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CENTRAL FOOD STORE FACILITIES FOR COLLEGES AND UNIVERSITIES.

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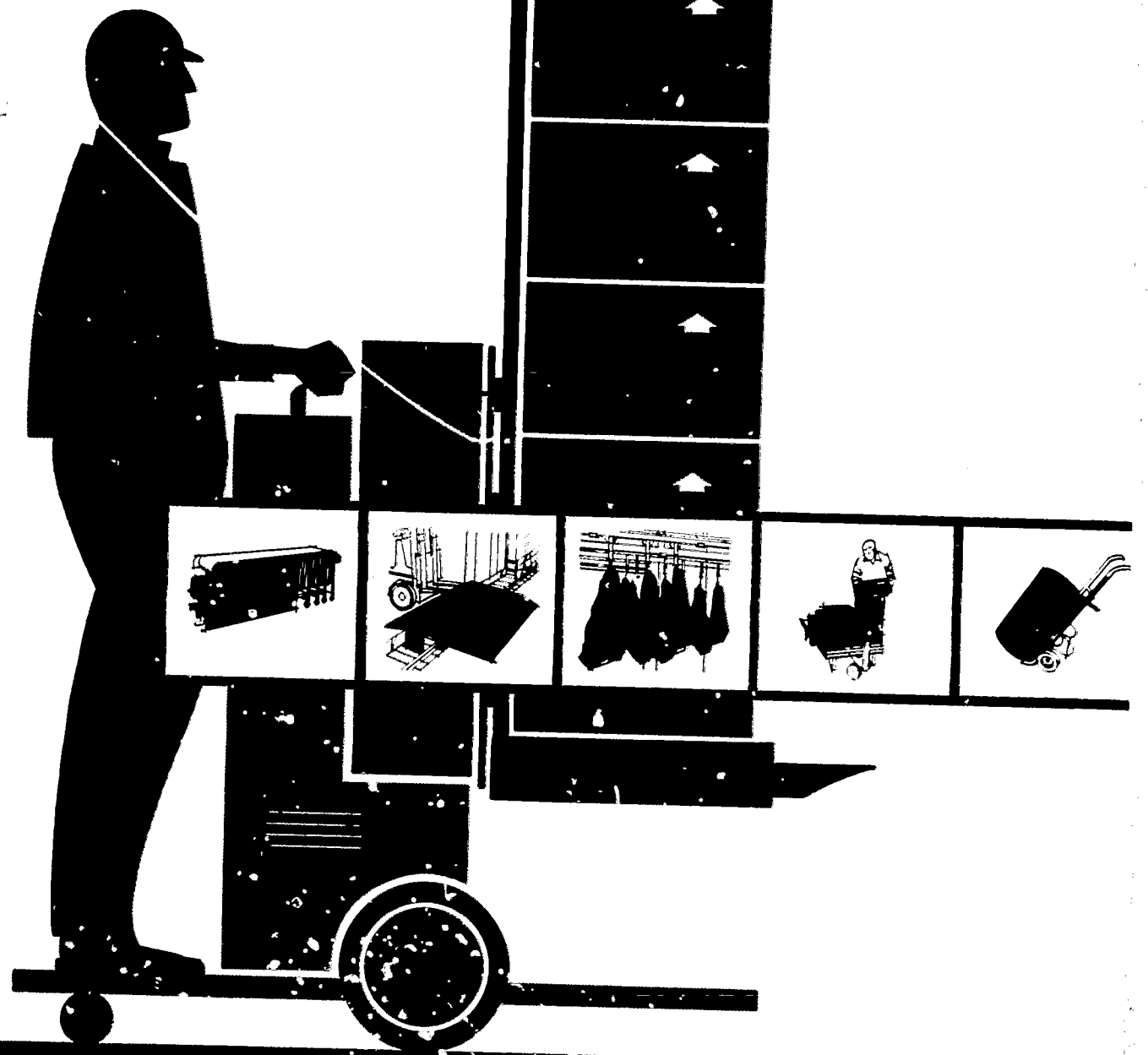
INSPECTION OF A NUMBER OF INSTALLATIONS WAS ORIENTED TOWARD ARCHITECTURAL AND PLANNING QUESTIONS INVOLVING ECONOMICS AND SERVICES OF CENTRAL FOOD STORE FACILITIES. COMMENCING WITH THE PURCHASING PHILOSOPHY WHICH OVERVIEWS THE ORGANIZATION OF FOODS PURCHASING, SELECTION OF PERSONNEL, SPECIFICATIONS FOR PURCHASING, TECHNIQUES FOR PURCHASING, AND TRENDS IN FOODS SERVICE, THE MONOGRAPH DISCUSSES PLANNING FOR A CENTRAL FOOD STORE. PLANNING REQUIREMENTS ARE PROVIDED FOR THE EQUIPMENT AND SPACE NEEDED FOR EFFICIENT FLOW OF GOODS, PROVISION FOR TEST KITCHENS, TECHNIQUES OF LABOR MANAGEMENT AND RESEARCH IMPLICATIONS. A SUMMARY OF DESIGN REQUIREMENTS AND A CASE STUDY OF MICHIGAN STATE UNIVERSITY'S CENTRAL FOOD STORE FACILITY INDICATES WHAT CONSIDERATIONS SHOULD BE MADE IN PLANNING A CENTRAL FOOD STORES FACILITY. (BH)

CENTRAL FOOD STORES FACILITIES

for Colleges and Universities



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BACKGROUND

THE U.S. Office of Education projects that in the future about half of all high school graduates will apply for entrance into institutions of higher education.

To make room for these enlarged enrollments, most colleges and universities are expanding their residential facilities at an unprecedented rate. The opening of new multi-million dollar residence halls are now common occurrences among colleges and universities. Residence hall construction loan funds made available through the Housing and Home Finance Agency coupled with other sources of self-amortizing funds are helping avoid enrollment crises.

Providing housing and academic facilities for expanding numbers of students are not the only problems. These students must also be fed. Up to 60,000 meals per day are served in such institutions with quality, as well as quantity, of vital concern.

Directors of Housing and Deans of Men or Women recognize that university housing plays an important role in fulfilling the educational objectives of their institutions. Excellence in housing and nutrition at the lowest cost possible are recognized goals. Indeed, personnel associated with the offices of housing and food services consider their charge to be that of providing highest quality at lowest cost.

Need for this study was identified by the Research Committee of the Association of Colleges and University Housing Offices—the determination of whether or not construction and operation of a central food stores facility could improve food service operations. One of two possible outcomes could validate the thesis: 1) Equivalent quality and service at lower cost or; 2) improved quality and service at no increase in cost. Major financial assistance from the Educational Facilities Laboratories, Inc. coupled with financial support and actual participation by the Association of College and University Housing Officers made the study possible.

Four members of the ACUHO participated in manuscript preparation. Each has been actively engaged in the handling of food services or central food stores for institutions of higher education. Because of familiarity with foods operations, it was possible for each manuscript participant to contribute to the study from the vantage point of his own experience as well as a knowledge of where source information could be obtained.

To further supplement the capabilities of the individual manuscript participants, an intensive two day meeting of directors of food services and managers of central stores was held to explore questions of mutual concern about construction and operation of such facilities. Participants are identified in the adjacent listing. Answers to questions entertained by this experienced group are reflected throughout this study.

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Inspection of a number of installations by a UFRC staff member was oriented toward architectural and planning questions involving economics and services of central food stores facilities. Installations visited included: The Pennsylvania State University, The University of Illinois, Ohio State University, The Berkeley Campus of the University of California, The University of Wisconsin, Michigan State University, Purdue University, Indiana University, University of Michigan, and The University of Minnesota.

HISTORY The first recognized central food stores operation was started at Miami University of Ohio some 30 years ago. A Food Service Building at the University of Michigan has been in operation for more than 15 years. Kent State University has also developed a creditable history of experience of operation.

It appears that at the present time about a dozen institutions operate what can be classified as complete central food stores facilities. Most of these have come into existence since 1949. At that time the Pennsylvania State University opened a facility containing many different temperatures and humidities for the purpose of bulk buying and long-term storage of food

products. Their building, designed to serve geographic needs caused by remoteness from market, represents the most sophisticated storage facility in operation at the present time. By far the largest majority of central food stores facilities are designed to accommodate car-load lot purchases of a number of commodities with a conscientious effort made to generate a high turnover of most products as a means of minimizing inventory investment. Proximity to market makes the latter operational objective attainable.

At the time of making this study the newest and largest central food stores building in operation was located at the University of Illinois. A number of institutions indicated they had new facilities in the planning or construction stages, including replacements for existing central foods stores buildings.

SIZE OF INSTITUTION

Historically, the size of the student body of an institution has not been a determining factor in initiating a central food stores. Colorado State University started its food stores operation when only 600 students were being housed and fed. By way of comparison, the facility at Michigan State University currently handles foodstuffs for more than 60,000 meals per day. When queried on what represents the minimum enrollment of an institution to justify a central food stores operation, the directors of such facilities are consistent in replying that factors involving *service to the institution* represent the prime motivations, rather than economics. As such, size of the student body being housed and fed is not as important as *services needed* which in turn, are dependent upon geographic location and characteristics of the institution.

ECONOMICS OF OPERATION

Degrees of efficiency of central food stores facilities vary widely. Two primary factors seem to be the basic cause of the variations: 1) the functional efficiency of the building itself and its proximity to the foods units being supplied; and, 2) the degree of operational latitudes afforded an experienced food services director.

In the initial phase of this study it was thought that comparison of unit cost "mark-up" percentages used by different institutions might reflect degrees of efficiency attained by different stores operations. It was soon discovered that so many accounting variables were included in the mark-up percentages used by different institutions that comparisons

on this basis became meaningless. The typical mark-up percentage is around 9% or 10%, but variations from 7% to 17% (on some items) are found to be existing practices. The percentage used may or may not reflect items such as building maintenance, utilities, truck service, management salaries, and the like. The percentage mark-up charged may, in fact, represent a year-end surplus which might be pro-rated among the foods units or simply returned to university operating funds. In either case, the end result may be the same in terms of university ownership of the facility and supplying foodstuffs to foods units. Only the accounting methods have varied.

Another approach in determining the economic benefits to a university operating a central facility is to determine all costs connected with supplying the needs of an institution and comparing this total cost with a similar sized operation not using a central stores facility. In 1957, such a comparison was made at Michigan State University by Horwath and Horwath, an independent accounting and auditing firm in Detroit.

The Horwath and Horwath study used the difference in average unit prices paid by restaurant clients of similar sized total operations but without central stores as compared to prices paid by the University central stores to determine annual cost differences in the procurement of the following items:

ITEMS	PROCUREMENT COST DIFFERENTIALS
MEATS	$104,602.77
PRODUCE	109,253.00
STAPLES	151,183.30
	$365,039.07

The total annual expense of the Food Stores operation was stated by the auditing firm to be $132,423.51. On this basis, a net annual savings of $232,615.56 to the university was credited to be the result of operating the central food stores facility.

Before concluding that any institution can gain a proportional savings by building and operating a central food stores facility, it is important to know that the manager of this installation moved into directorship of the operation after several years experience in private food procurement activities and had authority for considerable latitude in handling his purchasing needs. The actual building however, was not particularly efficient. Michigan State University has recently completed construction of a new facility which is outlined as a case study in this monograph.

The results of another approach toward providing an economic evaluation of a central stores facility was made available from Purdue University in the form of a Master's Thesis by Barton E. Severson. Mr. Severson made a study of the procurement costs of *canned foods, cereals* and *staples,* as compared to the costs of purchasing directly through *central buying*. Pro-rated operational costs of the facility were then added to the central food stores procurement costs to provide comparative data.

His study reported that if these items were procured from private distributers through centralized buying, that a modest savings to the university would result. His study does not extend itself into the effects on unit costs of other commodities required by the university if the identified items were dropped from the food stores operation. *Central procurement* procedures, used as a basis for comparison, may not be a practical reality without a central stores facility to serve as needed motivation for central buying.

The range of savings available to colleges and universities operating central food stores facilities is perhaps bracketed by the extremes found in the two investigations. Annual savings may vary from essentially no difference from that of existing procurement practices to substantial savings in the range of $250,000 per year for large institutions.

SERVICES TO THE INSTITUTION

Experience indicates that institutions with central food stores find many opportunities to take advantage of its capabilities. Instructional programs often depend upon the facility for demonstration of processing techniques or actual use of the facility as the consumer of university agricultural products. Meat processed by the University of Illinois facility is an integral and important part of the Animal Science program at that institution. Processing of university raised farm crops provides the Illinois facility with a balance of workload during the summer months while helping establish the validity of experimental agriculture processes. The University of Michigan reports handling tons of animal food each year as well as providing freezer space for storage of research items.

Service to foods units and the campus in general are difficult to separate from economic considerations. Such factors as reduction of truck traffic on campus, consistency of products and delivery of emergency supplies are often important planning factors as well as crucial services.

CENTRAL FOOD STORES FACILITIES

Following is a statement by Mr. Robert F. Herron, Manager of Central Food Stores at Michigan State University identifying major considerations involved in operating a central food stores facility:

The advantages of a Central Food Store are varied and many. It makes possible an opportunity to hire skilled and experienced personnel in every department—this means efficiency and the best possible control. Small units, operating independently, through local jobbers, cannot possibly afford this luxury. They often accept merchandise that should be rejected, and reject some that should be accepted, just from inexperience and lack of control. Full control is a "must" for good operation. You must be assured of what you have specified and get what you are paying for.

PRICE ECONOMIES: Centralization of all departments provides the necessary volume to demand the best available, both in price and quality, at every purchase. It reduces delivery costs to a minimum, provides better and faster service.

PLANNING AND UNIFORMITY: Centralization provides the opportunity to carefully plan your strategy, taking full advantage of fluctuating markets, etc. Careful planning can reduce overall operating costs to a minimum, including the usual expensive emergency orders, by permitting you to stabilize your inventories, anticipate future requirements and maintain your quality standards at the right price.

STANDARD SPECIFICATIONS: Uniformity of practical specifications is a prerequisite of good purchasing and receiving, permitting consistent standardized quality of products throughout the year, and this means real satisfaction to your feeding units.

ADMINISTRATIVE COSTS: Centralization eliminates the necessity for continuous duplication of effort and expense. Buying in small quantities necessitates frequent reordering which is not only expensive but reduces quality control as well.

Centralized administration opens this way for qualified persons to specialize in their field, which again reduces operating costs throughout the whole operation—faster approval and payment of invoices—one point of purchasing—one point of receiving—one point of control by specialized personnel.

One point of storage means substantial savings in reduction of inventories which is impossible when scattered throughout the campus in small units. All of these advantages are equally beneficial to your vendors—less calls by his salesman, larger orders, fewer deliveries, only one delivery point, less paper work and less cost to handle your account, all of which is reflected in savings to you.

CANNED FOODS: When buying direct, you know what you are getting, the growing area, the quality, variety, pack and size. This is impossible to control when purchasing from a jobber—his labels usually read "packed for" a specific company. This means that you may actually get three or four variations of quality, all under the same label.

When buying direct you have the advantage of any sudden decline in the markets, many times even after the merchandise has been received. When purchasing from a jobber, this advantage is all his, not yours.

When buying direct you are always assured of the current years pack, not something that has been in storage two to four years, all of which adds up to substantial savings and satisfaction to your people.

MEATS: The prime advantage of direct meat buying is control. Opportunities for pilferage and unscrupulous activities are greater here than in any other area, not necessarily by personnel but by the vendors themselves. Most meat items are sold by the pound and deliveries are frequent. Each and every delivery should be checked and completely weighed-in, not just occasionally.

Again, individual smaller units usually have neither the experience or facilities to handle the job properly. Some vendors are quick to take advantage. In a centralized operation you have both experience and facilities—make it pay. If handled properly the savings in this area alone could support the total cost of the operation.

FROZEN FOODS: These items should be handled the same as canned foods—buy once each year at packing time, choose your preferred growing areas and protect your quality and price for the entire year.

FRESH FRUITS AND VEGETABLES: The prime advantage in buying these items direct is freshness. The better the quality here, the better the yield. As in meats, savings can only be measured in the final cost per serving rather than the initial cost per unit.

TRUCKS ON CAMPUS: With no centralized operation there is of course no centralized point of receiving. This means that all items must be delivered directly to each unit on campus by the vendor. It requires no less than six to twelve vendors to handle the meat requirements alone—add to this deliveries of produce, dairy products, bakery products, coffee, etc., and the answer is bedlam. 75–100 delivery trucks jamming your campus daily—a major benefit of a centralized operation in itself.

PROGRAMMING CONSIDERATIONS

It can be pointed out that a university feeding 20,000 meals per day is handling a volume of foodstuffs not too different from that of a *single* large supermarket. Supermarket purchasing is usually accomplished through mass buying for a number of such retail outlets and therefore it follows that commercial distributors should be able to purchase at lower unit costs than a university sized facility, store and handle the goods at lower unit costs, and pass the savings on to a university sized buyer. A thorough investigation of both *services* and *economics* of purchasing foodstuffs and supplies through commercial distributors in the area should be conducted before commitments are made to build and operate a university facility.

To be most successful, a central food stores facility needs three important ingredients:

1. A university policy which insists that all university operated food services use the facility.
2. A central food stores building which is designed for functional efficiency.
3. A highly qualified central food stores manager with sufficient authority and operational latitude to manage the facility efficiently and in the best interests of the institution.

While most existing central food storage facilities have "evolved" from small-scale fragmented activities such as meat processing, central purchasing for stores items only, or simply taking advantage of unused storage space to stockpile canned goods, a new facility can operate at its full measure of efficiency only if as many university functions can be programmed into it as possible. If the university administrative structure permits, it is desirable to consider any activity which requires central supply, delivery, purchasing or accounting and to design the facility accordingly. In addition to typical frozen and canned goods, central food stores facilities can be found which handle meats, table service items, animal foods, bakery items, paper goods, vending supplies, produce, dairy products, ice cream, etc.

The characteristics of machine or electronic accounting devices lend themselves to common record-keeping services required for all such functions. In some instances the food stores facility shares a building with the university central stores unit.

PLANNING A NEW FACILITY

Sound planning of a new or enlarged central food stores must be based on the needs of the institution recognizing the functional characteristics of such facilities. On the following colored insert pages will be found answers to planning questions under the headings of Purchasing Philosophy, Food Service Trends, Flow of Goods, Test Kitchens, Labor Management, and Research Implications. Each section has been prepared by a Food Service Director or Central Food Store Manager actively involved with the subject material.

PURCHASING PHILOSOPHY

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ORGANIZATION OF FOODS PURCHASING A variety of organizations are utilized to establish effective food procurement programs. Each organization is designed to satisfy two essential requirements:

1. To insure that approved purchasing practices of the institution are applied to the purchasing of food supplies.
2. To insure that the organization and procedures applied to the procurement of food supplies are established so as to best accommodate the operational needs of the food service units, and are so adapted as to be in consonance with the general selling practices of each segment of the food industry.

The principal executive officer, responsible to the president of the college or university for purchasing activities, must decide who will be granted the authority and charged with the responsibility for the procurement of supplies to be distributed through the central food storage facility.

In many institutions, both authority and responsibility are assigned to the director of purchases. In some instances, responsibility is assigned to the principal food service officer and authority is retained by the director of purchases. In still other instances, both authority and responsibility for food purchasing functions are assigned to the principal food service officer.

The persons concerned in the establishment of the foods purchasing organization and procedures must carefully evaluate the sources of experience and technical knowledge available within the institution, and arrange to bring these resources to the organization developed in a manner which enhances the effectiveness of the foods purchasing program. The purchasing procedures appropriate to the procurement of manufactured non-food items are not completely appropriate for the purchasing procedures required for foods purchasing. Important to the successful functioning of the organization ultimately established is consideration of the following:

1. The office of the director of purchases is a source of:
   a) Current and continuing knowledge of the principles of purchasing established for this activity within the institution.
   b) Procedures, equipment, experienced technical and clerical assistance, systems of record keeping, purchasing directories and catalog files, and other services resulting from centralized purchasing.
2. The food service organization is a source of:
   a) Technical knowledge and experience regarding standards of quality, varieties, types, and kinds of foods most appropriate to the food production processes involved in producing a finished product, and has ability to relate this information to the food service standards such foods will contribute to the operation.
   b) Knowledge of relationship of costs to quality standards available in food supplies.
   c) Experience in testing and evaluation of foods which is essential to the development of purchasing specifications.
   d) Personnel with previous training and experience in procedures utilized in the procurement of food supplies.
   e) Current information regarding new developments and trends in the food industry as a consequence of professional interest, trade publications, professional associations and conventions and conferences.

SELECTION OF FOODS PURCHASING PERSONNEL Procurement procedures involved in foods

purchasing will benefit if the knowledge and experience in the following can be supplied by personnel engaged in foods buying.

1. Food service operational experience which provides knowledge of the effects of quantity preparation and cooking and the characteristics important in foods necessary to obtain a finished product which accommodates the standards of food service desired.
2. Knowledge of purchasing procedures and practices and use of the techniques and methods employed in volume procurement.
3. Knowledge of transportation methods, rates, and services available by rail, truck, and steamship companies.
4. Knowledge of office procedures related to accounting systems, maintenance of purchasing and inventory records, and the establishment of files, directories, and cost control information.

Some compromises will be necessary when selecting the person to be assigned the foods purchasing responsibility. Few people are available who can be considered expert in each phase of foods purchasing. Each category of foods such as meats, poultry, fish, dairy products, grains, cereals, flour, frozen foods, canned foods, oils and fats, freeze-dried, dehydrated, fresh produce, etc., is a category of supply which requires specialized technical knowledge and experience that is seldom possessed in equal measure in each category by those available for consideration for such an assignment.

Greater weight should be assigned to the factor of previously demonstrated food knowledge and food service operating experience than to the factor of previous purchasing experience. The latter experience can be more quickly and easily provided than the former.

In normal circumstances, the foods buyer will work in close association with members of the administrative and operating staff of food service. It is essential that the foods buyer be adept at communications; be mindful of his special staff functions; be thorough; creative; systematic; detailed and analytical in his thinking; be diplomatic; even tempered; patient; and public-relations minded and, of course, have the highest possible ethical standards.

LOCATION OF THE FOODS PURCHASING OFFICE If it is possible, the foods buying office should be located in the central food storage building. If practical, the experimental kitchen should also be located in this facility or as conveniently as possible to the location of the food buyer's office. Testing of foods under consideration for purchase and the sampling of food supplies received at the central food storage building is a function usually shared by the foods buyer and the supervisor of the experimental kitchen. If an experimental kitchen does not exist in the food service organization served by the central food storage unit, space and equipment suitable for sampling programs should be provided the foods buyer to permit him to satisfy this function of procurement responsibility.

Location of the foods buyer's office in the central food storage building also provides easy access to supplies for purposes of maintaining appropriate and current inventory information, knowledge of delivery of supplies against orders, and also makes him easily available to receiving personnel who may have need to communicate quickly with the foods buyer.

The offices of the principal food service officer and the office of the foods buyer should also be located in close proximity to encourage communications relative to procurement functions.

SPECIFICATIONS FOR FOOD PURCHASING The responsibility for the development of food purchasing specifications is a function which is largely fulfilled by the foods buyer and members of the

administrative and operating staff of food service. When this has been accomplished, the buyer's obligation is to obtain supplies in accordance with the agreed upon specifications from the best possible source at the best possible price and to have supplies so purchased on hand when needed.

The foods buyer should not deviate from the purchasing specifications developed without first consulting with those persons assisting him in the establishment of such specifications. If a latitude in this regard is to be provided to meet emergency or unusual market conditions, such circumstances should be predetermined so as to equip the buyer to act as quickly as is necessary and without costly delay.

The foods buyer and the administrative and operating staff of food service share in the responsibility to keep purchasing specifications up-to-date and modified as dictated by changes in market conditions and current trends in the food industry.

Food purchasing specifications should be prepared to adequately describe the food products desired and should include such detail as is essential to a complete and accurate description. Factors should not be included in the specification that cannot be checked when the product is received. If each factor described in the specifications cannot be analyzed by the personnel responsible for procurement, little purpose is served by including such details in the specification.

Specifications must also be developed with the capability of the sources of supply in mind. If the type and quality of product described in specifications cannot be supplied by normal sources available to the foods buyer, specifications may have to be altered to provide the degree of selectivity in purchasing important to the effectiveness of the purchasing program. In other words, specifications which eliminate all but a very limited number of vendors may have a negative effect upon the costs of the products purchased, and will reduce the variety of choices available from which to select suitable products.

TECHNIQUES OF PURCHASING FOOD SUPPLIES Procurement personnel engaged in food purchasing can develop effective techniques if they have knowledge of the food supplier's methods of operation. Such knowledge will equip the foods buyer to secure his supplies when the supplier is most anxious and is best equipped to sell his product and can do so at the lowest possible cost. In the case of canned and frozen foods, this condition usually occurs during the packing season for these seasonally produced foods. In the meat and poultry industries, the seller can supply at lowest costs when meat animals and poultry are ready for market at seasonal peaks.

A continuous study of market conditions, industry levels of supply, the effects of weather conditions, and world affairs on supplies available, and also the effects resulting from government farm regulations, will provide information of value to the purchasing program.

A systematic method of procurement which permits the seller to minimize costly services is essential to satisfaction of the objective of purchasing at the lowest possible cost.

The regulation of purchasing and scheduling of shipments of staple foods, so as to arrange for most efficient utilization of the storage capabilities of the central food storage building, is a necessary technique to apply to the purchasing activity.

Effective systems must be employed to insure that knowledge of the immediate and long-range requirements for food supplies have previously been determined and can be applied when advantageous purchasing conditions become available.

The foods buyer must conduct a continuing investigation of the capabilities of the food industry to uncover new and improved sources of supply for the food supplies required. In the case of seasonally produced foods, a variety of producing areas exist throughout the country. The characteristics of similar

foods vary somewhat when produced in different growing areas of the country. The foods buyer should develop knowledge of these varying characteristics, and after applying the consideration of transportation expense, select the type and kind of food product produced in the growing area which provides foods with the characteristics most suitable to his needs. Growing conditions vary from year-to-year in these areas of peak production. Tomato products, as an example, normally purchased from producing areas most adjacent, may suffer from a crop failure while a bountiful supply is produced in other growing areas of the country.

Important to the techniques applied to the procurement of supplies is a systematic procedure to determine that supplies *received* are in accordance with the supplies *specified* at time of order. Profit-oriented food establishments consider it important that procurement personnel not be assigned receiving responsibility to eliminate possible acts of collusion between the buyer and the seller.

If this precautionary policy is considered important, the receiving personnel must be trained to be competent to evaluate possible deviations from specifications or else a person in the organization who is so trained will need to be assigned this additional responsibility. Personnel assigned to the experimental kitchen are qualified for this assignment, and it is also possible to rely to some extent upon grading certificates and rolled-on imprinted grades on meat supplies. The local offices of the state or federal departments of agriculture can also supply professional graders to inspect such items as meats, poultry, eggs, butter, and fresh produce. The costs of such services will probably dictate their use at intermittent intervals.

Important to the quality of supplies received is the possible negative effects upon such food items while in transit from points of origin. Temperature readings should be taken in refrigerated rail cars and trucks, and products received should be checked as soon as possible to determine if adverse temperature conditions have affected supplies while in transit.

Products such as flour can become contaminated by a delivery vehicle containing insects, and products sensitive to strong aromas, such as butter, can suffer in quality if such unsatisfactory conditions are present in the carrier.

Concealed damage to a considerable extent is also possible, especially if the products being shipped require that transfer from one type of transportation means to another is necessary. Containers inside the shipping unit should be spot-checked to explore the possibility of concealed damage to the products received.

Thermometers to obtain temperature readings, scales for the weighing of bulk items, and equipment to record the quantities received should be present in the receiving areas. Also provided should be pre-printed forms to record any exceptions noted by personnel responsible for receiving supplies. Completed forms should be signed by the representative of the transportation company and also by the person receiving supplies and copies retained by both parties concerned. Such documents will be of valuable assistance when claims are instituted.

CHANNELS OF PROCUREMENT The facilities and operational procedures of a centralized food storage facility provide for duplication of the functions performed by wholesale distributors. It is essential, therefore, that purchasing procedures and efficiency of operation result in providing the operating units served by the central food storage facility with products of better or comparable quality, not only at a cost which compares favorably with that obtained from wholesale distributors, but also provides a differential in costs adequate to return the capital investment required for construction of such a facility.

DIRECT PURCHASING Processed, canned, or frozen foods can be purchased on a direct basis from the processor at the lowest costs obtainable through the various channels of procurement available in the food industry. Foods of this type must originate from these sources, regardless of the channels of distribution through which they may ultimately be purchased.

Direct purchasing methods differ in many ways from the methods suitable for purchasing through distributor channels, and if purchasing techniques are not tailored to this method of procurement, the products obtained may be of lesser quality and be owned at greater costs than when purchased through certain distributors.

Frequently, foods buyers for newly operated central food storage facilities will experience some difficulty convincing certain food processors that they qualify for direct buying arrangements. While this temporary circumstance exists, sources will be limited and the selectivity desired in purchasing will suffer.

Transportation: Products sold on a direct basis are generally sold at a price quoted F.O.B. point of origin, (the processing plant or adjacent warehouses). Unless the foods buyer has knowledge of freight rates and regulations, costly shipping charges will apply to the ultimate delivered price of the products purchased.

Shipment of supplies by water, rail, or truck differ in the weight requirements necessary for minimum freight rates. The interval of time enroute to the central food storage facility also differs significantly.

If other direct buyers are located nearby or on a direct route from point of origin to the final destination of the shipment, it is possible to share with another customer in a "stop-over" shipment. This method enables each buyer to contribute a share of the total supplies shipped by either rail or truck; share in the lowest possible freight rate which the weight of the combined order justifies; and, thereby, benefit by payment of a lesser freight rate than would otherwise apply to the weight of their individual orders. A service charge is applied for this stop-over service, however, it is less than the cost resulting from the freight rate which would apply to the lesser weight otherwise shipped by each customer participating in the combined shipment.

If the buyer can find a supplier who can supply more than one satisfactory product for shipment from the same point of origin, "pool" cars or truck-load shipments can be made at the minimum rate of freight and, as a consequence, the quantities of each item included in the shipment can be reduced.

The selection of the means of transportation designated for use by the foods buyer may also involve consideration of the urgency for delivery. Systematic procurement procedures should be employed to reduce to a minimum the payment of excessive freight rates so as to expedite shipment of supplies.

Some consideration may be justified in the selection of truck over rail shipments as the quantities required for minimum truck-load rates of freight is generally less than for minimum rail car rates of freight. Storage capabilities of the central food storage facility—during certain periods of the year—may become taxed and, as a consequence, the shipment of lesser quantities with payment of higher freight rates may have to be experienced. Consideration should also be provided to the fact that, in some localities, the driver of a delivery truck and often a driver's helper will assist in the unloading of the supplies transported. This savings in labor can sometimes offset lower rates charged when this service is not available.

Direct Purchasing Techniques: The food processor of seasonally packed foods has unusual problems of operation. Unless he produces products in his line

which will sustain his operations beyond the normal packing season, his annual processing operations are concentrated into a few months of the year.

This involves a capital investment for the raw product, containers, labels, cases, and labor costs which reaches its peak during the packing season. The food processor must reduce this capital outlay as soon as possible and, therefor, offers incentives to purchase early in the packing season which usually are not available at other times of the year.

Under normal selling conditions, the direct buyer is requested by his suppliers to indicate the quantities of product he will be in the market to purchase from current years pack before the packing seasons food processing has begun. Such contract forms are referred to as SAP contracts which mean that the buyer has agreed that he will purchase the stated quantity, "Subject Approval of Price," when the price is established. Most institutional buyers signing such agreements will add to the SAP form the additional phrase "and approval of sample."

The one advantage obtained by the foods buyer when such agreements are completed results when a crop failure or other circumstance occurs which would materially alter the yield of product available for the industries production. Under such conditions, only those buyers who have SAP agreements with the supplier are given an opportunity to purchase a prorated share of the limited supplies available.

When the packing season has progressed sufficiently for the quality and quantity of the seasons pack to be accurately predicted, the seller will designate his selling price. At this time he will ask the foods buyer if he wishes to confirm his SAP contract.

If the SAP contract is confirmed, the foods buyer will next provide an order for all or an adjusted amount of the quantity originally specified on the SAP form. This order usually takes the form of a "future" contract.

"Future" contracts normally consist of an order for a total quantity with a portion, usually ¼ to ⅓ of the total, specified for immediate shipment, and with shipping instructions to follow at a later date for shipment of the balance. Shipping dates are expected to be supplied so that the last shipment can be made approximately six months following the date of the original contract.

Price agreements governing such contracts will vary—depending upon market conditions. In some cases, the food processor will demonstrate his anxiety to liquidate his inventory quickly by offering incentives for that portion of the order that can be shipped promptly. These incentives may take the form of a special discount price or special freight allowance for the amounts shopped early. If market conditions are unusually strong, a firm price will be quoted only on that portion of the order that is shipped promptly, and the price in effect on date of shipment will apply to the quantities for shipment during the other months of the contract period. In the latter case, the buyer may, if he is not satisfied with the price in effect on date of shipment, cancel the unshipped portion of his order. When such pricing arrangements are employed by the processor, supplies are usually so limited that most buyers find it reasonable to accept shipment at the price then in effect.

If prices are not quoted as firm for the duration of the contract period, direct sellers will usually notify their buyers before an increase in price goes into effect. The buyer then has the opportunity to order shipment within the next 30 days from the announced date of the increase at the original and lower price quoted.

If the market weakens during the contract period and prices are announced which are lower than those quoted on the original order, a refund is granted the buyer for supplies received 30 days prior to the announced date of the price reduction, and the lower price is also applied to the unshipped balance.

on the contract.

Although "direct" purchasing usually follows the practice of purchasing directly from the factory sales representative, food workers also are used as a substitute sales representative. Manufacturers with a limited variety of products to sell or whose products are sold seasonally, cannot afford the selling expense occasioned by the employment of factory sales representatives. Food brokers, therefore, are utilized as sales representatives. Most brokers have a broad line of products to sell which are produced by a number of manufacturers.

Wholesale Distributors: Experience and knowledge of direct buying and the subsequent distribution of supplies on a wholesale level have been developed to a high degree of proficincy by progressive and successful wholesale distributors. Such distributors have valuable services to offer for consideration by the foods buyer assigned to the procurement of food supplies for the central food storage unit. A variety of selling arrangements are frequently made available by wholesale distributors for customers with the purchasing potential normal to the needs of the central food storage facility. Among the arrangements offered are:

1. The substitution of the wholesale distributor for the functions provided by a foods broker. Supplies are ordered through the wholesale distributor and shipment is made by the manufacturer directly to the central food storage unit of the institution. The wholesale distributor is paid an amount similar to brokerage commission on the transaction.
2. Purchases can be made through the wholesale distributor and the combined needs of the two customers can be made in one shipment. The transportation vehicle, rail car or truck, will stop over and unload each customer's share of the total supplies transported while enroute from the manufacturer's plant to each of the buyer's warehouses. This method of delivery is sometimes referred to as "drop shipments."
3. A "cost-plus" selling arrangement can also be arranged through some distributors. A percentage factor is added by the wholesale distributor to his cost when billing the central food storage unit for the supplies purchased. In some situations the cost-plus percentage is established on a sliding scale which reduces or increases in relation to the volume of supplies purchased.

Several types of wholesale distributors are available in major markets. Some are distributors of specialty items such as fish, fresh produce, frozen foods, and meat products. In some cases, such distributors may develop into the best source of supply for such food products.

H & I (Hotel and Institutional) distributors who operate with regional or national distribution, enjoy a volume of business which affords purchasing advantages not always available to the foods buyer responsible for procurement of supplies for the central food storage unit.

General line wholesale distributors (the local jobbers) limit their distribution usually to a more restricted area. Due to the more limited volume of business experienced by such distributors and in consideration of the sales potential represented by the needs of the central food storage unit, such distributors may be encouraged to reduce their profit mark-up substantially.

Retail grocery co-operatives, voluntary retail grocery chain organizations, and warehouse supplies of local supermarket chains are also possible sources of food supplies.

If the college or university served by the central food storage facility has within its various operations a college or department of agriculture, supplies such as dairy products, eggs, meats, poultry, and fresh produce are available for purchase.

FOOD SERVICE TRENDS

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DIETETICS: This field in itself is extremely important in Residence Halls Food Service because when the student is under contract to be provided meals three times per day a moral responsibility rests with the college or university to provide this student with a balanced diet. This balanced diet is a result of careful menu preparation and, its end result, the actual serving of the food to the student.

There are three schools of thought as pertains to menu preparation:

1. A master menu is prepared for the entire campus by a dietitian. This master menu is then implemented by personnel in the various Residence Halls. In some cases this personnel is not highly trained but are experienced enough to sufficiently execute with limited ability and within rigid guide lines and procedures.
2. A master menu for all residences is prepared by a committee of dietitians who are the managers of the individual units. These persons are also then responsibile for the implementation of the menu in the various Residence Halls.
3. Individual unit Food Service Managers are dietitians and are responsible for both the preparation and implementation of their menus. Review of these menus is, in most cases, done by higher authority.

Comments:

System Number 1:

Provides easier control by administration
Gives least flexibility in Residence Halls
Ordering is simplified by production in Central Food Stores but these facilities will sometimes be overtaxed if items requiring much "hand-work" labor are needed in large quantities.
Requires more experienced top administrators
Requires experienced (but not highly so) personnel in units

System Number 2:

Provides more unit flexibility, but still highly controlled.
Requires more persons with training but not necessarily too much experience in the units.
Requires experienced top administrators.

System Number 3:

Provides almost unlimited flexibility of menu in an individual residence unit. This can be of great benefit to student organizations and in maintaining student relations.
Requires more persons with training and experience in the units.
Should require less top administrative costs, but is probably the most expensive system of the three.

General:

The menu or menus used on the campus affect directly the work-load and schedule of purchasing, production and delivery from the Central Food Stores Facility. The Central Food Stores Facility manager must, in many cases, be consulted prior to and during menu preparation for guidance and advice on availability of certain foods, current prices and market trends as well as the effect of the menu, as prepared, on the Central Food Stores Facility operation.

Dietitians are becoming more scarce and more demanding. (Law of supply and demand). More undergraduate and internship emphasis is needed to insure a supply of trained dietitians in the future.

The training and experience received by a graduate in dietitics lends itself to College and University food service. Administrative and personnel training should be improved. Cost control, purchasing, preparation and service, and sanitation background is provided. All of these are essential.

These people are professionals and should be treated as such.

Dietitians in may cases perform duties within a Central Food Storage Facility. Some of these are discussed in another section.

Quality control on incoming products.
Supervision and operation of test kitchens.
Development and revision of new and old recipes and formulas.
Costing of recipes, formulas and menus.
Conduct training and sanitation courses for food service employees.
Work with and advise unit Food Service Managers.
Assist in the development of specifications for food and supply purchasing.

COEDUCATION FOOD SERVING: The current trend in College and University Food Service appears to be in the direction of coeducational dining. This trend does not appear to cause too much difficulty from the view point of Central Food Storage except for possible differences in portion sizes of those items provided from the Central Food Storage to the individual unit serving both male and female students. All in all it doesn't appear as though this coeducational food service has much effect on the Central Food Service operation.

Many arguments, both pro and con, exist for coeducational dining. Some of these are:

Better decorum in the dining room
Better dress on the part of the students
Better attendance at social functions
Better table manners
More difficult menu preparation and service
Higher costs when the girls are provided the same size portions as the boys in contrast to girls dining separately and frequently being provided a smaller portion or quantity of food.
Possibly slightly higher labor costs if separate service—because of difference in portion sizes —must be provided.

AUTOMATION-VENDING

AUTOMATION: Like practically every other business, Central Food Storage and its components is being forced to invest in labor-saving devices (discussed in another area). This decision to invest in these labor-saving devices has been necessitated because of increased labor costs and, in many cases, decreased labor productivity. Automation can include production-line type of preparation and packaging in a central kitchen, IBM or similar inventory control and billing, etc.

VENDING: On many campuses vending is a rapidly expanding business. Some schools, unfortunately, place too much emphasis on the profits to be derived from vending. Vending, in most cases, should be considered as supplemental feeding and its primary purpose in being should be to provide *SERVICE* to isolated campus areas, to small groups, at odd hours, for special events, as a supplement to manual feeding operations, where speed is important, etc.

If the administration decides that the vending on the campus will be operated by the Food Service Department and specifically within the Central Food Stores Facility, then the following considerations will apply.

Storage

A. Must be provided for a greater variety of food products and supplies than normally considered for a regular food service operation. Large amount of area required for the bulky items and the large variety needed. Examples of these are as follows:

1. Food Products:
   - Candy, Gum, Cookies, Crackers
   - Canned Foods and Soups
   - Soft Drinks and Syrups
   - Special Coffee
   - Special Cream
   - Individual Condiments
   - CO^2

2. Supplies:
   - Containers (variety of sizes & shapes)
     a) plastic and paper
     b) hot food and cold food
     c) liquids and solids
   - Sandwich wraps and labels
   - Disposable utensils

3. Refrigerated areas for:
   - Storage of ingredients for sandwich, pastry and Ice Cream production
   - Hardening room for Ice Cream (—20° to —25° F)
   - Holding Room for Ice Cream (—15° F)

B. Security storage for highly pilferable items such as cigars, cigarettes, candy, gum and cookies must be designed and controlled.
   1. If the volume of cigarette sales is adequate to support the cost of labor and equipment necessary for applying the sales tax stamp, consideration should then be given to purchasing on a direct sales basis.
   2. A cigarette stamping machine is necessary to put on state tax stamps when cigarettes are purchased direct.

Production:

A. Sandwiches
   1. Food storage and preparation of ingredients
   2. Preparation of sandwiches
   3. Wrapping and labeling

B. Pastry or Baked Products
   1. Production of
   2. Wrapping, labeling

C. Ice Cream and Frozen Products
   1. Storage of Ingredients
   2. Production

Services:

A. Repair Shop
   1. Need area for storage of inoperable machines
   2. Need area for repair of inoperable machines
   3. Need area for storage of operable (extra) machines
   4. Tools and testing equipment for machine maintenance
   5. Spare parts and storage area for them

B. Delivery
   1. Vehicles
   2. Materials and machine handling equipment
   3. Truck ports in separate shipping area
   4. Parking area
   5. Scheduling

C. Receiving
   1. Can use common area

D. Sanitation
   1. Daily cleaning by route man
   2. Scheduled periodic overhaul, disassembly and cleaning

Personnel:

A. Maintenance

1. In maintenance and repair and overhaul
2. At machine locations

B. Production—See section so designated
C. Receiving—See under SERVICES—(C)
D. Delivery—See under SERVICES—(B)
E. Accounting—See under section so designated
   1. Checkers (inventory)
F. Sanitation—See under SERVICES (D)
G. Storage—See under STORAGE (A), 1 & 2
H. Scheduling
   1. Vending is 7 day/wk, 24 hr/day operation
   2. Special events on campus place additional load or demand on vending services in certain locations. Personnel must be scheduled in advance to maintain these machines.

Accounting:

A. Separate accounting system including reports for:
   1. Each machine (complete a form each time machine is filled)
   2. Each delivery person
   3. Each vehicle (complete inventory each time truck leaves CFSF)
B. Cash control
   1. Bonding of all personnel
   2. Separate money counting & distribution room with proper security and equipment to perform duties, ex: safe, change counter and wrapper, locked money bags, work counter.
      Note: Your Campus Police and Cashier's Departments can be of assistance to you in this area.
   3. Banking
   4. System for refunds
   5. Provide change for resupply of machines to delivery personnel
C. Inventory
   1. Perpetual
   2. Monthly and Annual
   3. On and Off each truck

SCOPE: When vending is discussed, the following are generally automatically considered to be included:

Soft drinks—all varieties
Hot drinks—coffee, tea, chocolate—soups
Milk—a variety of types and sizes
Ice Creams—Commercial novelties—milkshakes
—sundaes
Cigarettes
Candy, gum, cookies & crackers

Many other items and services are available through vending and they include:

Hot Foods — hot sandwiches
prepared hot foods (fresh or frozen)
individual canned portions of food items and soups
Cold Foods— sandwiches, salads, pastries, fresh fruit
Sundries —including combs, razor blades, ballpoint pens, "blue-books"

Most vending machines, at the present time, will accept and give change for a quarter (25¢ piece). Because of this limitation it is necessary to provide and maintain coin and currency changers in the vending areas. A 50¢ coin change is a compact piece of equipment, easily wall-mounted and serviced and is of special value where large volume vending is involved or where older machines which only accept exact change (in nickels and dimes) are provided. The currency (paper money) changers are especially worthwhile in vending locations where customers are purchasing a meal, or most of their lunch for example, and need a considerable amount of change.

FLOW OF GOODS

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GENERAL: Plans developed for the most efficient flow of goods into, within, and out of a central food storage building have as their objective the accomplishment of these functions with a minimum of cost, time, effort, and space. Material handling methods developed and equipment selected have as their purpose:

1. The reduction of handling costs resulting from methods of materials handling which reduces the labor required, the distance and variety of directions supplies must travel, and the frequency of manual operations required.
2. The design and location of receiving, storage, assembly, and shipping areas which contribute to the increased productivity of labor and make maximum use of the storage capacity available.
3. The establishment of facilities and equipment which provide working conditions for reducing worker fatigue and protecting the worker from injury while engaged in handling supplies.
4. The layout and construction of the areas utilized for the flow of goods (receiving, storage, assembly, and shipping areas) designed around predetermined methods of operations and equipment to be employed in the handling of supplies.
5. To arrange for a high degree of accuracy in checking supplies into and out of inventory, and to provide adequate security to supplies in storage.
6. To protect the quality of food supplies by providing storage conditions most appropriate to the various types of supplies handled, and to insure that the intervals during which perishable supplies experience inappropriate temperature and humidity conditions is minimized.
7. To design areas utilized for food handling which provide control over insect and/or rodent infestation.

RECEIVING: Many factors related to the site of the central food storage building will influence the considerations applied to the location of the receiving facilities. Established rail lines will affect the distance required for a spur line, and established highways and roads will establish the length of and practicability of the addition or extension of roadways necessary for trucking operations to and from the building.

The location of the receiving platform(s) in relationship to the location of storage, assembly, and shipping areas will establish the length of travel supplies will be required to experience as they flow into and from the building. The cost, time, and effort expended in handling supplies will be influenced by the design and location of the areas where materials handling is required in the operations of the central food storage facility.

Location considerations: Consideration of materials handling methods is not complete unless these considerations include the rail and/or roadways utilized by the carriers delivering supplies. Rail tracks and roads used by trucks must be designed with solutions provided for removal of snow if normal weather conditions contribute such problems during winter months. Areas adjacent to the roadway or rail siding must be provided for placing snow as it is removed from traffic and maneuvering areas required for placing rail cars or trucks in position for unloading.

Area weather conditions will have an effect upon constructions of receiving platforms and will dictate the desirability of providing facilities inside the building—semi-enclosed or under roof only. The cost of each type of facility is a factor which must be

individually related to the obvious benefit in working conditions provided.

When engaged in the design stages of planning the central food storage building, the option of providing a *single* area or *separate* areas to be utilized for shipping and receiving functions must be evaluated.

A receiving area separate from the shipping area will usually permit a straighter flow of supplies from the receiving to the shipping point and will reduce the amount of back-tracking involved in the flow of supplies. (See Figure 1)

Separate areas for receiving will reduce conflict for the use of the space and facilities that will otherwise occur if a single area is provided for both shipping and receiving.

If cost considerations related to construction of facilities so dictate, larger areas can be provided by construction of *shipping areas* within the building and *receiving facilities*—semi-enclosed or under roof only.

Shipping platform and truck space can more accurately be determined than is possible when planning receiving areas. The delivery schedule established for shipment of supplies to the individual dining units will accurately establish the need for platform and truck space required for shipping functions, whereas, the receiving schedule is difficult to influence. Supplies purchased on a "direct" basis frequently travel great distances and are sometimes in transit many days or weeks. The latter interval is normal if products are shipped by a combination of water-rail or water-truck, or if stop-over cars are employed. As a consequence, large shipments, requiring use of receiving areas for a considerable time, establish periods of peak need for receiving space.

One location, utilized for both receiving and shipping, provides benefits not available when separate locations are provided. The distance of travel can

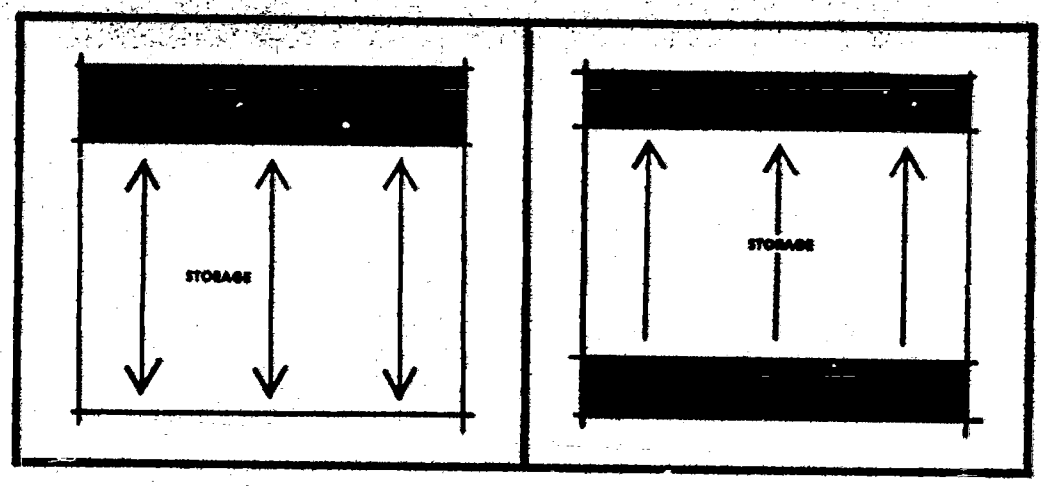


FIGURE 1

be reduced for supplies stored in areas adjacent to the combined shipping and receiving facility.

If the shipping and receiving functions are both conducted in the same area, it is possible to utilize personnel for both functions with greater flexibility than if the areas for shipping and receiving are widely separated.

Measures employed for control of insects and rodents, heat loss in the building through open truck port doors, and snow removal are simplified if a single area is used for both shipping and receiving.

Receiving facilities—rail: Railroad freight cars transporting supplies to a central food storage building are either box or refrigerator cars. Both are equipped with doors opening on either side of the car. A lack of standard dimensions for freight cars provides variations which eliminate construction of platform heights level with all cars door sills and floors. The following are minimum critical freight car dimensions:

	INSIDE DIMENSIONS			DOORS		DISTANCE ABOVE
TYPE OF CAR	Length	Width	Height	Width	Height	TRACK
BOX	40′	8′5″	7′9″	5′6″	7 9″	3′6″
REFRIGERATOR	29′4″	6′6″	6′	3′9″	5 2″	4′7″

The height of rail freight platforms are extremely important to the handling of freight. The height of the edge of the platform above the top of the rails recommended for use when unloading box or refrigerator cars is 47½ inches. Unfortunately, the racks on the floors of the refrigerator cars may be as high as 66 inches above the tracks. When a compromise must be made, the best arrangement is to have the dock level lower than the floors of the cars to be served. This permits dock boards to slant up into rather than down into the car. This saves space within the car where every square inch is important for maneuvering equipment.

Another critical dimension is the distance between the center line of the track and the edge of the platform because it determines the amount of open space or gap between the side of the car and the platform. Cars vary in width between 123 to 125 inches. The center line dimension recommended by the railroads is 68 inches, and this results in a gap at the platform's edge of between 5½ and 6½ inches. Refrigerator cars have their floor racks set inboard to allow the insulated doors to close properly which results in a longer dock board being required to bridge the gap than is required with box cars.

FIGURE 2 Magnesium rail dock board locked in position.

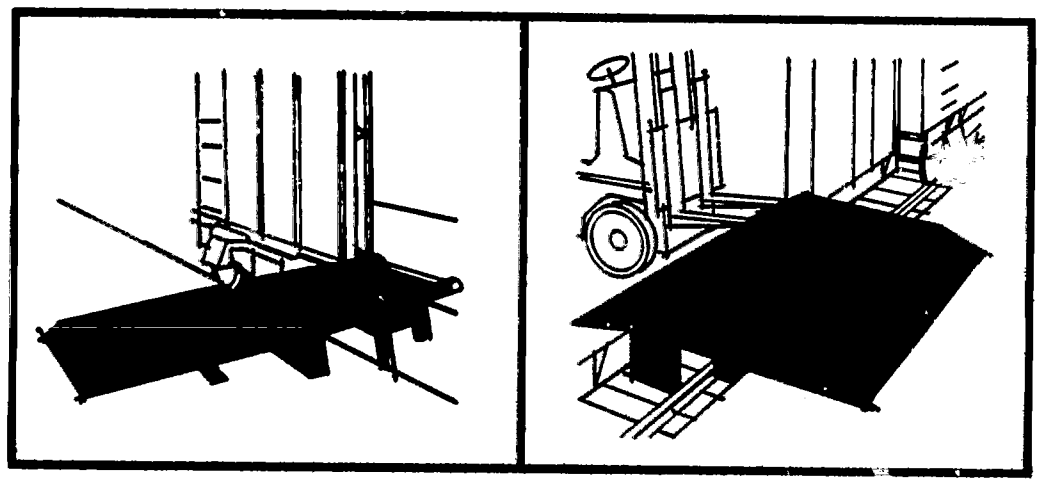


FIGURE 3 Rail dockboard with adjustable incline for use when receiving platforms is below floor level of rail car.

Certain minimum clearances are required between the car and the building or an overhead canopy. In planning a central food storage building, it is important to have such dimensions approved by the railroad company providing the spur. Most refrigerator cars have a refrigeration system operated by diesel motors. When these cars are in position for unloading, the refrigeration equipment can be operated by electricity. This alternate source of power can be supplied by an appropriate electrical outlet and cable at the rail dock, and refrigeration can be maintained if the unloading interval is extended beyond the limits of the diesel fuel supply in the rail car. The rail company providing the spur will supply the particulars of type of cable and electrical current required.

METHODS OF UNLOADING RAIL CARS: Rail cars containing staple foods or frozen foods packed in cases or bulk foods packaged in bags or bales, such as sugar and flour, are usually unloaded by conveyors. If such supplies are received in unitized loads shipped on pallets, pallet handling equipment will be necessary.

1. **Conveyor Unloading:** Wheel, roller, or belt conveyors are most widely used to unload cars. The efficiency of such an operation is dependent upon how quickly the equipment can be assembled into working condition and the ease with which it can be extended as the work moves toward the ends of the car.

A belt-type powered conveyor is most suitable for the movement of bagged supplies such as sugar or flour. Large, irregular sized items such as cylindrical shipping containers, commonly used for shipping shortening or frozen eggs and fruits, can also be handled most effectively on a belt-type powered conveyor.

The use of conveyor equipment can reduce the handlings required; however, a minimum labor

force requires personnel at the loading and unloading ends of the path of travel for such supplies. At times during the daily schedule of operations of a central food storage building, a limited number of personnel may be available, and the unloading of supplies from rail cars may have to be scheduled at intermittent intervals. The use of pallet equipment at such times will sustain the unloading activity with a minimum need for personnel.

Conveyor equipment is often utilized to move supplies from within the rail car, where space for maneuvering equipment is limited, and/or when the floor surface of the car is not suitable for the use of wheeled mechanical equipment, to a location suitable for assembling into pallet loads. Pallet loads are then moved into storage in unit loads by means of mechanical pallet moving equipment.

2. Pallet Unloading: Supplies received in rail cars are sometimes received as freight unitized on pallets. Handling can be reduced from the need to handle individual pieces of supplies to handling a unit load of supplies. For such unloading, a low-lift pallet truck, hand or powered, accommodates the limited work space within the car. Supplies can be moved with such equipment by unit (pallet) loads to the door of the car and, if the path of travel to the storage area requires a long lateral movement and placement at a high elevation for storage, a high-lift truck can be used for movement from the door of the car.

If maneuvering space within the car is limited by reason of the positioning of the remaining supplies during certain stages of the unloading operation, pallet loads of supplies can be moved manually by means of pallet dollies to a location where further movement can be accomplished by means of a low-lift or high-lift truck. If pallet dollies are not available, short lengths of roller conveyors can be used for the manual movement of pallet loads short distances.

FIGURE 4 Belt conveyor designed for easy extension.

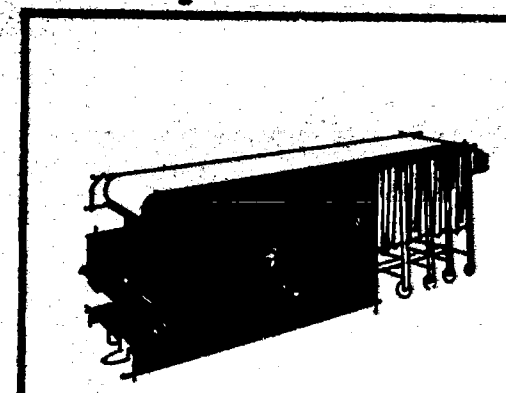
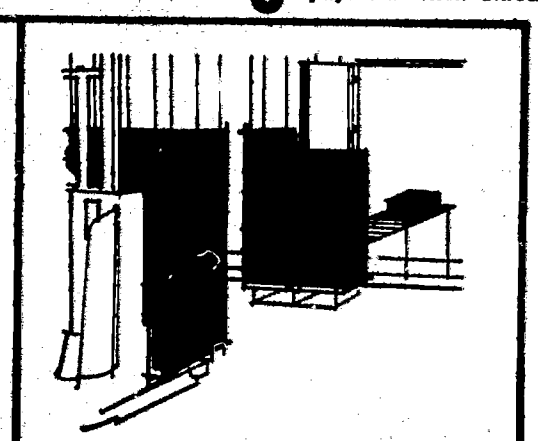


FIGURE 5 Use of both conveyor and pallet handling equipment when unloading a rail car.



Receiving facilities—truck: In general, the same broad principles will apply to the design and the construction of truck docks as is applied to the construction of facilities for the unloading of rail cars. As in the latter vehicle, again the problem is complicated by lack of standards for the height of trucks above road level.

Closed (van type) motor trucks or trailers utilized for highway travel and distance hauling will probably be the most common vehicle used for truck transportation of supplies to the central food storage building. For vehicles of the type described above, a receiving platform 48 inches above the road level will be suitable. A portable ramp will be required to bridge between the levels of some truck floors and the receiving platform; however, the varying difference in elevations will probably not exceed 6 to 8 inches.

An adjustable ramp, which can be raised or depressed as illustrated in Figure 7, provides a method of adjusting the height of the truck floor to coincide with the height of the receiving platform. Hydraulic dock boards can be built into the receiving platform to provide an adjustable ramp to meet the variety of truck bed heights encountered.

Other critical dimensions of highway carriers which relate to the size and shape of the receiv-

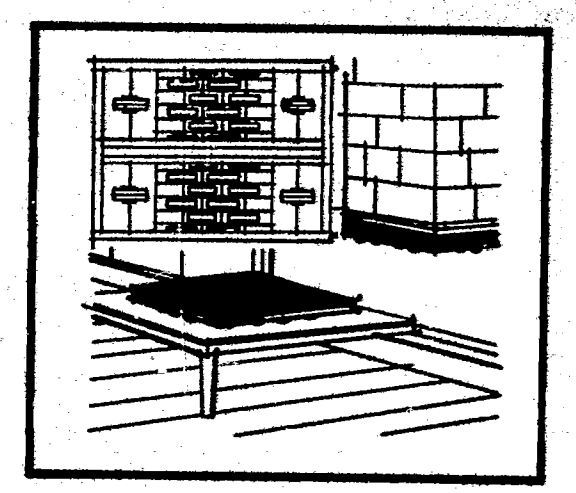


FIGURE 6 Pallet dolly especially constructed for use on slatted floors of refrigerator cars.

ing platform design are the width and length of the vehicles. The width of trucks will be close to or exactly 8 feet—the legal limit in most states. The length in most cases will include the tractor and trailer although in some localities the trailer may be removed for unloading and recovered when supplies have been unloaded.

Methods of Unloading Trucks: End unloading is the normal procedure with van type trucks and/or trailers, whereas, side unloading is required when unloading box or refrigerator cars. The end unloading of trucks increases the area available for unloading as the carrier acts as an extension of the receiving platform and requires generally less room for maneuvering materials handling equipment than is the case in unloading rail cars.

1. Conveyor Unloading: The use of conveyor equipment in unloading trucks and trailers is facilitated in that the conveyor equipment needs to be extended in but one direction as the unloading progresses. In unloading rail cars, movement and adjustment of conveyor equipment is required to move supplies from both ends of the car to the center door for unloading. The considerations previously described in the use of conveyor equipment for unloading rail cars otherwise applies to the use of this equipment when unloading trucks or trailers.

2. Pallet Unloading: Supplies to be unloaded from trucks and/or trailers can be effectively removed through the use of pallet handling equipment similar to the methods described for use when unloading rail cars. Unitized loads on pallets can be picked up at the door end of the car by low or high-lift pallet trucks, and the low-lift truck used to remove pallet loads as the unloading progresses to the end of the carrier.

If supplies are not shipped in unitized pallet loads, they must be manually loaded on to pallets within the truck and removed by mechanical pallet handling equipment. A low-lift, powered or manual truck is best suited for moving supplies to the receiving platform.

3. Mono-rail Unloading: Meat supplies not packed in boxes, drums, or barrels are usually moved from the carrier to refrigerated storage by means of an overhead single rail and with meat hooks equipped for travel on the rail. The positioning of the overhead track should be designed to provide minimum interference with overhead clearances required for the use of pallet moving equipment and supplies across the receiving dock. Sections of the overhead rail should be designed to be easily removable when not in use to reduce clearance problems.

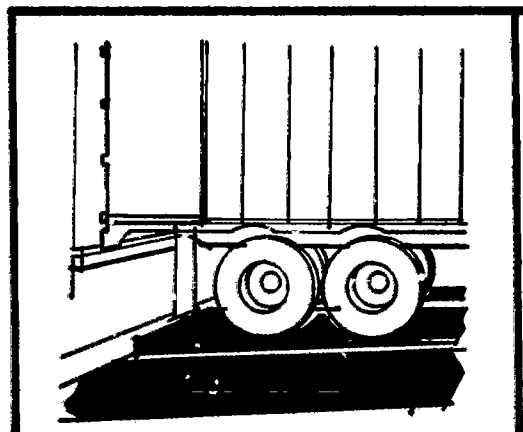


FIGURE 7

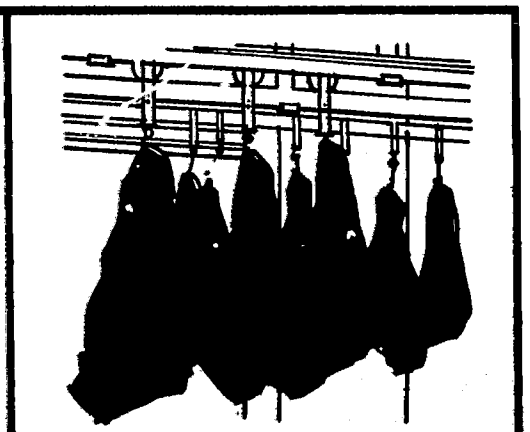


FIGURE 8 Meat stored on mono-rail system.

INTERNAL HANDLING OF SUPPLIES

Building obstructions: Important to the internal movement and storage of supplies are corridors, doors, and aisles which do not reduce clearances necessary for material handling methods and equipment planned for such operations.

Engineers and mechanics who plan and in-

stall the heating, ventilating, plumbing, refrigeration, lighting, and other electrical equipment to be installed in the central food storage unit cannot be expected to know the material handling methods planned for such operations. It is, therefore, the responsibility of the personnel having knowledge of proposed material handling methods to check the planned location for such devices and thus lessen the obstructions they might create.

Some of the items to check are:

a) Electric wall switches, outlets, and panel boxes.
b) Steam, water, and refrigeration pipe lines and valves.
c) Ceiling or wall mounted heaters.
d) Ventilating, heating, and air conditioning ducts.
e) Lighting fixtures, wall or ceiling mounted.
f) Refrigeration blower units, coils and thermostats.
g) Column locations.

The costs of eliminating each and every possible obstruction to material handling would be excessive. Some solutions at reduced costs are possible. Plumbing, steam, and refrigeration lines can be placed as near the wall or ceiling as conditions permit; and electrical wall boxes, outlets, switches, and thermostats placed near doors where they usually do not waste as much cubage. Centralized location of as many of these devices as possible will result in less waste of space than would be the case if they were installed in separate locations.

Storage of supplies: Supplies received for storage in a central food storage building can be generally classified as staples in cases, drums, or bags; frozen foods in cases, boxes, or individual cans; meats such as quarters, rounds, ribs, and chucks of beef received in unit pieces, and other meat, poultry, and fish items received in barrels, fibre boxes or wooden crates; perishable foods such as butter, fresh eggs, and cheese received in cases and boxes; fresh produce received in bags, bushels, hampers, baskets, wooden and fibre boxes. The variety of sizes and shapes, and the perishable nature of certain supplies compounds the problem of providing a minimum of materials handling equipment appropriate to each item of supply.

In addition to the variety described above, some items are especially fragile and require special care in handling, and some items of supply can experience only a short interval of improper temperature or humidity without deterioration of quality.

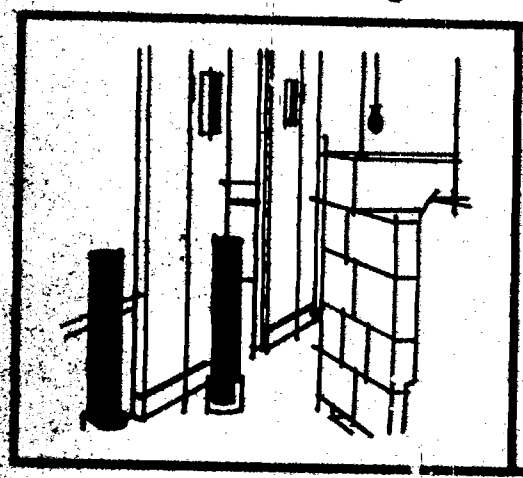


FIGURE 9 Steel bumper posts installed to protect corner. Overhead pull mechanism placed so as to permit opening and closing of doors without leaving the pallet truck.

FIGURE 10 Hand truck designed to handle drums and other cylindrical containers.

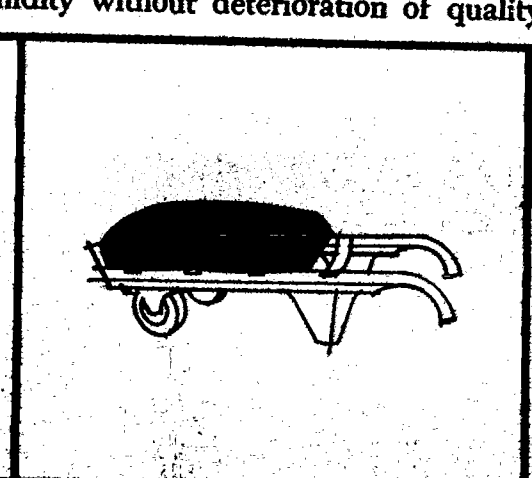


FIGURE 11 Hand truck designed for case or bag supplies.

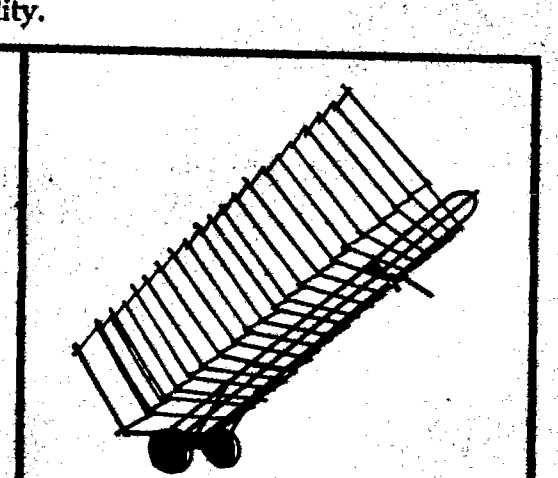


FIGURE 12 Hand truck designed to handle wide and tall items.

STORAGE OF STAPLES: Cases of canned or bottled products not requiring refrigeration lend themselves to storage methods which afford opportunity to utilize the maximum cubage of storage areas. Methods of storage, regardless of the product stored, has as its objectives:

a) Maximum utilization of space consistent with the time, effort, and labor costs appropriate to the need for such space utilization.
b) Rotation of supplies to move out of inventory on a first in—first out system.
c) Storage of supplies which facilitates both the placement of supplies into storage and the removal of supplies when required.
d) To extend the storage life of the supplies by providing storage conditions most suitable to the products in storage.

Most modern food storage warehouses provide storage areas for staple foods (such as cases of canned foods) which provide high ceilings and maximum vertical storing of supplies. High-lift pallet trucks are required to move previously unitized pallet loads into storage position.

To obtain maximum use of cubage provided in high ceiling (16 to 18 feet) storage rooms without requiring that duplicate areas be established for low-level stock selection, pallet racks must be utilized. Pallet racks are usually constructed of two or more steel rails supported above the floor by vertical steel posts. The height of the horizontal rails is adjustable and are usually located at a level which facilitates manual stock selection from the pallet load stored on the floor (under the rack pallet support rails). Pallet loads of supplies, not required to be in position for manual stock selection, are stored in tiers on top of the pallet support rails.

As supplies stored on pallets at floor level are exhausted, a pallet load is removed from a tiered position on or above the pallet support rails and lowered into position to be available for manual stock selection.

Staples received in bags such as sugar, flour, and dried vegetables, do not provide sufficient stability when stacked vertically to permit storage at high elevations. If pallets are used, smooth, double faced pallets designed to reduce the damage to the containers otherwise resulting from use of rough surfaced common pallets are recommended.

Stock selection: Supplies assembled into orders for shipment from the central food storage building are usually withdrawn from storage manually, placed on pallets, semi-live skids, or hand trucks, and moved in mixed loads of supplies to the shipping area. When pallets are used, a low-lift manual or powered pallet truck is employed and in the case of semi-live skids, a skid jack is used.

Personnel engaged in stock selection will require a minimum of time for this function if supplies are stored to provide for a minimum path of travel when so engaged. The fastest moving supplies as well as the heaviest supplies should be located nearest to the entrance doors of the various storage areas.

Heavy, large packages of non-fragile items should be the first items loaded on the pallet or skid.

FIGURE 13 Pallet load being placed on pallet support rails.

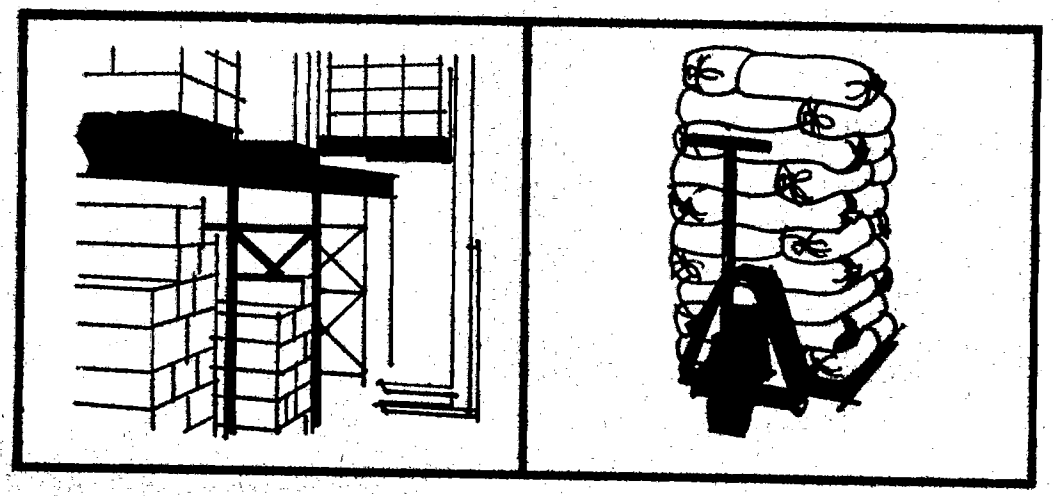


FIGURE 14 Bags of flour moved into storage on pallets and with manually operated hydraulic low-lift truck. Note the stacking method employed which positions each bag in order to tying the load [illegible]

being used when selecting stock for orders. Smaller packages or products of a fragile nature should be loaded on separate pallets or skids so that these items can be loaded onto the delivery truck after the heavier items have been arranged among the lower layers in the delivery truck.

Items arranged on the pallet or skid being used for assembly of stock selected for shipment should be placed in such order as to facilitate the function of counting and checking these items when loading the delivery vehicle.

Modern food warehouses designed for an extremely large volume of storage and shipment of supplies use four wheel trucks moved mechanically through the storage areas. Supplies are selected by hand along the route followed by these vehicles, and the stock so selected is moved, without additional manual labor, to the shipping area.

Another method employed in large volume warehouse is the use of gravity and powered conveyor systems (see Figure 19). Both of these methods reduce the need for labor required to move supplies from storage to the delivery area; however, volume required to make these applications practical does not exist in a college or university central food storage building.

Perishable supplies should be retained in refrigerated storage areas after they are assembled for delivery and moved as quickly as possible to the shipping area for prompt loading onto the delivery truck.

Shipping containers will need to be provided for the shipment of fresh meat and poultry products. Aluminum shipping containers, equipped with self-stacking handles and constructed to nest one within the other, are manufactured for use as the shipping container for such products. Orders can be preassembled, placed in the aluminum lugs, and the lugs loaded onto hand trucks or semi-live skids. Supplies so assembled are then held in refrigerated storage and moved promptly to the delivery platform for shipment to the dining units.

SHIPPING SUPPLIES

Loading the delivery truck: Supplies can be loaded into the delivery truck in unit loads on pallets and labor required for this function will be minimized. A low-lift pallet truck will be required for this operation as the loading door of the delivery vehicle will seldom provide the clearance needed for use of a high-lift pallet truck. When this method of loading

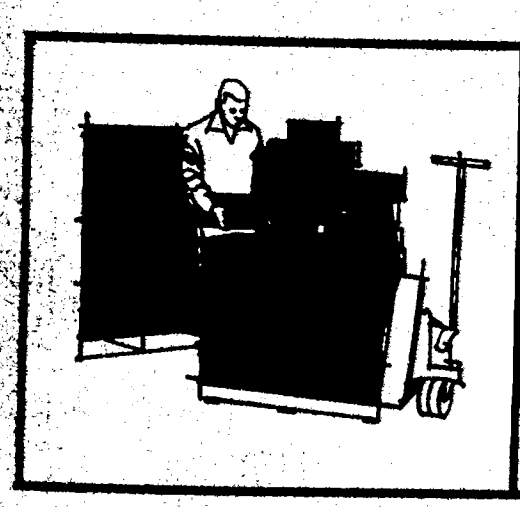


FIGURE 15 Use of pallets and mechanically operated low-lift truck by stock selector.

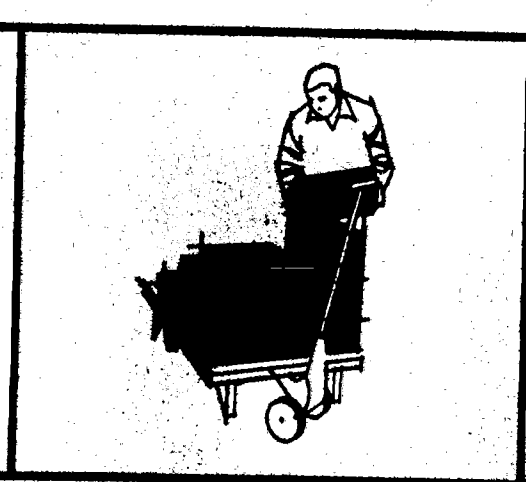


FIGURE 16 Use of semi-live skid and jack by stock selector.

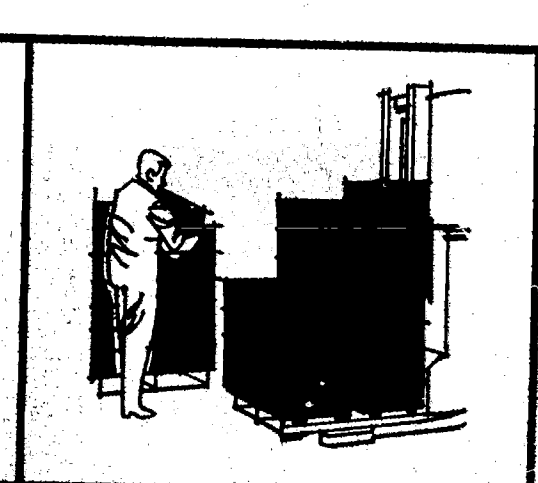


FIGURE 17 Use of pallets and high-lift pallet truck by stock selector.

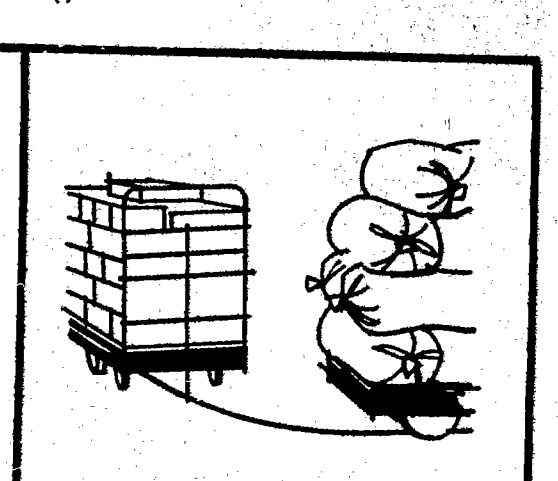


FIGURE 18 Continuous cable in floor slot tow trucks.

is utilized, it is also possible to unload at the delivery point in the same manner, and the labor required for unloading is again reduced. Equipment for pallet handling will either need to be carried with the delivery or duplicated at the receiving unit.

Two difficulties will be encountered if this method is utilized:

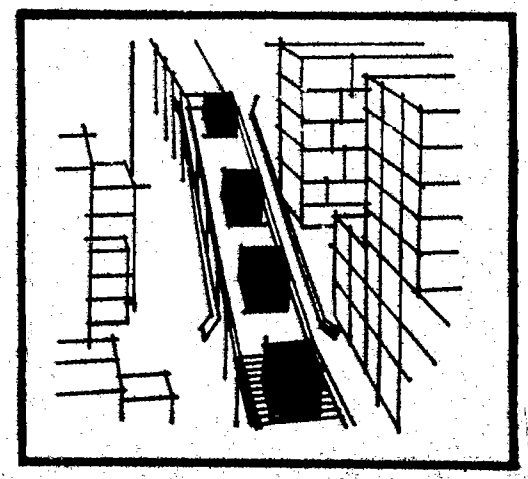
1. Supplies of mixed items loaded onto a pallet are difficult to count and check accurately and errors in checking orders onto the delivery vehicle will be more frequent.
2. Supplies of mixed items transported in pallet loads do not provide the stability for supplies that is obtained if boxes, bags, drums, and cases are individually placed into position in the truck by hand.

Manual loading of individual items necessitates a separate handling of each item of supply; however, it does permit accurate checking of supplies as they are loaded for shipment; permits maximum utilization of space within the delivery vehicle, and also enables placement of individual items within the delivery truck in a manner which will reduce the possibility of damage to supplies during delivery.

Delivery schedules: Schedules developed for delivery of supplies to the units served by the central food storage building should be designed to accommodate the following considerations:

1. A frequency of delivery which is appropriate to the storage capabilities of the receiving units and the level of supplies desired to be on hand in the dining halls.
2. Foods of a very perishable nature need to be delivered more frequently than foods with longer storage life.
3. When requisitions are prepared for supplies desired for shipment to dining halls, separate requisitions for various types of products (meats; poultry and fish; staples; produce; and perishables) will facilitate the function of preparing requisitions. A delivery schedule designed to make separate deliveries of supplies listed on such requisitions will reduce the labor and time required to assemble supplies in that supplies to be selected are generally located in the same general storage areas.

FIGURE 19



Delivery vehicles: Delivery trucks should be designed with interior body dimensions which are best suited to the quantity, shape and size of the supplies to be transported. The size of the vehicle will have its effect upon the economy of operation and also will dictate the personnel required for unloading operations at the dining halls. If cabinets for the delivery of bakery products are to be transported, the interior body width should be of a dimension to avoid the loss of load space when cabinets are being transported. A method of anchoring wheeled vehicles such as cabinets also needs to be provided within the body of the delivery truck.

The height of the truck floor above the road is an important factor when loading or unloading. Ideally, the shipping platform in the central food storage building and the receiving platforms in the dining halls should be a similar height.

MATERIALS HANDLING EQUIPMENT

Materials handling equipment is available in a variety of sizes with a range of capacities to satisfy the need to move supplies varying distances—either vertically, horizontally, or along an inclined or declined path of travel. Each particular piece of equipment lends itself for the special function(s) for which it was designed. The volume of materials handling performed in a central food storage building usually dictates the need to select equipment capable of being utilized for a variety of materials handling functions.

Considerations which influence the selection of equipment for materials handling include:

1. The working areas in which equipment will be used—receiving, storage, and shipping areas.
2. The conditions of temperature and humidity in the working areas.
3. The type, weight, shape, rigidity, and fragility of the products to be handled.
4. The functions required in handling such as conveying, elevating, and transferring.
5. The quantity and frequency with which products must be handled.
6. The work methods or procedures established for the handling of supplies.

Conveyor equipment: Equipment for conveying supplies can be obtained for permanent installations or as portable equipment—either power-driven or equipped to utilize the forces of gravity and constructed to permit supplies to move over wheels, rollers, or on a belt surface. Conveyor equipment is designed to move supplies horizontally, up an inclined plane, down a declined plane, or in a straight or curved path of travel.

Supplies are loaded and removed manually

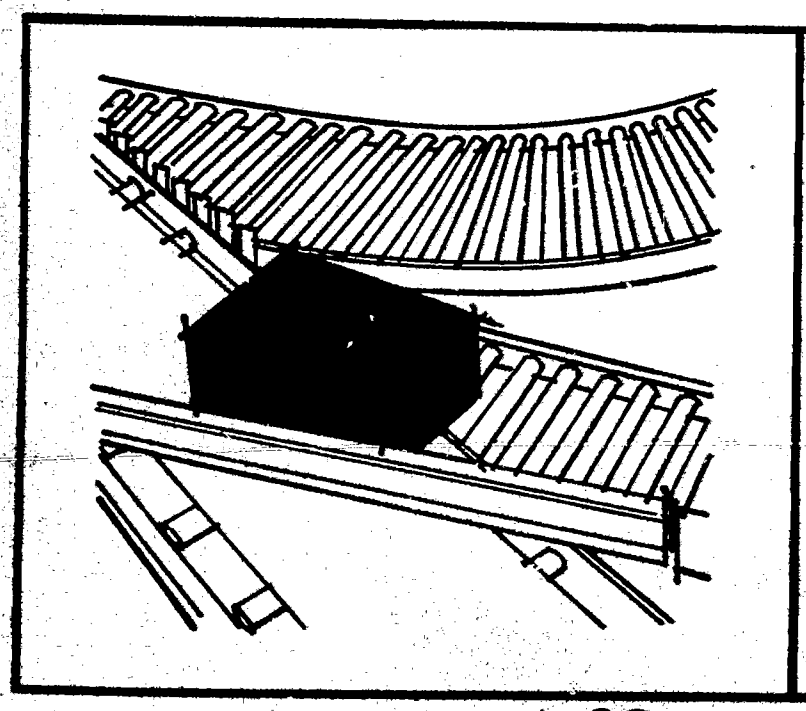


FIGURE 20
Belt and roller conveyor system in wholesale grocery. Note divesting to two lines of intermediate floor.

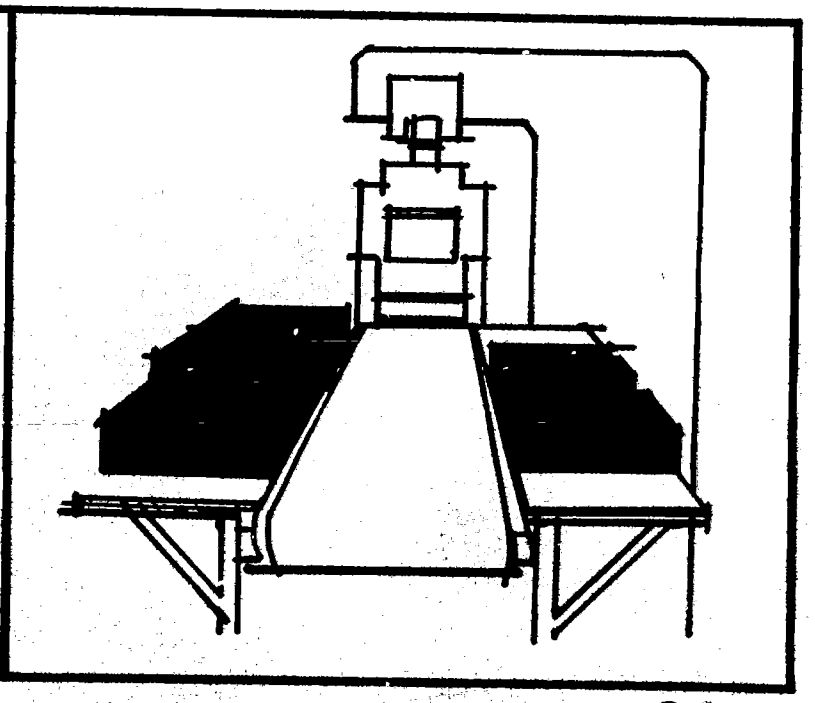


FIGURE 21
Conveyor table utilized in roll production operations.

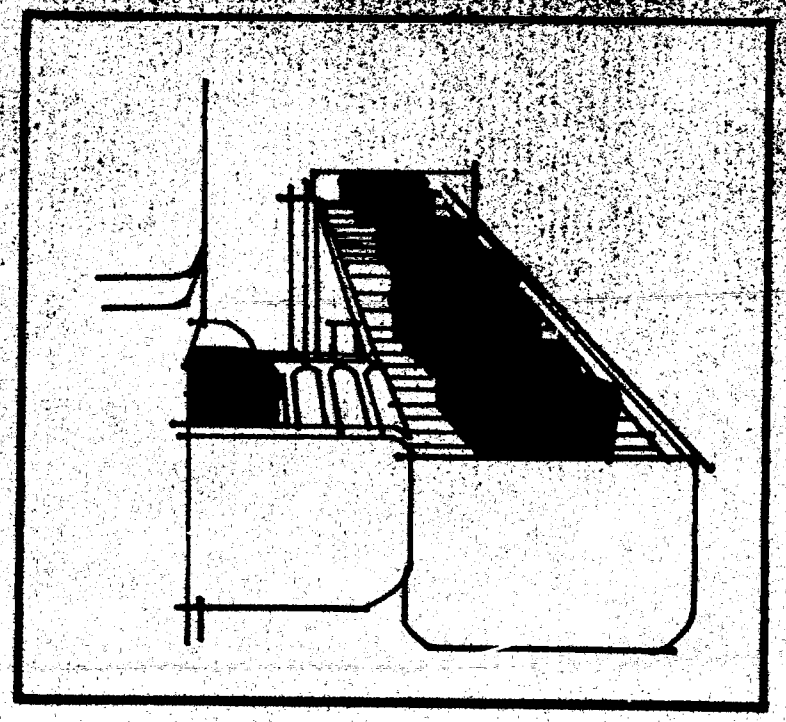
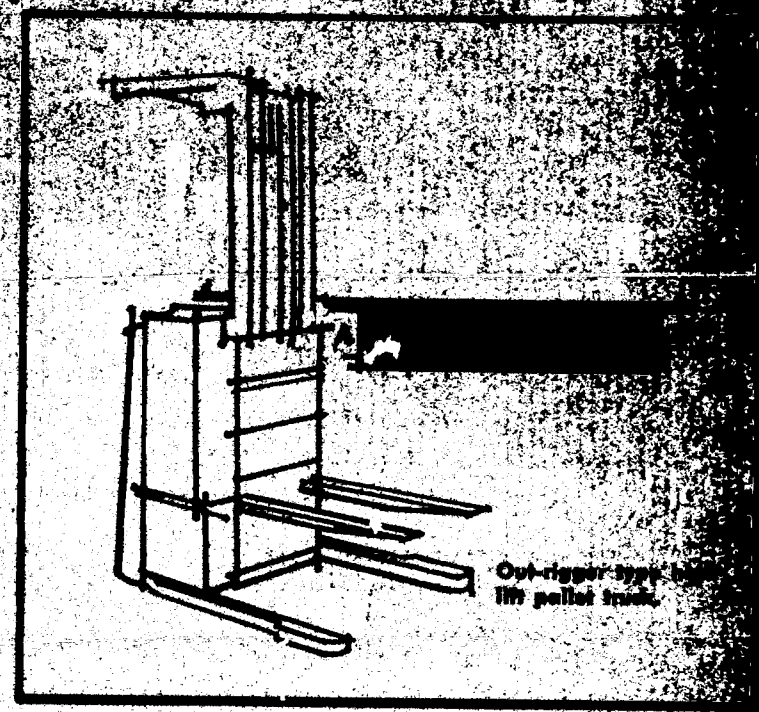
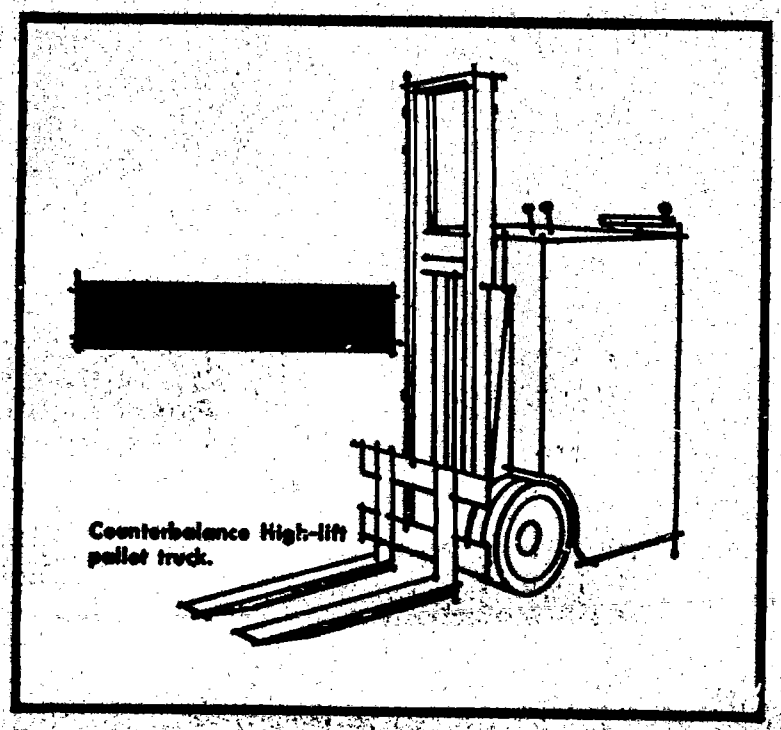


FIGURE 22

Powered conveyor used to unload bakery oven and convey bread to de-panning equipment.



Opt-rigger type [illegible] lift pallet truck.



Counterbalance High-lift pallet truck.

FIGURE 23

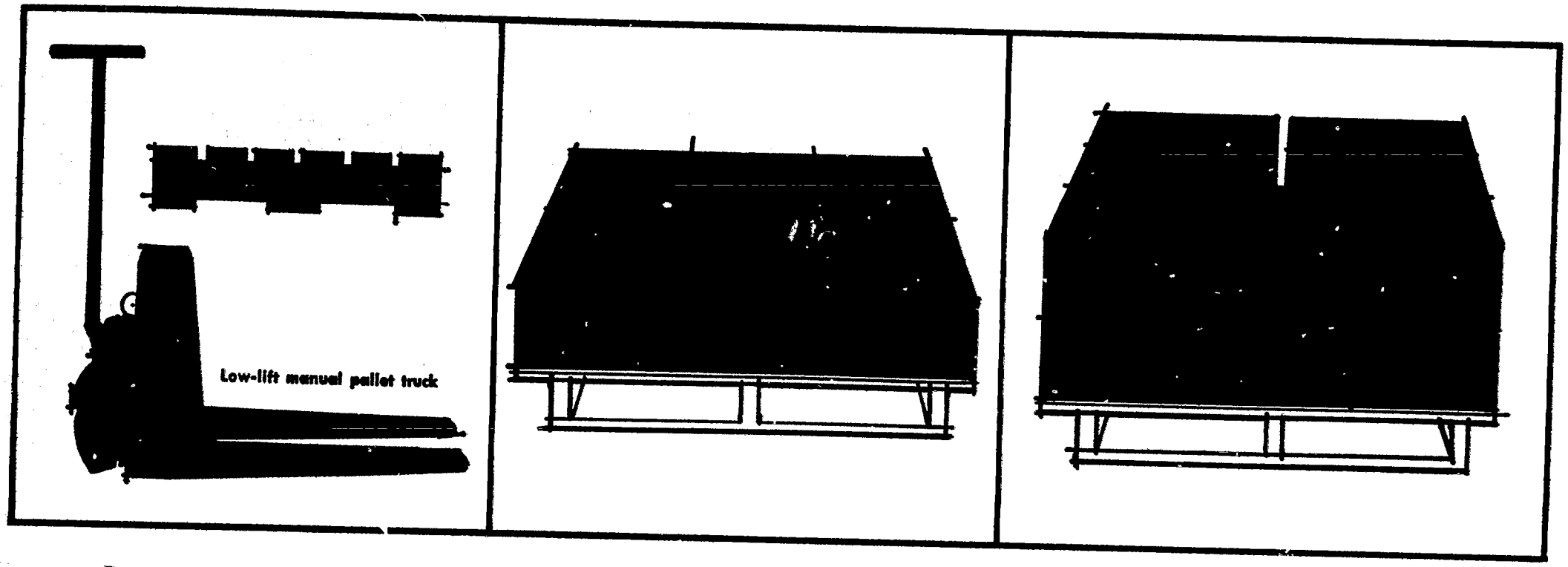
Double-faced pallet for use with counterbalance truck.

at the beginning and end of the path of travel. The rate of movement of supplies is regulated in a gravity system by the speed with which supplies are manually loaded upon the conveyor. This rate must coincide with the capabilities of labor at the unloading end of the conveyor. If line of sight is not provided to workers at both ends of the path of travel, handling difficulties will result. If a powered conveyor is used or is incorporated into the gravity system, the rate of movement of supplies will be regulated.

If conveyor equipment is permanently installed in hallways and aisles, restrictions result in the movement of personnel and other equipment in such locations. If installed in low ceiling storage areas and used for movement of supplies into and out of storage, greater utilization of storage areas is usually available due to the reduced aisle space required for conveyor equipment as opposed to that required for pallet handling equipment.

FIGURE 25
Pallet designed for use with low-lift pallet truck. Spaces are provided on the lower surface to allow the pallet wheels to contact the floor.

FIGURE 26
Odd numbered layers (1–3–5 etc.) placed on pallet as layer 1 above.



Conveyor equipment has many applications in operations involving the assembly or production of a finished product. The requirement to move products through various production stages with a minimum of handling and labor is satisfied in many situations by the use of conveyor equipment. Examples of the application of conveyor equipment to production operations in a central food storage bakery are pictured below.

Pallet handling equipment: Pallet trucks can be classified as powered or manually operated. Powered trucks used in food warehouses are generally electrically powered with driving mechanisms to raise and lower the supplies and also powered to transport both the supplies and the operator. Smaller trucks of this type are not designed to transport the operator. Operating controls, in the latter case, are located in the handle of the truck and operated by personnel standing within arms length of the truck handle.

Powered pallet trucks can also be classified in consideration of the points of balance provided to give stability to the truck when handling supplies. Counterbalance vehicles have three (infrequently four) wheels with most of the weight of the vehicle behind the elevating forks.

The second general classification of pallet truck is the "out-rigger" type. This vehicle also has three point suspension with the front wheels located in arms forward of the truck body and under the elevating forks (arms). The arms containing the forward wheels project along the side of and under the load surface of the pallet.

This type of vehicle is lighter in weight than a counterbalance truck of the same lifting capacity and, because of its shorter body, requires less aisle space for maneuvering than does a truck of the counterbalance type.

FIGURE 27
Even numbered layers (2–4–6 etc.) placed on pallet as layer 2 above.

FIGURE 28 Semi-live skid and jack.

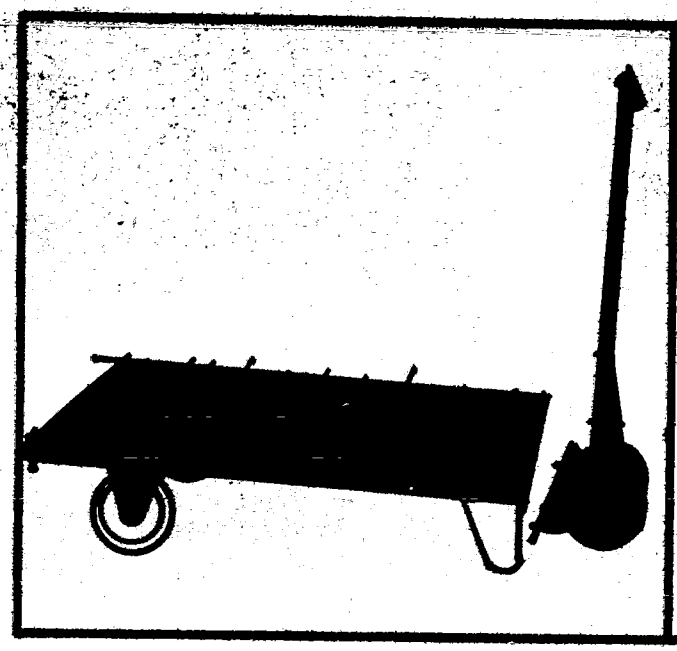
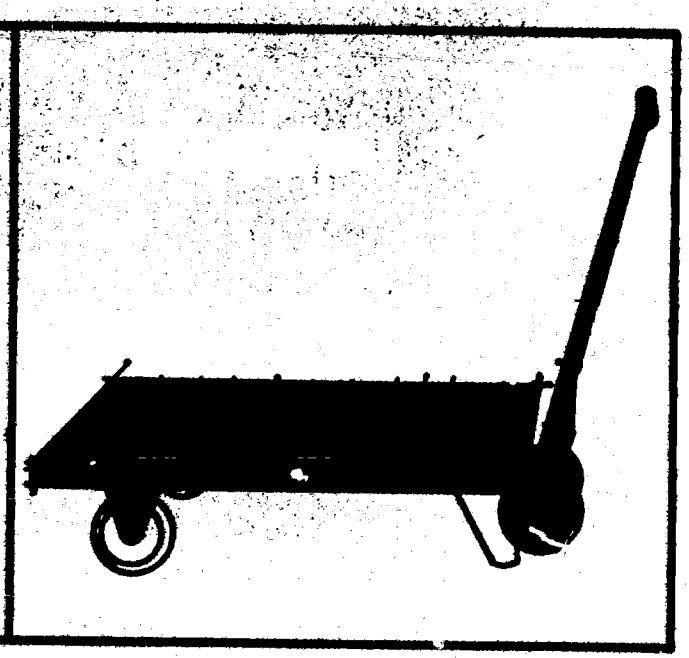


FIGURE 29 Semi-live skid with jack engaged providing a three wheeled cart.



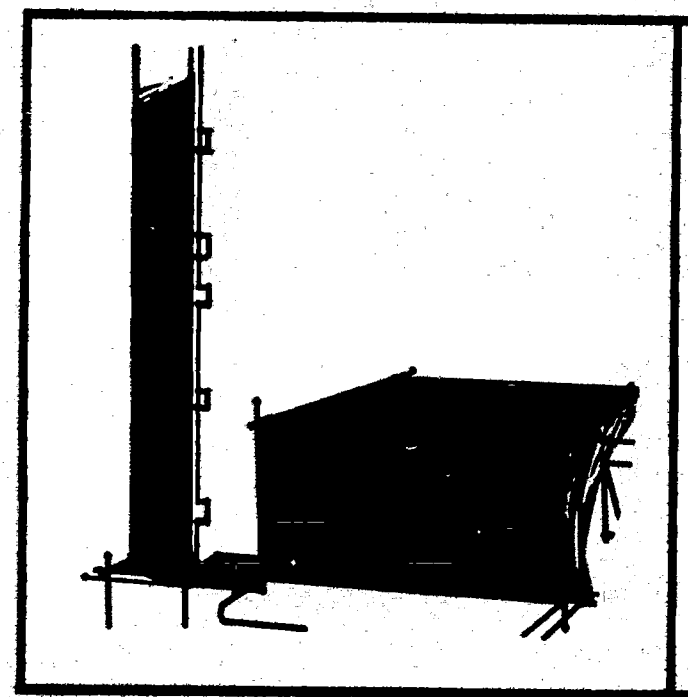


FIGURE 30

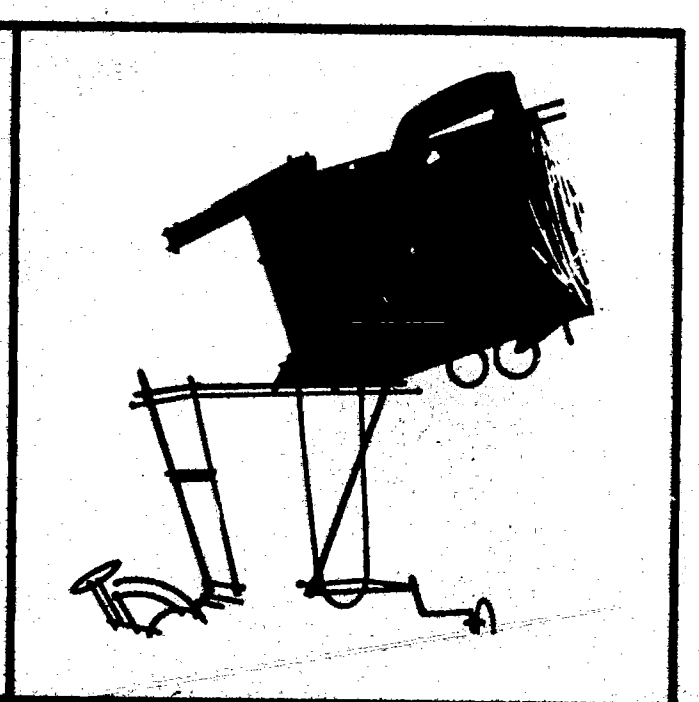


FIGURE 31

Hand operated pallet trucks are designed to lift pallet loads a sufficient height off the floor to permit horizontal movement of supplies. Pallets to be used with this type truck require spaces in the bottom surface to permit the wheels in the carrying arms to pass through and contact the floor.

Pallets can be obtained in a variety of qualities, design, and sizes and constructed of either metal or wood. Information concerning the design most appropriate for use with various types of pallet handling equipment can be obtained from the manufacturers of the pallet equipment.

If possible, one size and style should be selected for use with all supplies handled in the central food storage building as this will reduce the number of pallets required to be on hand. A 38" x 38" pallet is suitable for use with cases of 6/#10 canned food items—a common institutional shipping container. Six cases can be placed on each layer and if each layer is reversed as illustrated in Figure 26 and Figure 27 below, the unit load will have the desired stability.

Four wheeled platform trucks are useful when handling small quantities of mixed supplies. Semi-live skids (see Figure 28 and Figure 29) perform the same functions, can be stored on end when not in use, and will reduce the storage space required by four-wheeled platform trucks of similar size.

Bulk handling equipment: Bulk handling equipment is seldom required in a central food storage building. Two installations practical for use in bakery operations are pictured below. Figure 30 illustrates a flour bin for short-time storage of flour and also a vertical elevator used to move flour to a flour hopper positioned above a mixer. Figure 31 illustrates an electrically operated hoist used to position a dough trough over the hopper of a dough divider. The adjustable gate on the end of the dough trough is used to control the volume of dough released to the divider.

TEST KITCHENS

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TEST KITCHENS A. Introduction: All central food facilities do testing in varying degrees. The testing program, as well as all other phases of a central facility, must be tailored to meet the requirements of the individual institution. Some institutions provide an elaborate test kitchen well-equipped with utensils and related items, while others may have only a small room for sample opening in the central facility and do cooking and other testing in the kitchens of the food-consuming units. In considering whether or not to include a test kitchen it is very difficult to establish a rigid rule everyone may follow, but there is little doubt that such a kitchen, containing some of the more necessary testing equipment, will prove worthwhile.

After reaching a decision to include a test kitchen, considerable thought should be given to its general character, i.e., whether it should be a home style or commercial type installation. Obviously, the latter would be much more expensive and elaborate, as it would include pressure cookers and similar equipment found in the larger institutional kitchens. However, there are advantages to such a setup, as merchandise would be tested under conditions corresponding to those in food-consuming units. While not an integral part of the test kitchen, it is highly desirable to provide a small room contiguous thereto for the storage of merchandise samples. During certain periods when buying is heavy, adequate space for these items near the kitchen will be quite helpful.

It is sometimes difficult to obtain sufficient funds to provide a complete test kitchen, because these kitchens do not contribute directly to serving the food-consuming units and funds for the facility itself may be limited. However, the indirect benefit to the units served through better products should not be overlooked.

B. Layout: It will be essential to make an early decision concerning the size of the test kitchen. A room containing approximately five hundred to seven hundred square feet should suffice, but for some this size may be excessive. Consideration should be given the space required for demonstrations and meetings such as menu planning by dietitians, classes for various groups such as residence halls cooks, faculty wives' cooking clubs, conferences with dietitians and visitors, employees' meetings, etc. Since space for these general purposes generally is not available, it is good public relations if the test kitchen can be diverted to these functions without interfering with its primary purpose. It is not recommended that the kitchen be used for an employees' lunch room, as this would likely interfere with its major functions.

C. Desirable Equipment: The type and extent of the equipment to be installed obviously will be governed by the objectives of the kitchen. The major furnishings will include tables, chairs, a stove, and a refriger-

ator. Tables with folding legs and chairs that can be stacked will provide greater flexibility. Unless the refrigerator contains several cubic feet of deep freeze space, a small deep freeze for holding frozen items is desirable. The remainder of the installation might consist of smaller utensils, dishes, silverware, glassware, and other minor equipment. The latter category includes such items as an electric can opener, sieves for separating liquids from solids, an accurate scale, large flat pans for dumping products for inspection, miscellaneous thermometers, and various testing machines such as those used for determining the fat content of hamburger. In the early stages it is preferable to err on the conservative side and purchase only the more essential kitchen equipment. As experience develops later acquisitions can be made.

D. Quality Control: Satisfactory quality control is a problem for all food-producing areas. In the final analysis, the best test for any product is the degree of its acceptance by the consumers. However, a progressive operation will not sit back and wait for complaints. It will make every effort to maintain standards that will avoid complaints. One of the primary objectives of a central food facility is the production or procurement of products of a quality that will best satisfy the needs of its customers. The management, therefore, should continuously be on the lookout for new procedures and new products that will better meet these needs.

Quality control in the production areas of the central facility generally will be confined to the central bakery, ice cream room, central fresh produce preparation room, and the meat shop, where hamburger, sausage, meat loaf, or other products may be produced. Not all central facilities will contain all these units, and some may include even others. From time to time it would be highly desirable to test items produced in the central facility against those available from outside sources. Both quality and prices should be compared. If products of equal or better quality can be purchased elsewhere for the same price, or even less, their production in the central facility should be carefully weighed. On the other hand, service to food-consuming units must not be overlooked. If the institution is located in a remote area, to assure adequate service the central facility may sometimes find it necessary to produce some products that may cost a little more than those that might be purchased.

A central bakery is one of the production units most common to central food facilities. Quality control in this area, especially for sweet goods, is undoubtedly the greatest problem. The chemistry of baking processes is difficult to control, and there is no unanimity of opinion on the part of the consumers as to what constitutes good bakery products. Bread and bread rolls are not quite so complicated, as it is less difficult to maintain consistent quality in these products.

Very few central facilities manufacture their own ice cream, instead they purchase it from the college creamery or from a local dairy. Quality control of ice cream manufactured in the central facility does not appear to be a serious problem. Central preparation of fresh fruits and vegetables is practiced in a few institutions. Quality control in this area can be a problem because of irregular demand, sources of

ply of raw materials, transportation problems, the use of preservatives, etc. Although not directly related to quality control of central produce preparation, it should be pointed out that it is sometimes difficult to keep the staff in this phase of the operation occupied during periods of low demand.

Since meat items are a very important part of every menu, their quality can go a long way toward determining the success or failure of the central facility. Sausage, meat loaf, and hamburger processed in the facility itself should be scrutinized closely at all times tc maintain a high degree of quality. The fat content of these items should be carefully watched. Equipment to make proper tests is available, and it is recommended that such tests be made from time to time. Equally important is the quality of the raw ingredients. Nearly all central facilities produce their own hamburger, but the extent to which the meat shop may manufacture other items is debatable. Not only does this require special skills, but labor-saving equipment and space to carry on manufacturing operations. Moreover, if all items of cost are carefully considered, there may not be any saving. It is extremely difficult to define just how far a central facility should carry on meat fabrication. Local labor costs, quality control, proximity to sources of supply, and similar considerations are factors that may help to reach a decision.

D. Testing Samples Prior to Purchase: In a large operation where it is often necessary to move rather rapidly in confirming a purchase it is not always feasible to test samples. However, it there has been some question about the quality of a specific product recently purchased, it is quite essential that samples from various vendors be obtained and checked before making a new purchase. When the merchandise ordered finally is delivered it is common practice for some buyers to check it against one of the samples received from that particular vendor prior to purchase. Whenever complaints are received from the food-consuming units concerning merchandise received from the central facility it is highly important to check the quality of any of that particular lot still in stock. This sometimes will indicate that all or a part of the stock still on hand is not satisfactory and necessitate negotiations with the vendor from whom the purchase was made. It is well to emphasize the importance of dealing with reliable well-established vendors, as they generally stand ready to make restitution, if necessary.

In the final analysis, considerable responsibility must be vested in the buyer, as in many instances his judgment and past experience with certain products and vendors must be relied upon. While his judgment may not be infallible, as time goes on he builds up a background of experience that assists in deciding how far to go in testing products before purchasing. Any elaborate testing procedure, if dietitians from food-consuming units are called in frequently, will involve considerable time and take these people away from their regular work. Moreover it is often difficult to schedule a time when all involved will be available. Since quick decisions often must be made, frequent testing can become a hindrance to more effective procurement and defeat its major purpose.

E. Testing Procedures: There are no set rules for

preliminary testing of canned and frozen fruits and vegetables. Some of the more common criteria are color, general appearance, taste, odor, presence or absence of foreign materials or broken pieces, count per can, uniformity of size, firmness, and density. In comparing one sample with another one of these preliminary checks may rule out a product in short order. In examining frozen merchandise there is sometimes evidence of thawing and refreezing. This generally can be detected if a portion of the package is frozen into a solid lump with ice frozen between pieces of the products.

After preliminary tests are completed there may still be some question concerning the final choice. In this event more advanced tests will be desirable. These tests may include verification of drained weight for comparative purposes, cooking the products, and finally, a blind taste panel composed of several individuals. In the final analysis two or more samples may test equally well, and if this should happen, the lowest price may be the determining factor. If two prices happen to be identical, then the reputation of the packer or processor may be of assistance in reaching a decision. If a large quantity is involved it may be desirable to split the order between two vendors.

There is one other method of testing sometimes used. This consists of trying a product in one or more food-consuming areas for a limited period of time to obtain the reactions of the consumers. For example, a program of this sort can be used to test coffee, which happens to be one of the most difficult products to test. Moreover, it is perhaps the most difficult of all products to obtain any degree of consistency in test results, because of wide variations in people's tastes.

Testing meats and similar items also presents difficulties. Everyone agrees that it is not possible to write lengthy fool-proof meat specifications, nor is it feasible to unwrap and inspect every piece of meat that enters the plant. This must be done through a "spot check" which includes general appearance, odor, age, general conformity to specifications, etc. In addition to the initial "spot check" at the time of receipt, the meat cutters have an opportunity for further examination of meat at the time of fabrication and preparation of outgoing orders.

The importance of using caution in handling frozen meats cannot be over-emphasized, as appearances can be deceiving. Solidly frozen meats may be bright and fresh in appearance with no evidence of a questionable odor, but after thawing objectionable odors and a sticky appearance indicating a possibility of spoilage, may develop. It is the borderline case in this area that is most difficult. Some times only a portion of a shipment may be of dubious quality, and if sorting is attempted there is always serious danger of overlooking something. Meat shop personnel also should be alert for excessive dehydration and "freezer burns" in frozen meats. As previously emphasized, there is no substitute for experience in coping with the above problems. A central facility with well-trained personnel accustomed to inspecting incoming materials regularly will provide greater assurance of more consistent and better quality than would be likely if such duties were decentralized among the food-consuming units.

LABOR MANAGEMENT

DOROTHY O. BELL
Director, University Food Service
Stanford University
Stanford, California

Level Year-round Work Levels

Some employees can be hired for a 9 month or regular school year period, but the majority of full time employees need year-round employment. Some will accept nine months employment with the understanding that if work is available during the summer, they will be given an opportunity to work, even though the work is different than their regular work during the year.

A special form or card could be developed and given to employees, asking them to state whether they wished summer work or whether they wished leave of absence for the summer. They could indicate if they wish full time or part time work, the type of work they would be willing to do and the dates they would be available for work. The employee with the most seniority and highest work ability could be given preference.

Many employees have regular summer resort jobs and the University can assist others in obtaining summer jobs as vacation relief in an almost unlimited number of situations, as in summer camps, resorts, athletic stadiums, concessionaires, campus summer maintenance, etc.

The list of available summer jobs should be referred to the employee and he should make his own arrangements for employment.

Employees should be encouraged to take time off without pay during the summer, Christmas vacation, or at other times when the University is closed and there is a low level work period. Many employees are glad to have this break in their work schedule, particularly if they are older people.

Many of them have hobbies which they cannot pursue during the time when they are working. All employees should be motivated to have a hobby, particularly if they are housed on the campus in an employee dormitory. Boredom breeds discontent and a discontented worker soon loses interest in his job. If he has to be replaced this is costly to the department. Employees should be informed of the advantages of free lectures, library privileges, exhibits, etc., which the campus offers. After a six months trial period he could be given an identification card which shows he is a regular University employee and allows some of these privileges.

Vacations can be scheduled by the administration during the low level work periods as well as during the summer. Normally employees start to accrue vacation time after a trial period of six months.

Sometimes it is necessary for an employee to work overtime or on his day off. Perhaps instead of paying him at the time it could accrue and he could be paid in additional vacation time.

TEMPORARY LAYOFF PERIOD: There is always a reduced work load between quarters or semesters, and employees either have to be laid off without pay or hours have to be reduced. This is considered normal operating procedure. The employee must be informed of this when he is employed.

During reduced load periods many things can be done to give personnel work and still make their efforts beneficial to the University. These might include:

> Major clean-up and repairs to building and equipment. Conduct additional training and review classes. Testing of new recipes, improve old recipes and bring costing of all recipes up to date.

If you have some key personnel whom you cannot risk losing by temporary layoff without pay, you need to schedule them for some kind of work to earn their wages.

Employees whose salary includes room and board may be permitted to retain their rooms at no charge.

Civil Service—Union Implications

CIVIL SERVICE: Civil Service can offer job security

to your personnel. This can be a good selling point and is a good way to reduce labor turnover which, as we all know, can be very expensive as well as disrupting to the organization. Vacations, hours, and many other procedures and requirements set down for Civil Service employees can sometimes cause problems with the scheduling of our employees. However, it is usually feasible to request and be granted exceptions to rules where good reasons are evident.

Temporary layoff and hour reduction can cause problems when dealing with Civil Service employees.

Older employees, those no longer mentally or physically able or capable of performing their duties in an efficient and workmanlike manner can, under Civil Service, be a great problem. What do you do with them?

Sometimes arrangements can be made with the Civil Service to send two or three individuals for a job and allow you to select the one who is the most fitted to the job. Just because an individual has passed the examination for the job does not mean he is qualified to do the work. Also you could request the right to discharge a worker and ask for a replacement, within a six months period. One should be able to determine the level of performance of the employee in that length of time. After a review of his evaluation chart it could be determined if he was capable of responding to further training.

UNION IMPLICATIONS: Too many organizations are deathly afraid of union representation of their employees. This unfortunately is justified in some areas but when honest negotiations are conducted and good, honest, businesslike and understanding relations are maintained between the University and Union representatives, it is possible for both sides to benefit. There have been instances where labor unions have been of distinct benefit to food services by obtaining higher wages for employees. When this happens, a University can demand more from employees, and in some instances are even able to reduce the number of employees necessary because the unions are able to provide them with more highly trained and skilled employees. Better products can be produced in less time by skilled craftsmen than some of our regular employees and at a lower unit cost.

Different areas throughout the country have different problems concerning labor. Labor unions do make requirements of some universities as regards employee benefits, working conditions, hours, scheduling, and almost anything else that you can think of. However, if you stop to analyze this situation, most universities already provide and pay comparable vacations, better sick leave, more holidays, provide better working conditions, offer similar health and retirement plans, supply uniforms and launder them. The one real problem is the lack of steady, year-round employment in many instances. Even this can be resolved if good labor relations are maintained. In many cases the unions are requested to provide vacation relief in commercial establishments and this would give some of our employees a chance to earn money during our low level work period.

If you are faced with a Union drive, the best procedures to follow for retaining employees and continue to be non-Union are:

1. Remind employees of the benefits they have as non-Union members.
2. Inform them of Union benefits so they can make a comparison and a wise choice as to whether they wish to become unionized.

If the Union drive is successful, management should negotiate a contract beneficial to both parties.

It is management's responsibility to inform employees of the following:

1. Wages, pay progression, overtime payments, meals, and lodging allowances, deductions such as for Social Security and Withholding Tax.

2. Paid holidays, vacations and sick leave, and leave of absence privileges.
   Hospital insurance; life insurance, Social Security.
   Retirement Annuity Plan.
   Time off for jury duty and to vote.
   Rest periods or coffee breaks.
   Workman's compensation insurance.
3. Promotions; special treatment for long service employees.
4. Uniforms provided and laundered.
5. Suitable dressing rooms provided.

The prospective employee should be informed as to the number of hours he is required to work per day, and per week; whether it is a split shift or straight shift; the regulations concerning unauthorized absence and tardiness, and the length of the probationary period.

There should be a job title and a written job analysis sheet for every job.

An "Information for New Employees" manual (typed or mimeographed) should be given to every new employee. This means part time and full time regular employees, and student employees.

In theory, if we pay better wages, we can expect better work performance from employees. However, it takes a well trained supervisor to train and retain good employees.

LABOR SAVING DEVICES— EQUIPMENT ECONOMICS

Scales—overhead, platform, portion, printing
Portable meat trough
Sufficient and efficient refrigeration and freezer space
Distribution and storage equipment

Central Bakery: Revolving ovens
Roll divider and rounder
Dough sheeter (for rolling pie dough, sweet doughs, pizza pies)
Electric mixers
Doughnut machine
Proof box
Cake depositer
Electric or portable hoist for handling large and heavy batches of mix
Refrigerators and freezers
Steam kettles and hot plate
Small equipment
Distribution and storage equipment

Warehouse: Adjustable racks or pallet supports for making better use of the cubic area within the warehouse is advisable.
Palletizing of staples for storage and delivery
Use of fork lifts, pallets, rollers, carts, conveyors, etc. can be most advantageous.

Receiving & Shipping: Scales
Dock leveling device
Delivery trucks—the size and number will depend on the volume of deliveries.

sarily in the order of importance, can be determined by:

- Volume necessary to afford the piece of equipment.
- Cost of maintenance.
- Cost of cleaning and time required for same.
- Depreciation, even though in general this type of equipment does not depreciate very rapidly.
- Complexity of mechanism and ability of your personnel to operate it efficiently.

Replacement parts should be available.
Equipment should be selected to perform the maximum load of work and not the minimum.
Utility costs to operate equipment must be considered.

COST CONTROL—PERSONNEL

Cost Control

- Standardize recipes and specifications.
- Control production methods and volume.
- Establish policy of mark-up on cost.
- Establish price of merchandise.
- Transportation costs depend on location and distance from vendor to Central Food Storage, and whether shipped by rail, truck or water route.
- Control quality of products.
- Promote optimum sales.
- Work simplification methods.
- Test kitchens.
- Sanitation.
- Contract for seasonal supplies.
- Consider supply and demand, and know every source of supply.
- Efficient lay-out of Central Food Storage Facility.
- Flow of goods from Central Food Storage area to Food Service units.

Frequency of deliveries:

- Canned goods, paper and cleaning supplies —once a week
- Frozen fruits and vegetables —twice a week
- Meats, fresh —daily
- Meats, frozen —3 times a week (if freezer space in each unit is available)
- Perishables —daily
- Bake goods —2 or 3 times a day

Personnel

Food Buyer:

- Develop specifications for all supplies
- Know source of supply and determine whether to buy direct or from wholesalers
- Have knowledge of the kinds and amounts of merchandise needed by each Food Service unit
- Control schedule for deliveries to the units
- Maintain proper storage of all merchandise
- Control inventory of all merchandise
- Determine policy for charges of supplies
- Have knowledge of transportation costs
- Control receiving and inspection of all merchandise
- Have knowledge of all the duties of his supervisors.

Supervisors—responsible to Food Buyer:

- Control personnel and costs
- Train employees in methods of preparation and use of equipment
- Reduce labor turnover
- Maintain maximum performance
- Use minimum labor, but maintain standards of quality
- Operate within budget
- Keep up with research and development
- Develop teamwork
- Keep up with current developments and future trends
- Maintain sanitation, safety, repairs to equipment.

RESEARCH IMPLICATIONS

HERBERT P. WAGNER
Manager, Food Service
University of Michigan
Ann Arbor, Michigan

A. WITHIN SYSTEM Since these central food facilities are attached to colleges and universities, the possibilities for research should not be overlooked. This research falls into two categories. The first involves research conducted by the facility itself, and the second through cooperation with existing instruction and research departments. The former obviously would be of direct benefit to the central facility. In this category are such projects as the development and standardization of new formulas in the central bakery, improved methods for processing and preserving fresh fruits and vegetables, research in ice cream, testing new products brought in by vendors, and sausage manufacture, etc. Other possibilities for research include locating firms that use new methods of packaging and processing that will provide products more adaptable to the needs of the food-consuming units. For example, the size of the container in which the merchandise is packed should be scrutinized to make certain it best meets their needs. Likewise, any advancement in the area of portion control for those items fabricated or manufactured in the central facility will be most helpful to its customers.

B. ON-CAMPUS RESOURCE PERSONS

As stated above, there undoubtedly will be opportunities to participate in research through cooperation with instructional units and existing research projects on the campus. There are a number of facets through which this may be effected. The several examples given below are merely illustrative, as the nature and location of the institution undoubtedly will provide other possibilities.

1. Use of test kitchen for cooking products and for tasting panels by campus research projects. This possibly might include such items as irradiated foods.
2. Temporary storage of research materials belonging to others in deep freezes to avoid spoilage or other deterioration.
3. Procurement of special food items or products required for medical or other research projects.
4. Ascertaining the shelf life of meats, canned goods, or frozen foods.

There may be some reluctance on the part of the central facility to make use of existing research facilities due to the feeling that the research personnel may be too theoretical in their approach, but it is believed that there are mutual advantages to be gained from the use of such facilities. Some of the areas whose services might be employed are the Department of Home Economics, School of Public Health, Medical School Research projects, College of Veterinary Medicine, Dairy Division, and Food Technology Laboratory. This list is by no means all-inclusive, as there are undoubtedly other possible areas. Obviously some institutions may not include any of the above units, but most will likely have one or more of them.

One of the easiest and most direct methods of cooperation is the availability of the central food facility for tours and observation by student classes in a number of fields. As an adjunct to classroom instruction these groups may see, first hand, how food is procured, produced, warehoused, and dispensed to units. The Home Economics Department may be very helpful in locating new dietitians, testing new foods and recipes, and formulating new menus. Through consultation with deans and other officials, other areas of cooperation likely will be found.

At times the question whether foods, especially meats, are fit for human consumption may arise. In these instances the assistance of the School of Public Health, College of Veterinary Medicine, or some other unit may be exceedingly valuable. Their decision may well determine whether or not an item is fit to serve, and thus eliminate doubt from the minds of those responsible for food service. The only safe and sure way is, "Never take a chance; there is too much at stake."

Occasionally it is quite important to obtain a chemical analysis of a product, especially if it is intended for use in some special diet. A food technology laboratory, if there happens to be one on the campus, can be of real service in providing such an analysis. Sanitation and cleanliness in the central facility are most imperative, and there is no better way to maintain these objectives than by an occasional outside inspection. This may be done by representatives of the School of Public Health or some other appropriate unit on the campus.

The above are just a few examples of the research possibilities available to a central facility. There are undoubtedly a number of others, again dependent upon the type of college or university to which the facility is attached, and also the area in which the institution may be located. The extent to which the central facility may become involved also will depend, to some degree, upon the mutual receptiveness of its management and the heads of instructional units. If there is no such cooperation both parties may be overlooking possibilities for mutual benefit through a combination of the more theoretical with the more practical side of food research.

CONCLUSION: Finally it is recommended that any central facility have some type of test kitchen. The size, extent, type of equipment, and use of the kitchen will depend largely upon the scope of the facility itself. If it is large and more complex, then a more elaborate kitchen will be needed; on the other hand, in a lesser facility a smaller kitchen may suffice.

Likewise, it is recommended that the central facility make every effort to cooperate with and make use of the facilities of the instructional units located on the campus. The primary purpose of an educational institution is instruction and research, and any contribution to these functions by the central facility is highly commendable. Moreover, it does much to create good will and strengthen relationships with other campus areas, and makes the central facility a more integral part of the institution. It also should be helpful to the manager of the central facility to know that technical assistance is readily available when needed.

DESIGN OF THE FACILITY

Critical performance requirements are imposed on the buildings which house central food stores operations. If not properly designed and constructed, sub-zero temperatures can result in floor displacement or "heaving" causing severe damage to the structure. Inadequate circulation of air within cold rooms can generate heavy frost accumulations. High-humidity can cause vapor transmission damage within improperly designed walls. Interior wall surfaces in meat preparation and storage areas may harbor bacteria unless they are of a type which can be readily cleaned. Flooring surfaces will have various requirements depending upon the type of traffic and the use of the space.

Unique performance demands in cold storage installations have left a tradition of maintenance problems in such structures. Historical evidence of failures in buildings serving cold storage functions stimulated the Building Research Advisory Board of the National Academy of Science—National Research Council to investigate the causes and make recommendations for the design of new cold storage structures. The report, entitled, "Cold Storage Facilities: A Guide to Design and Construction," is available from the NAS-NRC. 2101 Constitution Avenue, Washington, D.C., 20418, at $4.00 a copy. This reference is an excellent guide for identifying applicable construction systems and installation details. Dry-storage areas of the building can be of any typical warehouse construction method compatible with the systems employed in the cold storage areas.

Recent advances in construction technology are well worth considering when designing a new facility. Prefabricated insulating wall panels now permit remodelling flexibility unknown at the time most existing facilities were designed. Poured-in-place, foamed insulation is available which forms its own integral vapor barrier and can be used in either exterior walls or permanent interior partitions. Concrete hardeners can increase the life-span of flooring surfaces subjected to heavy traffic and abrasive materials can be incorporated into floor surfaces where needed to reduce foot slippage. Floor cleaning devices which operate on a vacuum principle may be helpful toward reducing floor slopes to safer angles where drainage has been traditionally required.

Layout of the Facility

The manager of a central food stores facility will adapt his purchasing philosophy, arrange schedules, and organize his operation in ways to most efficiently utilize his plant. Conversely, when designing a new facility all of these factors become very important in

the design to assure the most efficient unit possible.

The program objective is to identify all of the functions required of the facility to satisfy the needs of the institution. The design objective is to arrange these functions in a manner which will permit operation with a minimum total annual cost composed of: 1) ammortization of building and land costs; 2) depreciation and maintenance of the building and equipment; 3) utilities costs, and; 4) all operating costs including management.

Low interest rates typically experienced by universities causes items 2,3, and 4 to become remarkably significant as contributing elements to the total annual cost. For instance, if the interest rate is 3% and a building can be designed in such ma ner that it can be operated as effectively with one less $5,000 per year employee, the initial building could cost as much as $167,000 more and result in the same total annual cost. Capitalization of possible dollar reductions in utilities costs or building maintenance costs must similarly be weighed against initial construction costs to avoid false economy in the construction of the facility.

Construction Cost

For purposes of planning new central food storage buildings, designers use square foot unit costs varying from $10 per square foot for dry storage space to $40 per square foot for low temperature refrigerated space. This approach to initial cost estimating can be applied for initial budgeting purposes but is often misleading when applied during the design phase. An example of why the square foot unit cost may lead to false conclusions in design may be illustrated by the location of refrigerated space. Should low temperature space be located with two of its four walls serving as exterior walls, its unit cost would be considerably higher than if the same space is provided in the interior of the building with surrounding intermediate temperature space serving as a thermal buffer.

It is suggested that before design processes are started, the architect estimate the in-place unit costs of the various building construction elements and structural systems he has found to be most applicable for the building. Possessing such unit costs for different types of walls, openings, floors, roofs, etc., the designer can then arrange the functional elements in a manner which will result in minimum construction cost.

Flexibility

If any lessons are to be learned from the experience of existing facilities, they are that the building must be capable of interior modification to meet future changes in food packaging and be capable of expansion as future enrollments demand. To this latter point, initial over-building of space may, in fact, represent long-range savings to the university in terms of needed services at critical times in the future and the economies of building in one increment rather than two or more.

A CASE STUDY— MICHIGAN STATE UNIVERSITY

The new central food stores facility at Michigan State University presents a unique opportunity to study the results of planning based on fifteen years of successful operation at that institution. Robert F. Herron, Manager of Central Food Stores at M.S.U. is responsible for the programming of the facility and working with architects Manson, Jackson and Kane, Inc., and Bolton and Heiveston, Engineers, in developing plans for the new building. Planning has included the provision for expansion of the facility when needed in the future.

Summary Program Statement

The new Food Stores for Michigan State University is designed to deliver the best possible food supply at the lowest cost per serving. The new facility will help maintain the outstanding reputation of the University of high quality food service in the complex operation of serving 60,000 meals per day.

The Food Stores Department of Dormitory and Food Services serves much the same as a commercial jobber in purchasing at wholesale and distributing to the consumer. It is responsible for the procurement, storage, processing and delivery of food and related items to all food service units on the campus.

To maintain quality of the food served, all items are handled in accord with highest commercial standards. To obtain the most economical prices, items which can be purchased in bulk are stored as required. Many canned and frozen foods are purchased annually at the source at the peak of the season.

The new building of 78,000 sq. ft. houses the central food storage and distribution facilities. A rail siding and six truck docks service incoming shipments. The single floor structure permits maximum utilization of floor area by stacking 18' high with high lift trucks.

The operation is divided into three sections; 1. Prouce, 2. Meat, 3. Staples. Orders are set up in

Meat is purchased in the most economical quantity. Cold storage capacity is 44,000 pounds. The meat is processed and distributed as required.

Frozen foods have created a new dimension in quantity cookery. The new 15,000 sq. ft. freezer will store 100 carloads to give the dormitories full benefit of new developments.

The truck load dock is the nerve center of the building. The central location gives easy access to all storage spaces. It is under surveillance of the adjacent offices. Operations are directed by a public address system.

The offices are grouped about the entrance lobby. The general office overlooks the truck well. I.B.M. equipment is housed in a separate enclosure.

A demonstration room seating 50 is used for presentations to staff and student groups visiting the building. Samples can be prepared in the kitchen, but most product testing is done under actual conditions in the dormitory.

The building is designed in a simple masonry mass to reflect the efficiency of the operation. The unbroken brick walls give the impression of security and minimize the adverse effects of temperature the respective sections to minimize pilferage.

Produce is purchased daily on the Detroit market and delivered by truck to the Food Stores where orders are prepared for distribution to the serving units. No trimming or other processing of produce occurs at the Food Stores.

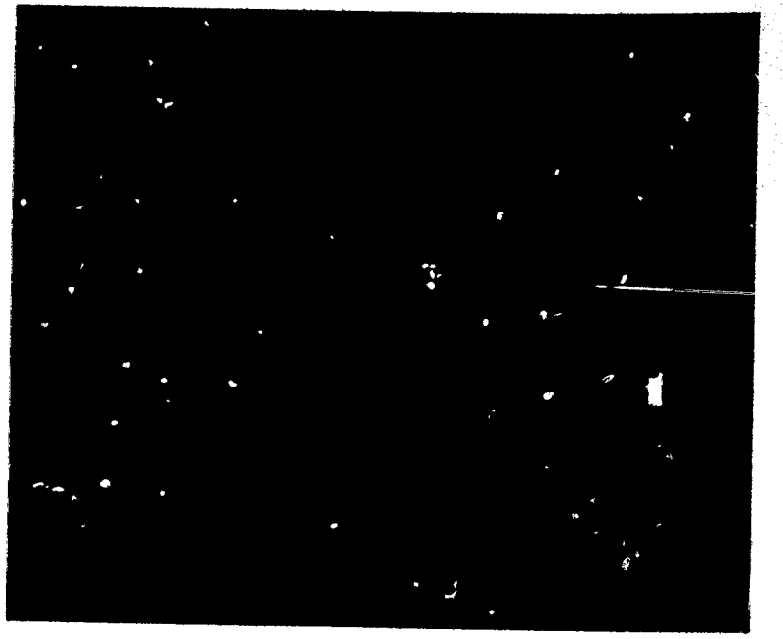
changes and excessive natural light.

The incombustible structure has masonry exterior walls and an unprotected steel roof. The 40′ x 40′ bay is large enough to give flexibility in the location of truck aisles. In the freezer the structural steel frame is enclosed within the insulating envelope which is panels of plastic foam with aluminum vapor barrier.

For efficiency of handling, dock boards permit hi-lift trucks to load and unload directly into the trucks. Freezer doors that receive major use are equipped with remote control mechanical operators so hi-lift drivers do not dismount. Certain openings have air curtains so that the doors can remain open during working hours.

The refrigeration machinery is located in the basement with the heat rejection air cooled condensors placed on the roof. The centrifugal compressors (Vilter) use R-12 refrigerant. The units are designed for 150% of the load with equipment arranged so that there is always a stand-by unit for emergency. The freezer room requires 60 T at –25° suction. The Produce and Meat Storage has 30 T at + 15° suction. The Meat Processing and Offices have 50 T at + 30° suction.

Four liquid sprayed coil coolers (Niagara No Frost) are hung from roof of the Frozen Foods Storage. Each has a capacity of 10 Tons refrigeration and handles 14,600 cubic feet of air per minute. A duct work system assures correct air distribution.



Frosting of the coils is prevented by the liquid spray. A concentrator in the mechanical room automatically removes excess moisture from the Glycol solution.

Frost under the freezer room floor is prevented by a system of electrical cables. To provide for replacement of cables, if necessary, they are installed in a conduit which is filled with liquid to assure proper heat transfer.

Controls are centralized at various centers in the building. Many instruments are recording. Automatic controls have alarms that indicate any malfunction. These alarms are connected to the campus police headquarters so that 24 hour surveillance of the equipment is not required.

Maximum protection against electrical power interruptions is assured by a double ended unit substation with two 500 KVA transformers. The primary is a dual voltage 13,200/4160V which can be converted when the proped power plant is in operation. The secondary is 277/480V Wye Dry type transformers located at load centers reduce to 120–240V single phase as required.

Completed in 1964. Construction contracts totaled: $1,040,784.00.

MICHIGAN STATE UNIVERSITY FOOD STORES

EDUCATIONAL FACILITIES LABORATORIES INC.

477 Madison Avenue, New York 22, New York

A nonprofit corporation established in 1958 by the Ford Foundation to help American schools and colleges with their physical problems by the encouragement of research and experimentation and the dissemination of knowledge regarding educational facilities.

OFFICERS

Harold B. Gores, president
Jonathan King, secretary and treasurer

ASSOCIATION OF COLLEGE AND UNIVERSITY HOUSING OFFICERS

The ACUHO is a national association of university and college administrators dedicated to the improvement of student housing by means of a free exchange of experience, information, and the encouragement of related research.

COMMITTEE ON INSTITUTIONAL COOPERATION

Of the Council of Ten and the University of Chicago

This Committee was established in 1957 as a voluntary organization of the following eleven midwestern universities: University of Chicago, University of Illinois, Indiana University, State University of Iowa, University of Michigan, Michigan State University, University of Minnesota, Northwestern University, The Ohio State University, Purdue University and The University of Wisconsin.

The goal of the Committee is to improve educational and public services by: (1) encouraging cooperative efforts among the eleven institutions, (2) identifying specialized areas of teaching and research in which cooperative arrangements may be desirable and (3) initiating cooperative activities in instruction and research, particularly in graduate areas, among the universities. Staff offices are located on the campus of Purdue University at Lafayette, Indiana.

UNIVERSITY FACILITIES RESEARCH CENTER

The University Facilities Research Center was created in 1960 by a special grant from the Educational Facilities Laboratories, Inc., to the Committee on Institutional Cooperation of the Western Conference Universities and the University of Chicago.

The Center, located at the University of Wisconsin, is now expanding those activities aimed at generating information useful to institutions of higher education toward increasing the effectiveness of the planning and utilization of their physical facilities.

The activities of the Research Center are conducted by a small staff, assisted by consultants drawn from either private architectural and engineering firms experienced in college and university facilities design and planning, or from university faculties and staff.

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University Facilities Research Center

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- High-Rise or Low Rise? A Study of Decision Factors for Residence Hall Planning
- Central Food Stores Facilities

CENTRAL FOOD STORES FACILITIES

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