardines (canned)		2,350,993	548,981		1,840,270	353,538		2,095,632	451,260
Other--fresh, frozen, canned, pickled fish and sea food		2,419,906	625,913		2,497,280	674,763		2,458,593	650,338
Vegetables									
Dry beans and peas		52,699,654	6,040,347		51,148,156	4,409,700		51,908,905	5,225,042
Potatoes, white (fresh)		82,159,149	2,194,065		61,428,109	1,344,788		71,793,629	1,769,427
Onions (fresh)		12,576,464	542,462		14,501,953	508,678		13,539,214	525,570
Other vegetables--fresh, frozen, canned, dehydrated		10,055,830	1,274,773		11,065,654	1,223,509		10,560,742	1,249,141
Fruits, fresh, frozen, canned, evaporated		11,846,983	1,740,963		12,216,817	1,570,671		12,031,900	1,655,817
Nuts, in shell and shelled		456,286	151,414		764,522	195,738		610,404	173,576
Confections and syrups		8,533,745	1,298,718		5,350,123	1,347,556		6,941,934	1,323,137
Spices		326,100	97,520		268,995	107,989		297,548	102,755
Beverages and beverage materials									
Coffee, tea, cocoa, etc.		1,944,795	754,151		3,191,897	1,176,920		2,568,346	965,536
Fruit juices, syrups, mineral waters 3/		1,786,203	2,094,974		1,892,079	2,072,828		1,839,141	2,083,901

Table 11 continued:

Type of product	No. head	1948 Quantity (Pounds)	1948 Value (Dollars)	No. head	1949 Quantity (Pounds)	1949 Value (Dollars)	No head	Average 2 years Quantity (Pounds)	Average 2 years Value (Dollars)
Malt liquors, wines 3/		3,593,203	3,120,605		4,305,557	3,705,999		3,949,380	3,413,302
Distilled liquors 4/		165,362	1,771,732		9,569	56,019		87,465	913,875
Miscellaneous foods--sauces, vegetable juices, macaroni, olives, bakery products, etc.		40,716,628	6,451,528		50,126,058	7,657,307		45,421,343	7,054,418
Total quantities of food and related products									
Food in pounds		876,449,395			898,376,204			887,412,800	
Eggs--dozens		2,728,218			3,342,185			3,035,402	
Fruit juices, syrups, malt liquors, wines--gallons		5,379,406			6,197,636			5,788,521	
Distilled liquors--PFD gallons		165,362			9,569			87,465	
Live animals--number		165						83	
Total value			113,118,122			97,441,133			105,279,628

1/ *Reports Nos. FT 800--U. S. Department of Commerce, April 1949 and April 1950.*

2/ *Dozen.*

3/ *Gallons*

4/ *PFD Gallons.*

Table 12.--Shipments of food and related products from countries other than the United States to Puerto Rico, by types, fiscal year 1948-49 1/

Type of product	Quantity	Value
	Pounds	Dollars
Meat and meat products	10,636,326	2,471,962
Poultry, live	3,570	9,906
Eggs, shell 2/	27,630	11,897
Dairy products	668,896	312,918
Feeds, hay, grain, animal foods	35,113,476	1,176,592
Fats and oils	669,562	198,534
Fish and sea food products		
Cod, haddock, hake, pollock and cusk, pickled or salted	29,973,150	4,608,696
Other fish and sea food and products of sea	302,668	55,005
Vegetables		
Dry beans and peas	4,926,256	512,571
Potatoes, white (fresh)	19,259,131	350,408
Other vegetables, fresh, frozen, canned	529,629	80,421
Fruits, fresh and canned	27,956	6,149
Nuts, in shell and shelled	2,176	1,984
Confections and syrups	73,017	85,134
Beverages and beverage materials		
Coffee, tea, cocoa, etc.	6,545,867	2,071,125
Fruit juices and soft drinks 3/	24,129	32,542
Malt liquors and wines 3/	121,790	372,643
Whiskey, rum, gin, other distilled liquors 4/	31,412	175,613
Miscellaneous foods, sauces, vegetable juices, olives, biscuits, etc.	693,503	244,208
Total shipments		
Food in pounds	109,425,183	
Eggs--dozens	27,630	
Fruit juices, soft drinks, malt liquors, wines--gallons	145,919	
Whiskey, rum, gin--PFD gallons	31,412	
Total value		12,778,308

1/ *Annual book on statistics of Puerto Rico--fiscal year 1948-49, Puerto Rico Department of Agriculture and Commerce.*

2/ *Dozens.*

3/ *Gallons.*

4/ *PFD gallons.*

Table 13.--Total annual shipments of food and related products from the United States and foreign countries to Puerto Rico, 1948 and 1949

Type of product	Unit	From United States 1/	From foreign countries 2/	Total shipments to Puerto Rico
		Quantity	Quantity	Quantity
Food	Pound	884,412,800	109,425,183	996,837,983
Eggs (shell)	Dozen	3,035,402	27,630	3,063,032
Fruit juices, syrups, malt, liquors, wines	Gallon	5,788,521	145,919	5,934,440
Distilled liquors	PFD gal.	87,465	31,412	118,877
Live animals	Number	83	0	83
Total value	Dollars	105,279,628	12,778,308	118,057,936

1/ *Average for calendar years 1948 and 1949 from Reports Nos. FT 800, U. S. Department of Commerce April 1949 and April 1950.*

2/ *Fiscal year 1948-49 from Annual Book on Statistics--Puerto Rico Department of Agriculture and Commerce.*

Table 14.--Shipments of food and other agricultural products (including processed) from Puerto Rico to the United States, years 1948 and 1949 [1/]

Type of product	1948		1949		Average 2 years	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Animal products						
Cattle hides and skins	2,224,824	274,611	2,796,087	363,767	2,510,456	319,189
Goat hides and skins	24,971	7,268	19,491	6,544	22,231	6,906
Vegetables--fresh, canned, dried, etc.	8,141,262	690,989	10,594,449	881,598	9,367,856	786,294
Fruits, fresh	11,090,000	612,536	28,186,623	1,493,566	19,638,312	1,053,051
Fruits, prepared or preserved						
Citrons in brine	3,014,518	194,219	4,114,366	268,779	3,564,442	231,499
Pineapples	23,368,257	3,642,480	23,700,142	3,320,378	23,534,200	3,481,429
Other fruits	1,309,779	95,670	796,585	151,956	1,053,182	123,813
Coconuts in the shell--sweetened, shredded, or prepared	2,837,916	854,385	799,764	171,898	1,818,840	513,142
Coffee	1,327	632	0	0	1,327	632
Sugar						
Unrefined	1,752,130,010	94,940,461	2,049,815,473	118,454,317	1,900,972,742	106,697,389
Refined	200,670,921	14,887,616	247,655,190	17,256,133	224,163,055	16,071,875
Molasses [2/]	44,810,278	9,098,823	43,588,815	1,725,008	44,199,547	5,411,916
Honey	722,362	89,484	703,138	79,606	712,750	84,545
Candy and candy coating	1,460,615	403,007	1,077,596	221,615	1,269,105	312,311
Fruit juice [2/]	688,849	585,093	548,454	407,093	618,652	496,093
Rum and cordials [3/]	529,927	1,606,609	1,045,641	3,026,161	787,784	2,316,385
Vegetable oils (incl. coconut)	343,110	127,019	37,317	12,112	190,214	69,565
Bulbs, roots, trees, plants	278,587	383,381	370,161	303,165	324,374	343,273

Table 14 continued:

Type of product	1948		1949		Average 2 years	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Tobacco and manufactures						
Leaf, stemmed	9,571,783	8,083,989	10,129,240	9,139,693	9,850,512	8,611,841
Stems, scrap, trimmings	5,561,425	2,061,770	7,565,260	2,484,043	6,563,342	2,272,907
Cigars and cheroots	110,974	249,069	111,458	191,201	111,216	220,135
Other tobacco and manufactures	32,283	26,608	247,131	94,864	139,707	60,736
Cotton--Raw	196,742	148,004	413,541	249,420	305,142	198,712
Manufactured 4/	2,543,293	12,035,284	3,263,496	13,467,510	2,903,394	12,751,397
Total shipments						
Food and products in pounds	2,046,789,459		2,416,261,508		2,231,525,484	
Molasses and fruit juices--gallons	45,499,127		44,137,269		44,818,199	
Distilled liquors--PFD gallons	529,927		1,045,641		787,784	
Total value		152,015,646		174,662,524		163,339,085

1/ *Reports Nos. FT 800--U. S. Department of Commerce, April 1949 and April 1950.*

2/ *Gallons.*

3/ *PFD gallons.*

4/ *Shipping weight.*

Table 15.--Shipments of food and other agricultural products (including processed) from Puerto Rico to foreign countries, fiscal year 1948-49 1/

Type of product	Unit	Quantity	Value
			Dollars
Animals (live)			
Cattle for breeding	Number	10	4,300
Hogs (swine)	Number	49	4,480
Poultry (live)	Pounds	614	1,219
Animal oils and fats (including neutral lard)	Pounds	11,100	1,776
Hides and skins (calf-goat)	Pounds	2,545	1,995
Dairy products			
Milk and cream (fresh-sterilized)	Gallons	113	384
Evaporated, unsweetened milk	Pounds	12,760	1,852
Dried whole and skim milk	Pounds	12,185	5,869
Other dairy products (malted milk, ice cream powders, preparations)	Pounds	717,828	108,216
Fish and fish products (canned)	Pounds	33,725	13,361
Feeds--hay and grain	Pounds	252,928	7,989
Vegetables--			
Fresh	Pounds	73,000	4,610
Canned	Pounds	34,473	6,833
Fruits			
Fresh or frozen	Pounds	37,440	6,781
Dried and evaporated	Pounds	129,460	19,889
Canned	Pounds	91,273	15,051
Fruit juices	Gallons	5,198	5,687
Vegetable oils	Pounds	817	196
Nuts	Pounds	1,010	539
Miscellaneous foods			
Sauces, vegetable juices, bakery products	Pounds	739,256	157,420
Confections, candy	Pounds	31,010	7,648
Beverages and beverage materials			
Coffee, tea, chocolate	Pounds	19,076	5,487
Syrups for beverage	Gallons	4,013	14,808
Malt liquors and wines	Gallons	638	838
Distilled liquors	PFD Gals	4,991	17,867
Sugar products			
Molasses for human consumption	Gallons	1,842,611	418,410
Molasses not for human consumption	Gallons	3,742,325	149,692
Tobacco products			
Flue cured and cigar leaf	Pounds	5,763,614	2,166,813
Cotton manufactures			236,930
Total shipments			
Food and products	Pounds	7,964,114	
Milk, cream, fruit juices, syrups for beverages, malt liquors, and wines, molasses (edible and and inedible)	Gallons	5,594,898	
Distilled liquors	PFD Gals.	4,991	
Total value			3,386,940

1/ *Annual Book on Statistics of Puerto Rico--fiscal year 1948-49, Puerto Rico Department of Agriculture and Commerce.*

Table 16.--Total annual shipments of food and other agricultural products (including processed) from Puerto Rico to the United States and foreign countries, 1948 and 1949

Type of product	Unit	To United States 1/	To foreign countries 2/	Total shipments from Puerto Rico
		Quantity	Quantity	Quantity
Sugar--unrefined	Pound	1,900,972,742	--	1,900,972,742
Refined	Pound	224,163,055	--	224,163,055
Molasses	Gallon	44,199,547	3/ 5,584,936	3/ 49,784,483
Food and related products	Pound	106,389,687	7,964,114	114,353,801
Fruit juices	Gallon	618,652	4/ 9,962	4/ 628,614
Distilled liquors	PFD Gal.	787,784	4,991	792,775
Total value	Dollars	163,339,085	3,386,940	166,726,025

1/ *Average for calendar years 1948 and 1949 from Report Nos. FT 800, U. S. Department of Commerce, April 1949 and April 1950.*

2/ *Fiscal year 1948-49--from Annual Book on Statistics, Puerto Rico Department of Agriculture and Commerce.*

3/ *Includes molasses for human consumption and not for human consumption.*

4/ *Includes syrups for beverages, malt liquors, and fresh and sterilized milk and cream.*

☆ U. S. GOVERNMENT PRINTING OFFICE : O—1951