REVISION OF THE LAYOUT AND FORMULATION OF EQUIPMENT CLASSIFICATION AND SPECIFICATION FOR A COFFEE SHOP KITCHEN IN THE PHILIPPINES

By

AMELIA RIVERA PANES

Bachelor of Science

Philippines Women's University

Manila, Philippines

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Thesis Approved:

Mary E. Leidigh
Thesis Adviser

Helen F. Barbour

June Ozine

Dean of the Graduate School

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CHAPTER I

INTRODUCTION

Eating establishments are one of the greatest businesses in every country, and the Coffee Shop presents one aspect of these. Since labor is becoming more expensive and difficult to obtain in the Philippines, scientific procedures for designing an institution kitchen should be developed having for the main objective an increase in production and efficiency in labor.

The Coffee Shop is one of the food services which provides a convenient eating place in an atmosphere of relaxed sociability. It also provides fast service of the popular Philippine dishes or short orders, giving the customer a wide choice for a well balanced meal at various prices.

Since the author's family has been operating a Coffee Shop in the Philippines, she has had the chance to observe the different difficulties in each area in a Coffee Shop. After finishing the dietetic internship and giving enough thought to it, the author decided to analyze the different difficulties encountered in her family's Coffee Shop.

It is the purpose of this study to propose how to have (1) efficient production and service, (2) adequate

equipment, (3) good quality food that would satisfy the customer at a reasonable price, (4) better flow of work - the movement from preparation to service, and (5) more efficiency in filling orders for faster service.

A convenient layout and suitable equipment are indispensable to insure cooking of the majority of the items as close as possible to the specific serving area with production scheduled as late as possible. In the interest of efficiency and quality, the layout and equipment should be able to meet the needs of a particular situation.

In order to accomplish these purposes, thoughtful consideration must be given to the many factors contributing to the successful operation of the Coffee Shop by a revision of the layout and development of specifications for needed, desirable and luxury equipment. Therefore, it is necessary to study how to write specifications and to learn more about kinds of layouts before the actual work of revision can begin.

CHAPTER II

REVIEW OF LITERATURE

Layout Planning

For the purposes of this study, the author looked for definitions of layout and found several which will be utilized. The first one is by the Westinghouse Electric Corporation (36) and the other two are by Kotschevar and Terrell (23).

> Good layout means placing the right equipment, coupled with right method in the right place, through the shortest distance in the shortest possible time (36).

> Layouts are plans of equipment placement for accomplishing work according to a specific operational program (23).

> The factors that affect quality and quantity of output, cost of operation, time schedules, and character of materials produced are significant in determining layout (36)(23).

The work of developing the kitchen plan can be done by the food service operator and staff, although outside assistance may be desirable. If changes are to be made in the kitchen layout in the future, the operator and his staff might do most of the work. If the changes are to be made immediately, someone else should be employed to develop the plans (25). In this case, the food service

operator should make a preliminary plan as only he and his staff know what his business requires of the kitchen (25).

The food service consultant can be employed either on a part-time basis or to handle the complete job of planning or can provide valuable advice on layout, equipment and costs. This advice can save the food service operator time and effort (25).

The employment of an architect familiar with kitchen planning is also recommended. The architect can provide guidance in selection of the least expensive type of construction to meet the needs, and his advice can result in considerable savings in cost (25).

Purpose of the Layout

The layout provides a means by which ideas of what is needed in the new kitchen can be developed and modified before the final plans are made. It offers a visual method of translating these ideas into arrangements of specifications and equipment and provides a view of the entire results rather than just a small segment. Through the use of layout, the most efficient locations can be determined quickly by trying various combinations, using models or templates of the equipment (25).

The layout aims to speed service while labor saving equipment serves as an additional incentive to reduce labor needs. The menu is an excellent starting place in planning an eating establishment layout because the flow

of production should be in logical sequence in a food service operation; for example, administration, purchasing, receiving, storing, cooking preparation, cooking, serving, dining, cleaning, planning, maintenance and repair, and bookkeeping (11)(31). The flow begins at the receiving entrance, passes through the various preparation channels, proceeds to the cooking bank, and continues on to the customer. There should be little or no cross traffic either in the preparation or in the serving of food to afford a continuous flow throughout, thus assuring maximum control and minimum labor (24).

Sansonettic and Mallick (22) assert that layout "must insure low cost production that is well established and well understood." Every good food facility should provide working centers for different activities. The layout of the food service facility generally includes at least four main areas: receiving, production, service, and maintenance. These areas are usually planned separately because of their functional differences, but a close relationship between them must be maintained.

Kotschevar and Terrell (23) indicate it is important that operations progress according to a smooth flow of work. They state that a flow of work is "the sequence of operations in the processing of materials or the performing of essential functions." Therefore, a flow diagram should show the logical sequence of food as it proceeds through production and service. The establishment of flow will

serve as a guide for the location of the four areas of the food facility. Specific work centers and sectional flow should be planned in greater detail than the over-all plan that coordinates them. Specific equipment will be influenced by these plans. The flow most suitable for one operation will differ from others according to the manner in which it meets the individual needs of the facility as well as its structural limitations.

There is a need for a new layout when the cost of moving materials or personnel involves considerable expense. Then the study of layout with a view to reducing these expenditures is justified. The larger the expense involved, the more time and attention may be given to this study. The use of good layout aids in controlling a revised layout and management is afforded an excellent opportunity to effect savings in operating expenses (21).

Importance of Good Kitchen Layout

A well designed kitchen is vital for efficient operation of a food service establishment. The best employees serving the best food cannot offset money lost because excessive time and personnel are needed when a kitchen is poorly laid out. Many eating places just grow without much advance planning. The result is often a beautiful dining room, but a very inefficient kitchen with a hodgepodge of equipment. This not only leads to high costs of handling food, but also to built-in characteristics which

make it almost impossible to have an efficient organization of production facilities. Since labor and food are the major operating expenses in food service establishments, a re-evaluation of the kitchen layout may lead to changes which will reduce or hold down costs (27). According to Smedley (29), simplicity of equipment and simplicity of service are essential and compactness is the very keynote.

Rules in Analyzing Food Service Layout

In order to plan a good layout, the planner should develop an understanding of the operation as a whole and have an open mind for suggestions of employees. Immer (21) has indicated a number of rules for the layout and design of plants. The author has adapted these rules to aid in analyzing food service layout. The good layout should:

1. Reduce the number of accidents and provide good working conditions by eliminating congestion.
2. Provide advantages to management in the area of labor costs by increasing productivity measured by output per man-hour.
3. Reduce the number of food service employees required including workers in receiving, preparation and service areas as well as those in actual production.
4. Reduce indirect production costs by decreasing waste and spoilage due to difficult handling situations.
5. Reduce maintenance and cleaning costs by providing easier access to equipment and

facilities. Further cost savings of expensive supplies also may be affected.

6. Help hold permanent capital investment in equipment to a minimum, but does not allow equipment to become obsolete.

7. Provide flexibility for method improvements and future expansion.

8. Eliminate wasted aisle and use only the essential space required.

9. Minimize work in storage areas by providing appropriate facilities to keep foods moving through production.

10. Make optimum use of food handling equipment without incurring congestion.

11. Make supervision easier and at the same time reduce the need for excessive quality checks.

12. Aid in production control by providing smooth work flow which facilitates personnel scheduling and food production scheduling.

Considering the above, the author searched for further specific guides in making kitchen layouts.

According to George and Heckler (17):

> The total number of meals served daily, usually referred to as the 'size' of the food centers, will determine the dimensions of the kitchen as well as the number and sizes of equipment.

Consequently, the layout must be convenient and compact without being crowded. As George and Heckler (17) further indicate:

> Whenever possible a rectangular-shaped kitchen should be planned because it lends itself best to an efficient arrangement of equipment. The length of the preparation area in a rectangular-shaped kitchen should be one and one-half times the width area for kitchen.

Pitfalls to Avoid in Planning Layouts

Brodner, Carlson, and Maschal (5); Mooring (27); and Broten (6) give detailed lists of pitfalls to avoid in planning layouts. Some of the more important ones are:

1. Inadequate space for the entire kitchen because space requirements for equipment were not carefully analyzed in the preliminary stages of planning.
2. Inconvenient location of equipment; so placed that server must be constantly turning back and forth.
3. Lack of tray rests on which waiters or waitresses may place trays while assembling orders.
4. Garbage and trash rooms accessible only through the kitchen. Example: When these areas are used by persons from departments outside food service.
5. No receiving scale or inconvenient location so that it is seldom used.
6. Storeroom with inadequate area and poor ventilation. Poor ventilation results in food spoilage; inadequate space requires more frequent deliveries and affects the purchasing policy as well as making it virtually impossible to keep the storeroom clean and orderly.
7. No provision for a work surface in the storeroom because a place is needed for assembling orders. Also, small packages of goods may be stored there.
8. Floor drains and drain troughs in kettle areas improperly placed causing spillage on floor.
9. Inadequate dish storage space.
10. Inadequate number of sinks or sinks without drainboards, which encourage poor work habits, lower standards of sanitation and loss of time.

11. Inadequate facilities for proper storage of cleaning supplies and equipment, which will aid in keeping brooms, mops, and powders off the floor and in well ventilated areas.

12. Inadequate soiled dish table space.

13. Inadequate areas as well as poor lighting throughout the kitchen.

14. Poor construction of equipment and its installation making it difficult to clean and maintain high standards of sanitation.

Different Types of Layout

There are different types of layout as specified by different authors, such as (a) Straight Line, (b) Back to Back, (c) Island, (d) L or U Shaped, (e) Parallel, Back to Back, (f) Linear, (g) Square, (h) Parallel Facing, (i) Work Center, and (j) Combination Arrangement, (k) Improper Arrangement.

(a) The Straight Line Arrangement (Figure 1, Appendix, page 52) is one in which the layout and equipment is placed in a straight line -- ranges, ovens, sinks, peeler, steamers, and mixers in one row, and work tables in a parallel row. In this arrangement, a main aisle is provided and the space between ranges and tables must not be used in passing from one end of the kitchen to another (17). There is likely to be greater flexibility in this arrangement in the location of kettles and range top for the greatest convenience of the range cook or sauce cook who will use them most. A broiler is generally desirable at

the end of a line of equipment because the cook operating it must turn frequently from it to the work or steam table. For this reason, the range cook must be as free as possible from the traffic of other areas. The deep fat fryers should be located either at the opposite end of the range and oven equipment or adjacent to the broiler (10).

Also, in straight line arrangement, it is advantageous to have one or more breaks or entrances in the front line equipment [steam table and work table] so that access to the different sections is possible from the front rather than only by the opening at the end of the aisle (10). Stokes (30) states that straight line arrangement is often found in hotels and large institutional kitchens where the work is divided among various cooks who perform specialized cooking functions, such as preparing sauces, broiling, and frying.

(b) In the Back-to-Back Arrangement (Figure 2, Appendix, page 53), the ranges, ovens, and steam equipment are located back-to-back near one long wall of the kitchen. The cook's and the baker's tables are parallel to the cooking unit and the main passageway is located outside this preparation area (17). Generally, sufficient aisle space or working space is not provided by this arrangement. Therefore, the main traffic aisle will be congested. One of the advantages of back-to-back and straight line arrangement is having one rectangular hood. This centralizes

the exhaust of cooking odors, vapors, and heat. However, this should not be considered a major reason for the back-to-back arrangement, as this set-up does not provide a good opportunity for supervision or transporation. Again, it is desirable to have breaks between the equipment to afford freer access from one side of the arrangement to the other (10).

(c) Island Arrangement (Figure 3, Appendix, page 54) produces a very compact kitchen. The main passageway is arranged so as to avoid interference with food preparation and to provide adequate work tables near the cooking units (17).

(d) L or U Shaped Arrangement (Figure 4, Appendix, page 55) provides a line in which the hot food preparation must be L or U Shaped, with the angle usually between the steam cooking batteries and the range-oven-broiler batteries. Again, it is desirable to have a break in the front line counter and work tables. In all cases, it is best to have the range, broiler, and oven set at least 12 inches from the wall to make cleaning possible behind this arrangement (10). According to Kotschevar and Terrell (23), the L Shaped Arrangement is often difficult for it tends to invite traffic through it and care must be taken to provide good aisle areas at the back or front to avoid conflict with traffic in each section. The angle tends to discourage traffic, thus, isolating respective work centers and allowing for a more orderly procedure of work. The

U Shaped Arrangement is efficient if not too large, and also it discourages traffic through it.

(e) Parallel, Back-to-Back Arrangement (Figure 5, Appendix, page 57) is probably the most common arrangement pattern observed. Here, the range, broiler, and fryer are on one line, with steam kettles and steamers in another line back-to-back with the first, and all under one large hood (30).

(f) Linear Arrangement (Figure 6, Appendix, page 58) violates many principles of good work center arrangement. If linear arrangement must be used, breaks in frontal equipment every 12 feet permit entry into the section. If four or more centers are arranged, the distance will be around 24 feet. Linear arrangement works best in small facilities. If this type of arrangement is at right angles to a service area, it is usually desirable to place the hot top or grill, fryers, and broiler closer to the service area and the oven further away (23).

(g) Square Arrangement (Figure 7, Appendix, page 59) tends to invite traffic through it and care must be taken to provide good aisle space behind the cooking areas or in front of them to avoid conflict with traffic in the section (23).

(h) Parallel Facing Arrangement (Figure 8, Appendix, page 60) is one in which the equipment is arranged in parallel lines facing each other, separated by a very wide work table, or, preferably, two rows of work tables with a

traffic aisle between and with intermediate cross aisles. This arrangement is practical in a large production kitchen where dispensing to the plates occurs at independent serving counters. It may be utilized in a cafeteria or in a table service restaurant where production is separated from distribution. Dana (10) states the advantages of this arrangement as being:

1. Opportunity for closer supervision.
2. Improved communication between all cooks.
3. Less likelihood of traffic interference in the aisles.

(i) Work Centers Arrangement (Figure 9, Appendix, page 61) is used in large institutional kitchens where the equipment is often arranged in various sections, each constituting a separate work center. The arrangement has the advantage of keeping traffic away from the work center and yet brings the entire operation within reach of the serving area (30).

(j) Combination Arrangement (Figure 10, Appendix, page 62) is a combination of back-to-back and facing arrangements, where the production is for a table service restaurant. This permits the cooks to have accessibility to the broiler and griddle stations, the frying stations, and the vegetable cookery station, and assures preparation of frequent batches in close proximity to the serving counter. The roasting and sauce production areas will be at the rear because their transportation to the serving section is less frequent.

(k) Improper Arrangement (Figure 11, Appendix, page 63) shows an arrangement with excessive and improperly proportioned areas. In this plan, two-thirds of the total square footage is devoted to the auxiliary areas and only one-third to food preparation. The area allocated to dry storage is one-half as large as that for food preparation when it should be only one-fifth the size of the latter. The space allotted to the storage and washing of garbage cans is twice as large as necessary. The dishwashing area is slightly larger than necessary (17).

The Space Requirement for the Kitchen

In an exceptionally large kitchen, it is possible that a variety of these arrangements may be necessary or desirable, but here it is feasible to review only the general principles upon which final decisions will be made.

A tentative list of equipment prepared early in the planning stage as a check on the proper balancing of building and equipment costs can be used as a guide in making the layout (17). The responsibility for making approximate dimensions of each item with this list should be delegated to the food service person who participates in the conference of planners. Equipment dealers, engineers, and specialists can be of invaluable aid in helping make selections and determining dimensions of equipment. The necessity for enlisting the aid of persons having wide experiences in the actual operation of food service should not be overlooked (31).

The efficiency of any food service layout depends in large measure upon the selection of the proper equipment and furniture. Only those items should be purchased which are necessary for efficient service and each item of equipment and furnishings should be selected according to specific factors. Among the most important are these (17):

1. Size. Is it the correct size for the job?
2. Space. Does it fit into the layout?
3. Need. Will it be used sufficiently often to be a wise purchase?
4. Durability. What is its life expectancy?
5. Efficiency. Is it expensive to operate? to maintain?
6. Service. Are parts readily available?
7. Labor saving. Will it minimize hand operation? Will it speed production?
8. Time saving. Will it do the job in less time?
9. Cost. Is its cost prohibitive? Can a less expensive item be substituted?

According to Gottlieb and Couch (19), factors which affect the layout efficiency may be:

1. Distances between pieces of equipment.
2. Priority or importance of menu items.
3. Production time.
4. Labor cost.
5. The value to layout efficiency of additional or duplicate pieces of equipment.

Because of the many factors to be considered in planning a kitchen, it is almost impossible to give an over-all figure in square feet that can be used in calculating the total space requirements for all types of eating establishments.

A rule-of-thumb guide which has been found satisfactory under normal conditions allows equal amounts of space for the kitchen and its related areas, and for the dining

areas. This measure may be used as a rough estimate of space requirements, but should not by any means be considered final (5). Observation has shown that the relationship of efficiency to physical plant is unrecognized in many instances. A large number of food services are acknowledged as inefficient due to some limitations which result in lower production and high operating cost (2). Developing a good layout for a food service is not a simple task. It is complicated by the diversity of functions to be planned, control of quality, cost of highly perishable products, and social and psychological aspects of food, in addition to the specific needs of the individuals to be served (23).

A frequently used rule in allotting space to a kitchen is that one-third to one-half the area of the dining room should be allocated. Factors that influence space requirements, are (23):

1. Type of preparation and service.
2. Amount of the total production done in the unit.
3. Volume in terms of the number of meals served.
4. Variety of foods offered on the menu.
5. Elaborateness of preparation and service.
6. Amount of individual service given.
7. Seating and serving on other floors, as called for.

According to Cronan (9), the space requirement for the layout spacing of a school kitchen may vary slightly, but a quick rule-of-thumb for planning is to allow from two to two and one-half square feet of space for each meal served in any given period. On the other hand, West and

Wood (34) have indicated that kitchen area requirements are much more complex and less definite than those for dining areas. They state that estimating kitchen area on the basis of the number of meals served, income per seat or dining room seats alone would be unreliable. The relationship of kitchen to dining space for different types of food services necessarily differs. Other methods used by some kitchen planners are the allocation of space to dining and kitchen areas by using percentage figures based on total area; and a similar division of kitchen areas into major units. In direct opposition to these is Scott (35) who says, "Actually it is the kitchen (alone) and not the dining room that has to be modified to fit your particular operation."

It is frequently stated that 35% of the total area is a reasonable kitchen space for most restaurant operations. This may vary, of course, with the type of operation, but is a target to aim for (34). Many writers agree that the menu is basic in determining space and equipment requirements in an institutional food service. Quality food is the commodity in question and much of the success or failure of the enterprise depends upon the physical setup (34).

After the space requirement is determined or the present area is measured, the following guides may be helpful in planning.

Dana (10) has indicated that ample aisle clearance between cooking or other equipment and work tables is

needed to permit free passage of one worker by another, both of whom are presumably engaged in closely related work. Furthermore, he states that in order to permit a cook to withdraw a large roasting pan (26" in length), and swing it into place on a work table behind him, the minimum aisle clearance should be three feet, six inches (10).

A minimum aisle clearance of three feet is preferred, unless portable wagons about 24 inches wide are used to transport food withdrawn from steamers or kettles. Then an aisle of four feet wide may be desirable. Where two work tables are parallel to each other, Dana (10) recommends a minimum clearance between the tables of three feet six inches with a preferable distance of four feet or four feet, six inches.

Kitchens serving a smaller number require a larger square footage per meal than those serving a larger number, according to Kotschevar and Terrell (23). For example, if the meal load is 100-200 with an allowance of five square feet per meal, the footage required in the kitchen would be 500-1,000 square feet. But, if 200-400 customers are anticipated, 800-1,600 square feet would be the area requirement for the kitchen.

Kotschevar and Terrell (23) say that aisle space should permit free, easy movement of essential traffic. The minimum width for a lane between equipment where one person works alone is 36" to 42"; where more than one is employed and where workers must pass each other in the

progress of work and mobile equipment is used, they recommend an aisle of 48" to 54". At least 60" are needed for main traffic lanes where workers regularly pass each other with mobile equipment.

If workers or equipment must stand in the traffic lanes, appropriate space should be allowed for this. Thought should be given to space for doors opening into an aisle and for handling large pieces of equipment, such as roasting pans, baking sheets and stock pots (23).

The main thoroughfares should not pass through work centers. Compactness is essential for step-saving. It is well for the centers to be in close proximity to main traffic lanes, with easy access to them. These suggestions are important both to avoid distraction from outsiders passing through work centers and to conserve space. Work centers at right angles to traffic lanes are efficient (23).

The percentage of floor area covered by equipment varies according to production needs and the type of equipment used. A satisfactory layout may claim less than 30% total space for equipment, while work areas, traffic lanes and space around equipment, for easy operation and cleaning, may require 70% or more (23).

The plans for space-saving compactness require use of actual equipment measurements when planning. Manufacturer's specifications should be consulted for the plan. Templates made to exact scale for both fixed and mobile equipment are

helpful in arriving at the suitable arrangement of the equipment (23).

Dana (10) says the menu pattern must be interrelated with the design of the layout. The size and capacity of each type equipment must be determined, not based on the total number of persons served, but on the size of the individual batches prepared and the frequency with which they must recur.

The major goal of intelligent kitchen planning is the specification and arrangement of equipment and facilities so that excellent food, well-prepared, with good flavor, as well as eye-appeal, may be produced with minimum effort and without confusion or waste (34). As early as 1936, Bryan (7) states that beauty and utility in food service cannot be more aptly illustrated than by the marked advance in both of these features in kitchen equipment. The use of stainless steel in tables, sinks, and dishwashing machines; of chromium plating on slicers and choppers; of durable and attractive enamel finishes on peelers, mixers, shelves, and cabinets are examples of combining utility and beauty.

Adequate space for the installation of the necessary equipment can be calculated for each area after equipment needs have been established. Also, consideration must be given to the number of workers and their work space needs, aisle and temporary storage space, possible plans for expansion and growth in space or equipment, and then all

must be combined into a workable master plan (34).

According to Brodner, Carlson, and Maschal (5), kitchen layouts should be considered in two ways:

1. The planning of a new facility.
2. The rehabilitation and modernization of an existing one.

Kitchen planning cannot be confined only to the kitchen proper with its receiving, storage, preparation, and service areas (5). The planning also includes and makes provisions for all related departments such as the dining rooms, including the employee's dining room, cafeteria counters, snack bars, coffee shops, banquet rooms, bars, service bars, the handling of clean and soiled dishes, silver, and glassware, as well as linen and uniform rooms and janitor's closets (5).

A food operation may be likened to an industrial plant because it receives raw materials, and processes, prepares, and sells the finished products; so the individual work units should be planned in relation to the sequence of food production operation.

Equipment Specifications

A fundamental requirement in engineering and all industrial activity is the specification.

Definitions of "Specification" by different authors follow:

MacNiece (26) states that:

> Specification is the definite, particularized

> and complete statement of qualities, characteristics, and requirements of materials, processes and procedures. As more is known about a raw material, a part, a finished product, an organizational function or a procedure, specification can be established. These specifications then become the bench marks that make possible prediction and reproducible results.
>
> Industrial art gives way to engineering science as specification requirements are reduced to numerical values. The language of mathematics is universal, one in which truth and fact cannot be distorted by translation or interpretation. Specification depends in terms of numerical values upon the increasing accuracy of measurements. We really cannot specify anything that we cannot measure. Neither can we reproduce it.

"Specifications are written instructions distinguishing or limiting and describing in detail construction work to be undertaken," according to Edwards (12).

Goldsmith (18) says:

> A specification is a written or printed description of work to be done in forming part of the contract and describing dimensions and other information not shown in the drawings. Specifications are also instructions to the builder and as such must be mandatory, reasonable, simple, clear, and complete. They are supplementary to and explanatory of the drawings from which the equipment is to be patterned. It is their function to make perfectly clear everything that cannot be made on the drawings. They include descriptions of materials and methods for their use which cannot be illustrated on the drawings and in many cases they tell where these materials shall be placed, usually in general terms, but sometimes very specifically.

Gale (16) states that "specifications are the written materials that accompany the drawings for a construction project."

In other words "specification" may be defined as a contract document, supplementary to and explanatory of the layout drawing, used for instructions to the builder, and arranged for quick reference by the estimator. They are equally important for all these purposes.

According to Kotschevar and Terrell (23),

> Equipment specification should define exactly what is desired and the condition for its purchase. Written specifications become established record, prevent misunderstanding and dissatisfaction and make it possible upon delivery to determine performance. Precise, clear, and tightly written specifications are desirable. They leave little doubt as to what is desired and contractors can precisely calculate costs and often give lower bids.

Specifications usually have a section devoted to general provisions and other delineating specific factors desired in individual pieces of equipment. General conditions or general provisions are fairly standard to the American Institute of Architects (23).

> Specifications may vary from one or two simply written statements to extensively written documents depending upon the conditions. Specifications should be concisely written and give only those details necessary to assure delivery of the equipment desired (23).

> They should establish the form of the proposal for a bid, which is usually an itemized schedule of equipment listing the unit price of all items, identifying the item by name and number as given on the plan and in the specifications. If individual bid items, aggregate bids, or a total bid for all the equipment is to be accepted, this should be stated in the bid. Proposals should be sealed and delivered on or before a specified date, and addressed to the individual or agency as given in the general conditions. Also, general conditions should clarify the relationships

> between the owner, architect, contractor, subcontractors, and material men (23).

Therefore, by knowing the definitions of specifications through the different writers, the author will be able to know the relationships between the owner, architect and contractor as well as to help her write specifications for this study.

For Whom Specifications are Written

According to Edwards (12),

> Specifications are written for estimators, buyers, superintendents, foreman of contractors and subcontractors, vendors, and architect's job inspector. The interested parties are: The architect who writes them, the builders who follow them, and the client who pays for the equipment. Specifications are not written primarily for the owner's perusal since they are technical in wording and largely beyond the grasp of the average client.

Also, the architect would have little need to write specifications for his own information, but, since he delegates much of the superintendence to a subordinate, it is necessary to describe the work clearly so that the superintendent may know exactly what the architect intends (18).

It is essential says Goldsmith (18) to make clear to the builder the specifications which are really mandatory instructions. Obviously, they must be written particularly for the builder and his subordinates. Even though the latter are the two who are most interested in the form of the specifications, the estimator and the superintendent

of construction should also be consulted.

The author as a buyer should know how specifications are written in order to understand technical words that she can use in writing specifications.

Who Writes a Specification

Some architectural offices have specification writers whose specific duties are to draft specifications. However, the architect who is doing his first independent work will probably have to write his own specifications.

> In either case, the writer will need to be a fount of information in regard to matters of construction and equipment. Unless properly qualified he will produce a document open to serious criticism and one which may produce confusion during the course of building (23).

Goldsmith (18) says that the young architect, whether a graduate of a school of architecture or a product of office training, is seldom qualified to write specifications. Furthermore, he may be skilled in design, well trained in drafting and possibly experienced in construction, but he will probably be less qualified in this last essential. In any case, it is almost certain that he will not be qualified to write specifications when he makes his first attempt to do so.

Goldsmith (18) continues by stating that the qualifications to write specifications include the ability to "visualize", to think logically and systematically, and to use clear, correct, and concise English. The writer

also must have a thorough knowledge of construction and building materials. The specifications should be written only by one who is properly qualified. This person, Goldsmith (18) asserts, should make a searching self-analysis and undertake to remedy the lack in any of the necessary qualifications.

The office trained man, although knowing less in theory than the graduate student, will be enabled by his experience to qualify better in certain particulars for specification writing than the recent graduate (16). The recent graduate, however, will have gained much more from his schoolwork than the office man, but would still have to acquire practical training.

For small project specifications, preparation may be by the same individual making the drawings and one who will later supervise the work. Edwards (12) says:

> Large architectural and engineering offices have either a specifications expert who devotes his entire time to that one function, or a special department composed of a group of people for the purpose of composing specifications.

Purposes of Preparing Specifications

Gale (16) states that specifications have the following purposes:

1. To describe what is shown on the drawings and give information that can be explained better verbally than graphically.
2. To provide a document that forms a part of the "in writing" agreement between owner and contractor.

3. To provide a basis for the contractors' estimate and the submissions of bid.

4. To facilitate competition in bidding. Drawings are not sufficient for this purpose.

5. To describe options, alternates and other bidding variations.

6. To help the contractor organize his purchase of materials and services by classifying all work into trade grouping for subcontractors.

7. To be used as a guide during construction.

8. To be used as guide for inspection of work done.

9. To regulate payments (progress and final).

10. To settle legal questions, should any develop.

In summarizing, the author feels that by adapting these purposes she will acquire an understanding of the importance of specifications.

Importance of Specifications

In large architectural and engineering offices and in government agencies, it is often established by the contract documents that in the event of a conflict within the drawings, the large-scale details shall govern over small-scale details, and that in the event of a conflict between the agreement and the specifications, the agreement shall govern (18). It is further established that in the event of a conflict between specification and drawings, the specification shall govern. This emphasizes the important

part which the specifications play in construction work and the responsibility of the specification writer.

Specifications are also important to give a clear understanding of the nature of machinery, supplies, or materials to be furnished or work to be done under a contract; as essential for such work as the coffee shop plans and equipment specifications are for the author.

Procedures for Preparing Specifications

Procedures for preparing specifications vary by authors, but these rules by Gale (16) may be followed:

1. Obtain the corrected preliminary drawings and as much other data as possible.

2. Ascertain the type of contract, the number of independent contracts and a general idea of the limits of the scope. (The type of contract is finally the responsibility of the owner. The architect may help but he should not make the decision himself.)

3. Prepare an outline specification. Otherwise, prepare a scope for each separate contract. These will be used later for inclusion in the general conditions.

4. Tentatively divide the work into sections. Make a pocket* of each and also one for unclassified materials. Number it leaving some missing numbers. Make index of trade sections.

5. Collect pertinent information and put it into the appropriate pocket, whether needed at the time or not. Such data would include job-meeting discussions, parts of other specifications, trade data and the like. If the

---

*Pocket - receptacle to receive all notes, ideas, thoughts, and cross references as they occur to you. The receptacle may be files, file folders, or large manila envelopes.

material is too bulky for a pocket, put a reminder tracer in the pocket.

6. Decide what the drawings shall and shall not show with the job-captain. The 'not shown' items must be covered by specifications. This is a policy matter that depends on the customary office procedure for adequate or scanty detailing, scheduling and the like. It is usually more economical to specify an item than to draw it.

7. Check progress, as each item in the pocket is taken care of; circle in red and identify with specification paragraph number.

8. Make final draft as fast as sections are completed and bind loosely. Use this draft for checking, cross reference and proof reading.

9. Check sections against all pocket items. Contract work must be shown or specified. Get job captain to make this check. Many specifications rely on drawing information for completeness, and many times such checking is never made.

10. Make a final check and the necessary corrections in the final draft. Last thing before printing or typing is that the pages should be tabulated. Always think of the basic ways in which the specifications will be used.

The author feels that knowing the procedures for preparing specifications will be helpful to her in writing specifications for equipment being proposed for purchase.

The Writing of Specifications

Writing specifications does not require as much imagination and originality as it does visualization, research, clear thinking, and organization. A good specification writer should have an understanding of all other phases of

an architect's work plus a thorough knowledge of materials and construction methods gained through study and actual experience.

While drafting specifications, Edwards (12) states that several general rules should be followed:

1. Use simple and clear language readily understood by the average layman. Be specific. Avoid the use of indefinite words or clauses. Attempt to prepare specifications that will require no interpretation as to meaning.

2. Be brief and avoid long involved sentences. Specifications tend to be too lengthy in spite of the greatest economy of words. Specify standard articles by reference to accepted standard specification. This will eliminate many words.

3. Be fair and do not attempt to throw all risks and responsibility on the contractor. Avoid the use of 'weasel clauses' making the contractor responsible for possible errors or omissions of the architect. The contractor should carefully read and note all other work that may be required to complete the equipment.

4. Include all items affecting the cost of the work; describe in such detail as to leave no doubt as to the requirements. Warn the contractor in the specification of particular departures from standard practice likely to be encountered.

5. Avoid repetition of information shown or scheduled on the drawings. Also avoid duplication within the specifications themselves. This will eliminate the possibility of contradiction.

6. Arrange text logically. Follow an established pattern of grouping and sequence. Separate paragraphs into trade sections to facilitate the letting of subcontracts. For easy reference, distinguish each paragraph with underlined word or words.

7. Do not include inapplicable text. Avoid discussion of materials or methods which cannot pertain to the actual construction work for

which a set of specifications is prepared as it is confusing to bidders. When old specifications are used for the preparation of the new set, the writer should delete inapplicable material.

8. Specify stock articles and size wherever possible. These are more easily obtained and are less expensive than special items or unusual dimensions.

9. Minimize cross references to sections and paragraphs of the specifications; when absolutely necessary, do so by referring to titles instead of numbers.

10. Do not specify the impossible or anything not intended to be enforced.

In writing specifications, the language used should be clear, accurate, and precise according to Cronon (9). The technical terms common to the trade to which the specification applies may be used, but they must be understood and used correctly. When used they must be defined or be used in the sense which they have acquired through common or local usage, and the basis on which they will be legally interpreted. In the writing of contracts and specifications, everything should, if necessary, be sacrificed to clearness. In contracts, this should be avoided; words are almost never exactly synonymous and, in contracts and specifications, the words having the exact meaning should be used as frequently as necessary (4).

In practice, the meaning of every term of expression should be analyzed and checked as to whether or not it may have a meaning other than that desired. It is necessary to consider whether or not under the contingencies of

construction, where unforeseen conditions arise, the terms may still have other meanings or perhaps prove quite inexact and indefinite (15).

If there is any secret of writing good specifications, it is the intimate knowledge and care, with concentration of thought upon every detail and requirement of the building or equipment in hand, until one can see it in his mind's eye, complete in every respect. It is also not enough that one shall, thus, discern it but he must also describe it in such a way that it will be understood by all concerned in the construction (20).

The process of specification writing has been taught in schools of architecture without a systematic and comprehensive textbook (13). Specification writers have been generous in their efforts to pass on by word of mouth the secrets of specification writing, but definite improvements have been largely among the more experienced practitioners.

Relation of Specifications to Layout

In order for the student to realize the relationship of specifications to drawings, Edwards (12) has given three factors to consider:

A. Specifications and drawings should be complementary. What is better described in the specifications should not be shown on the drawings and likewise, what is better shown on the drawings should not be described in the specifications.

B. Items better shown on the drawings than described in the specifications are generally:

1. Detail and over-all dimensions.
2. Sizes of prefabricated items.
3. Locations of materials, equipment, outlets, and fixtures.
4. Locations of finishes and openings.
5. Interrelation of materials and equipment.
6. Swing doors.

C. Items better described in the specifications than shown on the drawings are generally:

1. Type of workmanship, materials, equipment, and fixtures.
2. Quality of workmanship, materials, equipment, and fixtures.
3. Finish of materials.
4. Gauges of materials.
5. Methods of fabrication and installation.
6. Allowances and unit costs.
7. General and special conditions, incidental work.

Man always will want to specify; with ever-increasing accuracy and ever-narrowing limits. Accepted standards and more accurate means of measurements and specification form the bedrock, supporting reproducibility, uniformity, and value (3). They are primary requirements in the systematic achievement of scientific, engineering, and manufacturing goals. They are essential elements whose effects are the continuation of progress and the advancement of human welfare. Even if man lacked the desire for better specification, MacNiece (26) says that four factors would

force him to impose his methods and means of specification and to increase their field of application:

a) The nature of modern business itself.

b) The need for improved human relations, both within business and between business and the public.

c) Competition, and

d) Productivity, in which the companies would give a fair measure of direct losses from poor specification and improper attention to good ones.

Effective specifications set the mark for and limit the variations in these values -- values that can stimulate everyone to want all the things offered in the market place. The sale of some products for which there are inadequate specifications will falter and some will inevitably fall by the wayside. This is the price of progress. Those companies giving proper attention to specifications and to all other factors can enjoy happy and profitable operations.

CHAPTER III

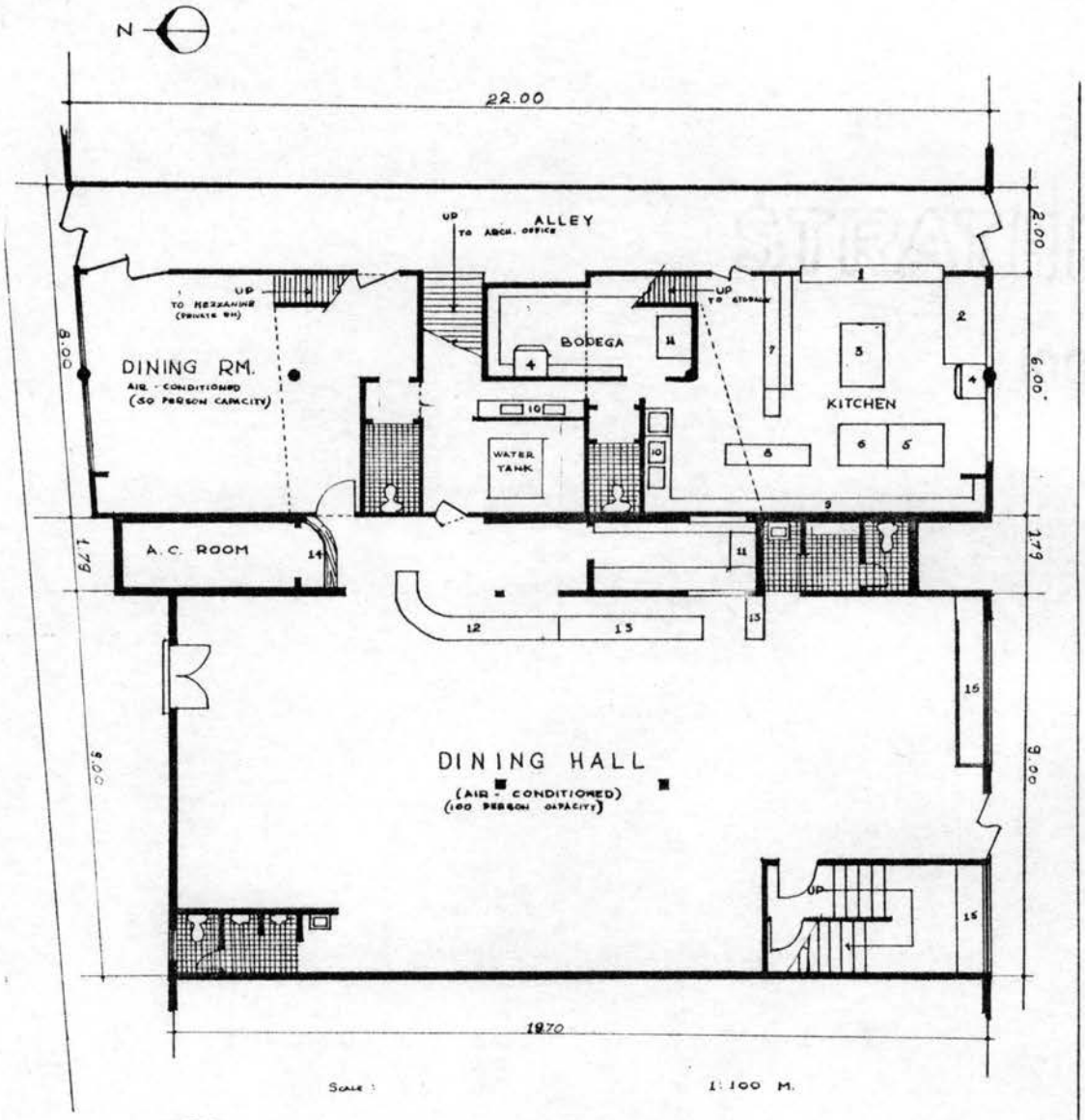
THE PROBLEM

The Present Coffee Shop

The present plan (Figure 1 on the following page) of the Rolling Pin Coffee Shop, where the author has worked, was sent from the Philippines and has been used for the proposed revision of the kitchen.

The Rolling Pin Coffee Shop, in Manila, Philippines, is in a three story building located near other office buildings, shopping center, churches, and a recreation park. The second and third floors are occupied by offices whose personnel may come down an inside stairway to the shop. This stairway is located at the dining room A. Because they cater mostly to the office personnel, breakfast and lunch are the meals being served. The Coffee Shop is open to the public, of course, but their usual choices are heavy snacks or merindas.

At present, the Coffee Shop has the following facilities (Figure 1). The dining rooms are centrally air conditioned. The AC or air condition power room is located at the north end of dining room A, which centralizes all the power in this coffee shop. An extended little room is



LEGEND:

1. SHOW WINDOW
2. TABLE 3'×6'
3. TABLE 3'×5'
4. REFRIGERATOR 3'×3'×6'
5. RANGE w/ OVEN
6. OVEN
7. SHELF for PLATES
8. STEAMER
9. CABINETS
10. WASHING AREAS
11. FREEZER 3'×4' & 2'×2'
12. COUNTER
13. SALES STANDS
14. CASHIER'S BOOTH
15. DISPLAY

Figure 1. Present Layout of the Coffee Shop

used as a cashier's booth for both dining rooms A and B. Of the two dining rooms, the largest (A) can seat 100 to 125 guests at one time, and the other dining room (B) can seat only 50 persons at one time. This one may be used also for special parties. In dining room A, there are two service tables for waiters and cabinets in the service room for silverware, plates, napkins, and glasses which are to be used daily. Dining room B has one service table and a small cabinet for napkins, glasses, silverware, and plates for special parties. The mezzanine of dining room B is used as office of the manager. The food for dining room B comes directly from the kitchen, while that of dining room A passes through the service window at the main kitchen. No attempt has been made to alter the dining room facilities.

The Coffee Shop has 30 full-time employees, from bookkeeper to dishwasher. Among these 30 employees, there are 12 waiters, 3 bus boys, 3 cooks, 1 vegetable lady, 2 pot and pan men, 2 dishwashers, 1 janitor, 1 storeroom man, 1 bookkeeper, 1 cashier, 1 food supervisor, and 2 pastry sales ladies who can help in waiting tables during the rush hours. There are two bodegas (storerooms), one of which is located on the mezzanine, while the other one is located near the kitchen area.

The water tank (Figure 1, page 37) is to store water for emergency purposes, as well as for hot water storage. It holds approximately one hundred gallons. The enclosed

alley located at the east side (Figure 1, page 37) is where deliveries come into the kitchen.

At the present time, the kitchen has this equipment:

1 Work Table 3' x 6'

1 Work Table 3' x 5'

1 Refrigerator 3' x 3' x 6'

1 Range with Oven

1 Oven

1 Shelf for Plate Storage

1 Steam Jacketed Kettle 36" x 16" x 15"

Cabinets above and below a work surface - 8 meters

1 Washing area - Pots and Pans

1 Washing area - Dishes

1 Freezer 3' x 4'

1 Freezer 3' x 2'.

The Rolling Pin Coffee Shop has a one week menu cycle, which is being changed from time-to-time as needed. The menu cycle includes soup, two entrees, two vegetables, rice, salad, several desserts, and choice of beverages. The menu for lunch is planned with a choice of two prices - $1.35 and $1.65. When the menu selection is priced at $1.35, there is no choice of dessert and no salad is offered.

The hours for serving are as follows:

Breakfast - 6:30 - 7:45 Lunch - 11:00 - 12:45

Coffee Break - 7:45 - 10:30 Merinda - 2:00 - 6:45.

The Proposed Changes for the Kitchen

Layout of the Coffee Shop

The proposed kitchen layout (Figure 2 on the following page) was evolved by using a scaled plan and equipment templates, and by considering the menu, employees, present and future development, finances, and limitations of the present location. A back-to-back straight line arrangement finally appeared to be the best plan for the kitchen.

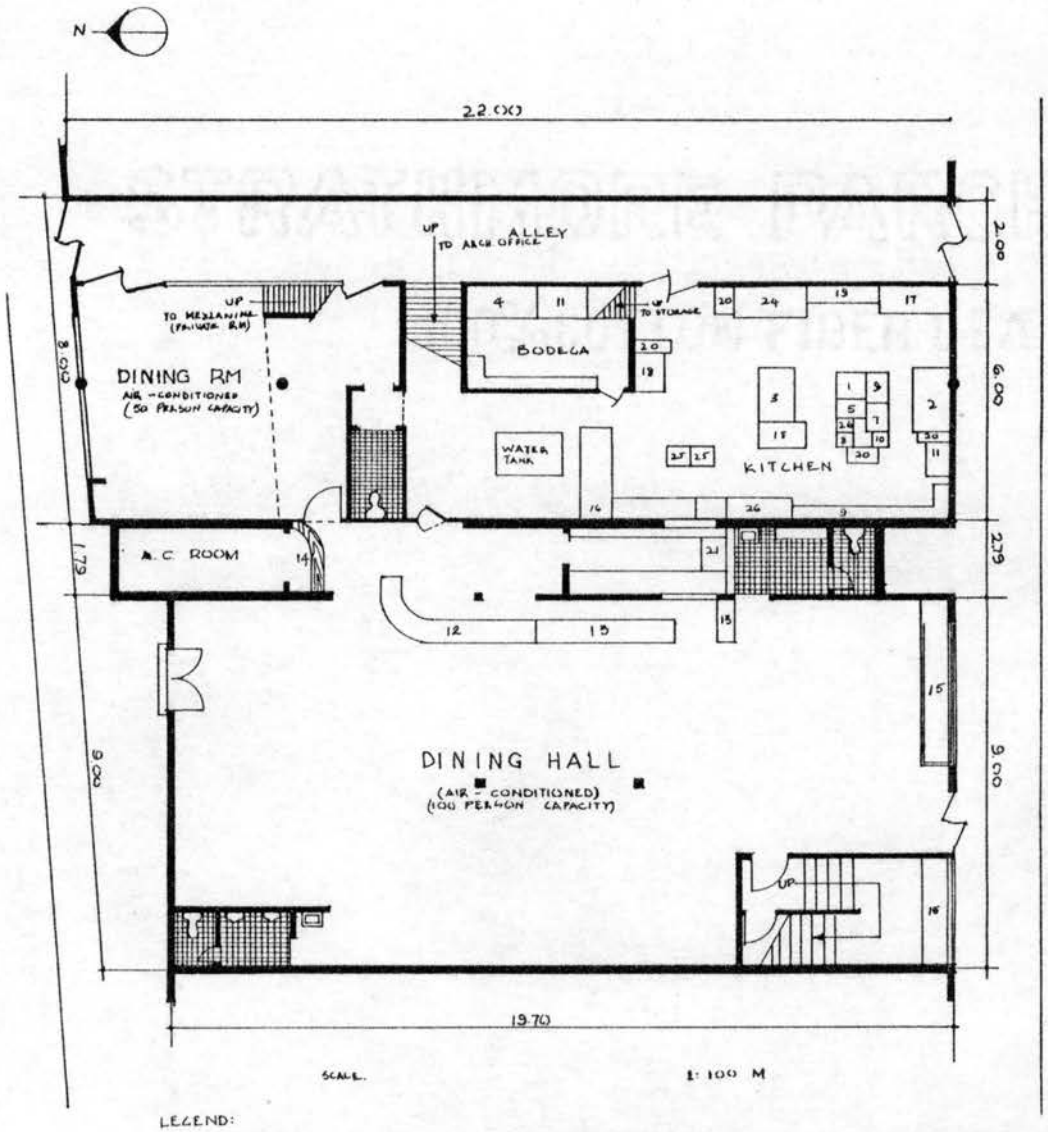
The remodeled kitchen of the Rolling Pin Bake Shop (Figure 2) will have the following new equipment:

1	Working Table	2	Two-compartment Sinks
1	Dish Machine	1	Refrigerator
2	Freezers	1	Three-compartment Sink
1	Mixing Machine	1	Pot and Pan Rack
1	Oven	4	Carts
1	Griddle with Broiler	1	Toaster
1	Gas Range	1	Can Opener
1	Deep Fat Fryer	2	Scales .

Specifications developed for this proposed equipment will be found in Appendix B, page 65.

Also in this new layout (Figure 2), eleven pieces of equipment from the present Coffee Shop will be utilized as follows:

1	Steamer	1	Refrigerator
2	Working Tables	1	Cabinet
2	Freezers	1	Counter (pastry)



LEGEND:

#1	GAS RANGE	#10	MIXER, MACHINE	#19	POT & PAN RACK
2	WORK TABLE W/(22) SCALE, W/(24) CANOPENER	11	2 FREEZER	#20	4 CARTS
3	WORK TABLE W/(23) SCALE	12	COUNTER, PASTRY	#21	TOASTER
4	REFRIGERATOR	13	SCALE STAND	#22	CAN OPENER
#5	FRYER	14	CASHIER, BOOTH	#23	SCALE
#6	GRIDDLE & BROILER	15	DISPLAY	†24	REFRIGERATOR
†7	OVEN	#16	DISH MACHINE	#25	2 FREEZE
8	STEAMER	#17	3 COMPARTMENT SINK FOR POT & PANS	#26	WORK TABLE
9	CABINET	#18	2 COMPARTMENT SINK FOR VEGETABLE & MEAT	*	NEW EQPT.

Figure 2. Proposed Kitchen Layout of the Coffee Shop

1 Sales Stand 1 Display Case.

1 Cashier's Booth

All the equipment in the present layout (Figure 1, page 37) that has not been utilized will be sent to the Bakery Shop, which is located in another area of the city and is a part of this business.

The space between the deep fat fryer and steamer (Figure 2, page 41, items 5 and 8) will be finished as a wooden working surface for this area, with one or two shelves below. The work table (Figure 2, item 26) near the pass-through window will be movable in order that it can be used in the cooking and serving areas. Also, this will facilitate the transportation of plates from the cabinets (Figure 2, item 9) to the serving area and back to the pass-through window.

The walls (on the east and south) that enclose the rest room and water tank will be torn out, if architecturally possible, in order to have a wider passage into the kitchen and more space for the proposed dish machine. Another remodeling suggestion is to remove the sinks located near the rest room and water tank (Figure 1, page 37, item 10) giving a wider passage. Women employees will use the rest room for women customers. The show windows (Figure 1), on the south and east sides of the kitchen will be replaced by a wall to a height of six feet and six inches from the floor. This will give privacy to the kitchen and more working space.

Since the hood over the range was not shown in the plan obtained (Figure 1, page 37), one will be made to cover the cooking area. This hood will be vented through the south side of the kitchen. The present hood will be used if at all possible.

The flow of work was considered in making the layout changes. So the flow chart (Figure 3 on the following page) was evolved to aid in planning the functional relationships of work centers.

The author does not feel this layout and proposed equipment is perfect and will continue to analyze the operation upon her return to Manila. Upon decision to remodel, a competent architect, other dietitians, and/or a food consultant will be asked for assistance. Measurements must be checked as Figure 1 (page 37) was submitted in meters.

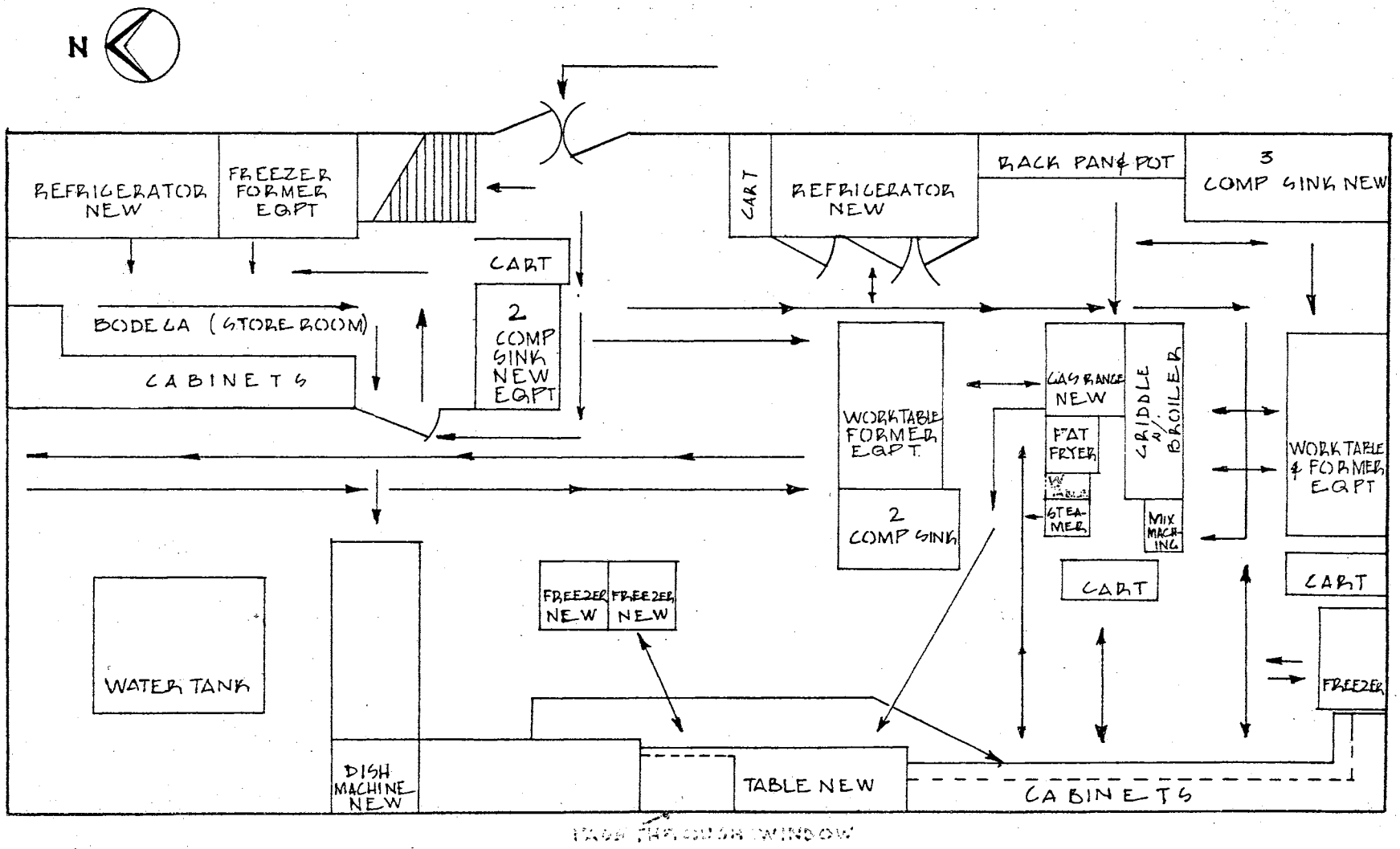


Figure 3. Functional Flow Diagram of the Proposed Kitchen Layout

CHAPTER IV

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary and Conclusions

The main objective of this study has been analyzing the present layout and equipment of the Rolling Pin Coffee Shop in Manila, Philippines. Layout and equipment play an important part in designing or remodeling an institution kitchen. A re-evaluation of an existing operation is important for it may lead to changes which will reduce food costs and labor needs.

In proposing changes for the Coffee Shop owned by the author's family, it was recognized that new equipment and layout reorganization should increase production and decrease labor costs. Also, recognized and kept in mind was the expense of remodeling and the cost of the desired new equipment.

The flow diagram which was developed demonstrated the logical sequence of foods as they proceed through production and service. This diagram is a very helpful guide for locating the different areas of food operation.

Realizing that a knowledge of the different types of layout will be useful in helping determine the space

requirements for kitchens, the author has included as many kinds as she could locate. Next, the efficiency of any food service depends upon the selection of the equipment. Equipment specification is especially significant when revising a layout, as well as when purchasing the equipment; therefore, detailed specifications were written for all the proposed new equipment. Attention to size and details, and knowledge of materials was gained by this experience.

The new kitchen layout uses a back-to-back straight line arrangement. The author found that developing a good layout for a food service is not a simple task; it is complicated by the diversity of functions to be planned for, control of food quality, cost of highly perishable products, and social and psychological aspects of food in addition to the specific needs of the individuals such as the owners, operators, or the managers.

Implications

From this study, the author has formulated these points to be remembered:

1. Anticipate the labor and equipment needed to justify the proposed layout and equipment.
2. Know the kinds of equipment available and assess their use in the proposed operation.
3. Plan the layout using a scale model and templates.

4. Be aware of the budget required to justify the proposed layout and equipment.
5. Have qualified persons such as a dietitian, food consultant and/or an architect to assist in finalizing the layout and equipment plan.

BIBLIOGRAPHY

1. Balsley, M.: Cafeteria styles keep pace with evolving needs. Hospitals. 36:72, (Aug.) 1962.

2. Beauvais, Margaret Hott: Standards for planning and equipping school kitchens. Unpublished Master's study. Oklahoma State University, Stillwater, Oklahoma. 1960.

3. Blickman, S.: Fabricated food service equipment. J. Am. Dietet. A. 23:752, (Sept.) 1947.

4. Bloetjes, M. and R. Gottlieb: Determining layout efficiency in the kitchen. J. Am. Dietet. A. 34:829, (Aug.) 1958.

5. Brodner, J., H. M. Carlson, and H. T. Maschal: Profitable Food and Beverage Operation. 4th ed. New York: Ahrens Publishing Company, Inc., 1962.

6. Broten, Paul R.: How to avoid pitfalls in kitchen planning. Institutions. 43:106, (Sept.) 1958.

7. Bryan, Mary deGarmo: The School Cafeteria. New York: F. S. Crofts and Co., 1936.

8. Child, Georgie B.: The Efficient Kitchen. New York: Robert M. McBride and Co., 1925.

9. Cronan, Marion L.: The School Lunch. Peoria, Illinois: Chas. A. Bennett Company, Inc., 1962.

10. Dana, Arthur W.: Kitchen Planning for Quantity Food Service. 1st ed. New York: Harper and Brothers Publishers, 1949.

11. Dykman, M.: The menu - determining factor in food service layout. J. Am. Dietet. A. 34:138, (Feb.) 1957.

12. Edwards, G.: Specifications. 2nd ed. New York: D. Van Nostrand Co., Inc., Princeton, 1961.

13. Fish, Mary et al.: Planning food service layouts. J. Am. Dietet. A. 42:489, (June) 1963.

14. Flack, K. E.: Arrangement and equipment of the physical plant. J. Am. Dietet. A. 41:35, (July) 1962.

15. Flambert, Richard, and Fern Flambert: Food service equipment guide. Food merchandising supplement to chefs' and stewards' food and equipment manual. 15:27, (Aug.) 1963.

16. Gale, D. W.: Specifying Building Construction - A Guide for Architects and Engineers. New York: Reinhold Publishing Corp., 1961.

17. George, N. L., and Ruth D. Heckler: School Food Centers. New York: Ronald Press Co., 1960.

18. Goldsmith, G.: Architects Specifications - How to Write Them. New York: John Wiley and Sons, Inc., 1935.

19. Gottlieb, R., and M. A. Couch: Using the cross chart in planning kitchen layouts. J. Am. Dietet. A. (June) 1960, p. 585.

20. Gunderson, G. W.: Planning for volume production. Volume Feeding Management 16:26, (Jan.) 1961.

21. Immer, J. R.: Layout Planning Techniques. New York: McGraw-Hill Book Co., Inc., 1950.

22. Immer, J. R.: Layout Planning Techniques. New York: McGraw-Hill Book Co., Inc., 1950, p. 5.

23. Kotschevar, L., and M. Terrell: Food Service Layout and Equipment Planning. New York: John Wiley and Sons, Inc., 1961.

24. Little, Keith R.: Kitchen Layout Logic. Canada: Age Publications Limited, 1959.

25. Lukowski, Robert F.: Principles of Kitchen Layout Planning for Food Service Establishments. Food Management Program Leaflet and Cooperative Extension Service. College of Agriculture, University of Massachusetts. March, 1963.

26. MacNiece, E. M.: Industrial Specifications. New York: John Wiley and Sons, Inc., 1953.

27. Mooring, S. J.: Pitfalls in planning and layout. Hospitals 30:74, (Nov.) 1956.

28. Segeler, C. George, and J. S. Setchell: Commercial Kitchens. New York: American Gas Association, 1948.

29. Smedley, Emma: The School Lunch. Philadelphia: Innes and Sons, 1960.

30. Stokes, John W.: Food Service in Industry and Institutions. Dubuque, Iowa: W. M. C. Brown Company Publishers, 1960.

31. Terrell, M. E.: Analysis in guiding food department planning. J. Am. Dietet. A. 41:558, (Dec.) 1962.

32. Thomas, Orpha Mae Huffman: A Scientific Basis for the Design of Institution Kitchens. New York: Teachers College, Columbia University, 1947.

33. Webster's New Collegiate Dictionary: Based on Webster's New International Dictionary, 2nd ed. Springfield, Massachusetts: G. C. Merriam Company, 1956.

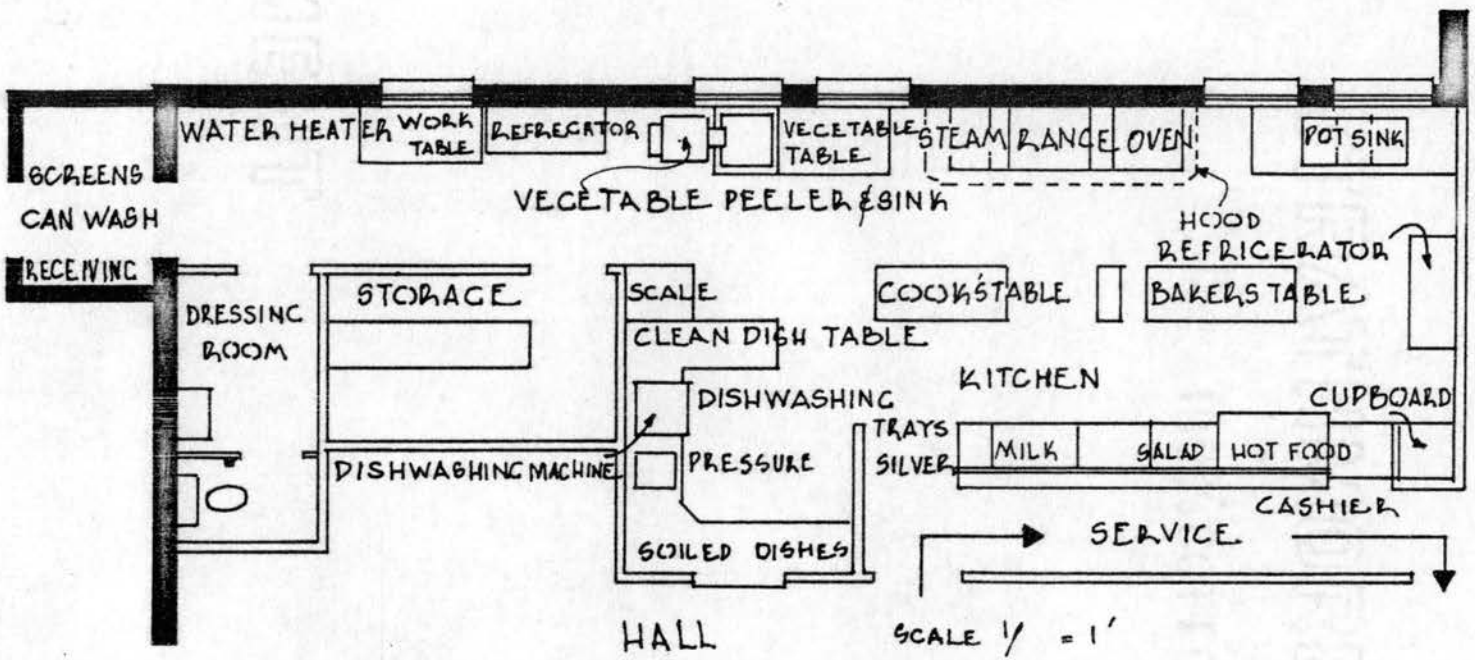
34. West, Bessie B., and Levelle Wood: Food Service in Institutions. 3rd ed. New York: John Wiley and Sons, Inc., 1955.

35. West, Bessie B., and Levelle Wood: Food Service in Institutions. 3rd ed. New York: John Wiley and Sons, Inc., 1955, p. 545.

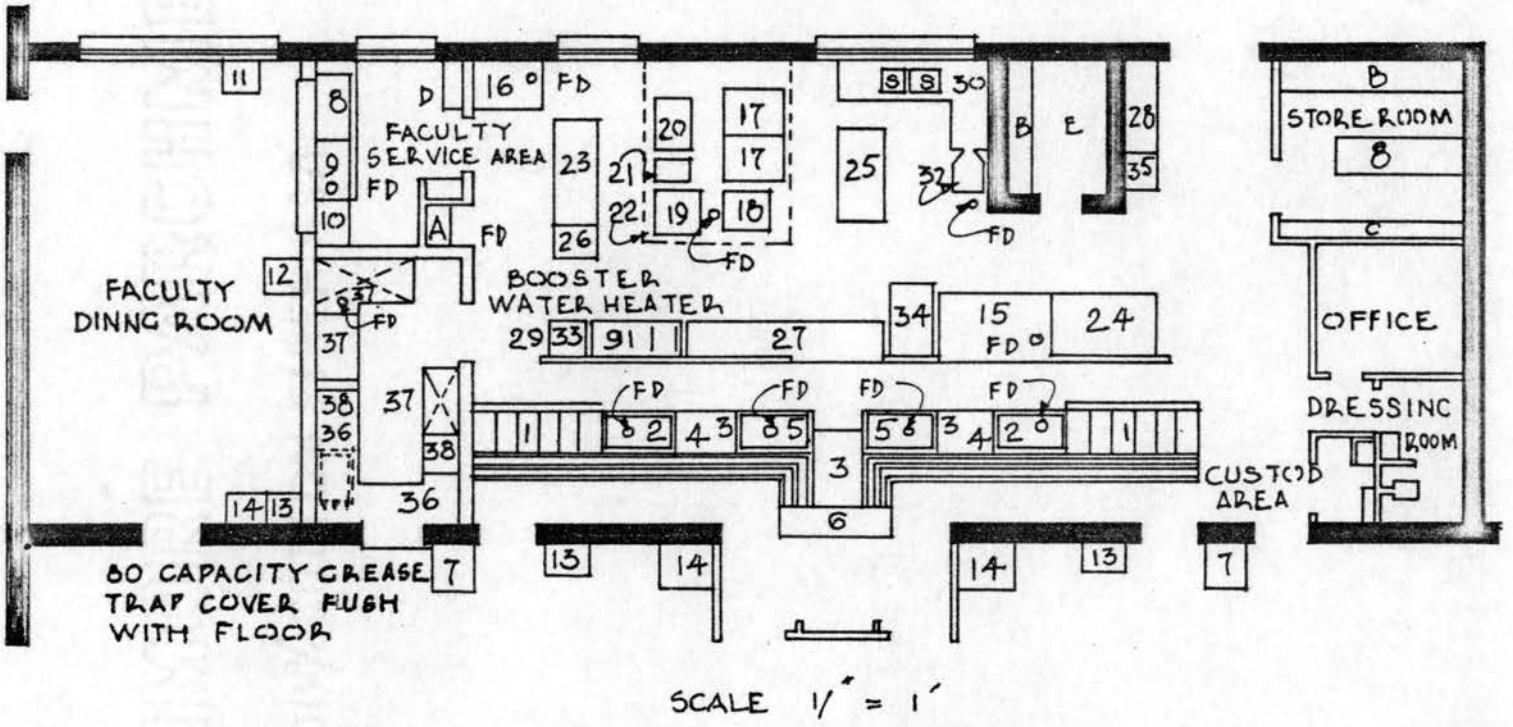
36. Westinghouse Electric Corp. Planned Classroom Lighting and the A B C Plan for School Lighting. Lighting Division - Edgewater Park, Cleveland, Ohio.

APPENDIX A

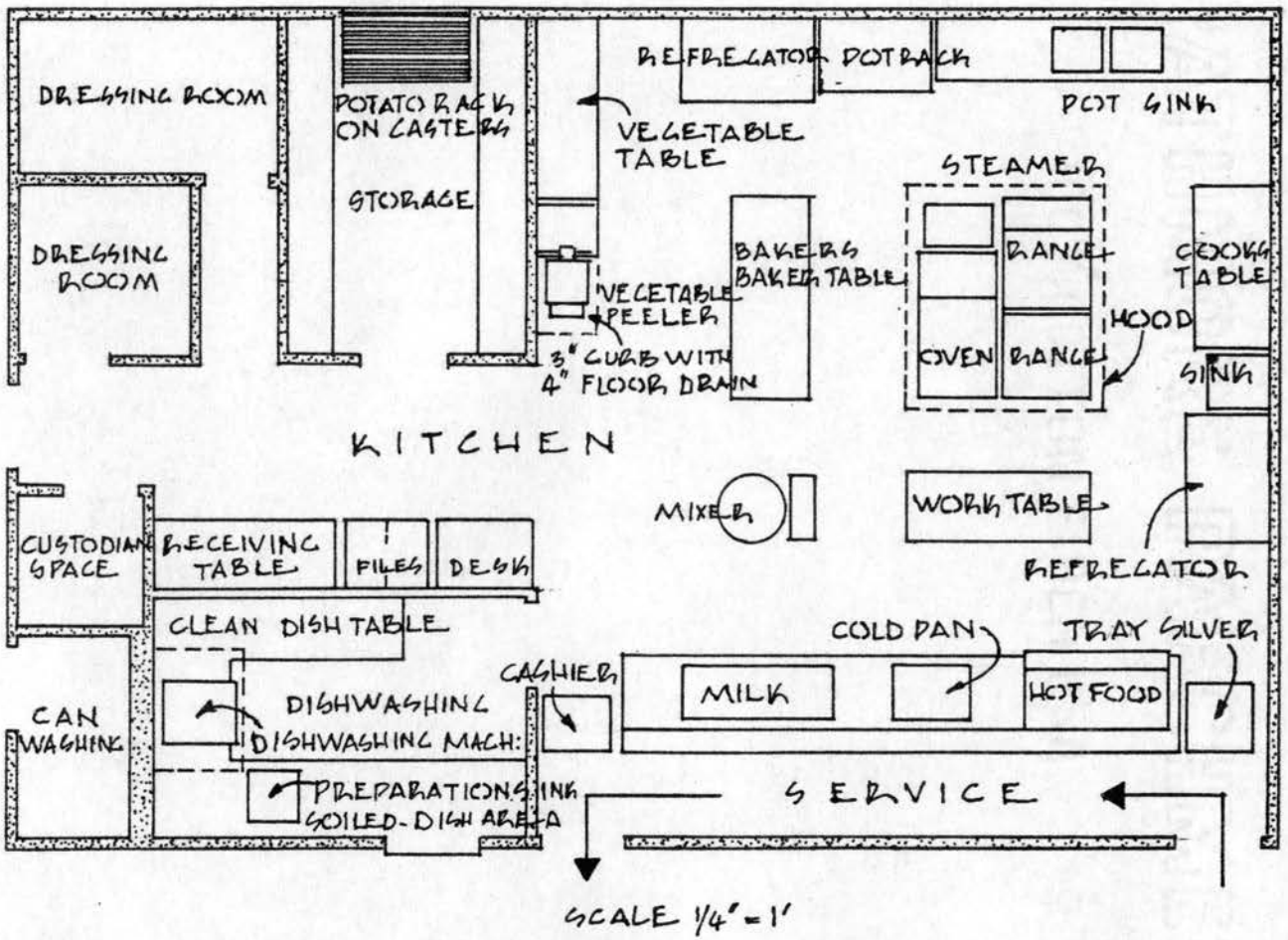
TYPES OF LAYOUTS



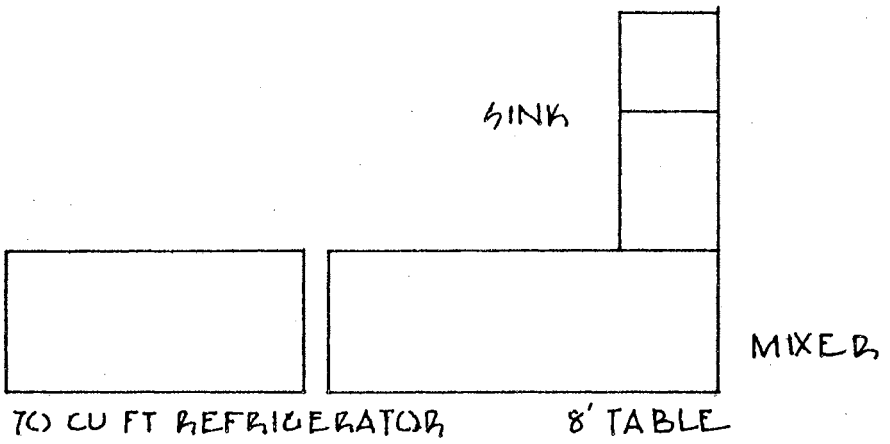
Appendix Figure 1. Straightline Layout



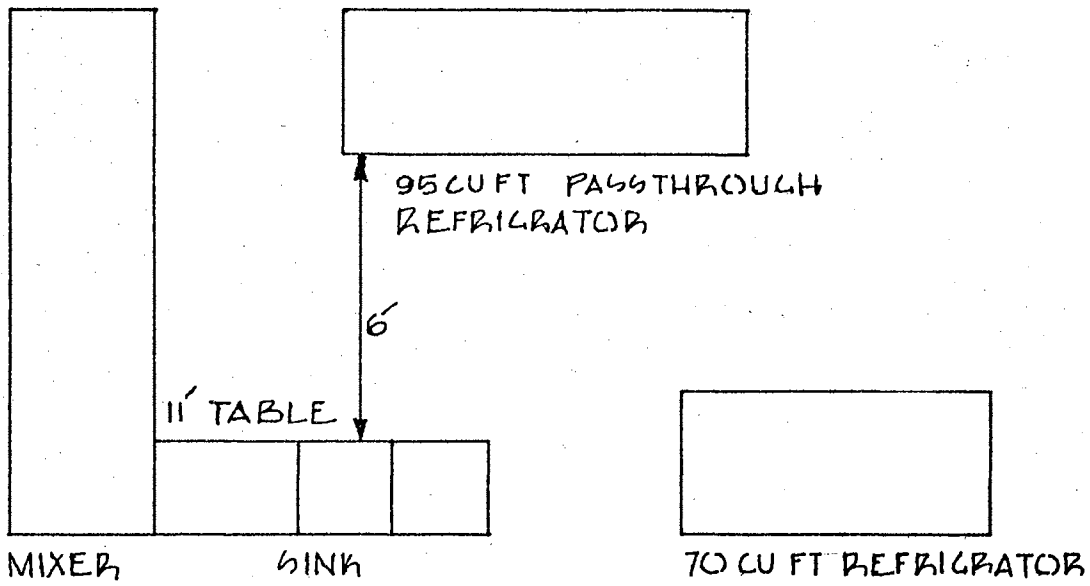
Appendix Figure 2. Back-to-Back Arrangement



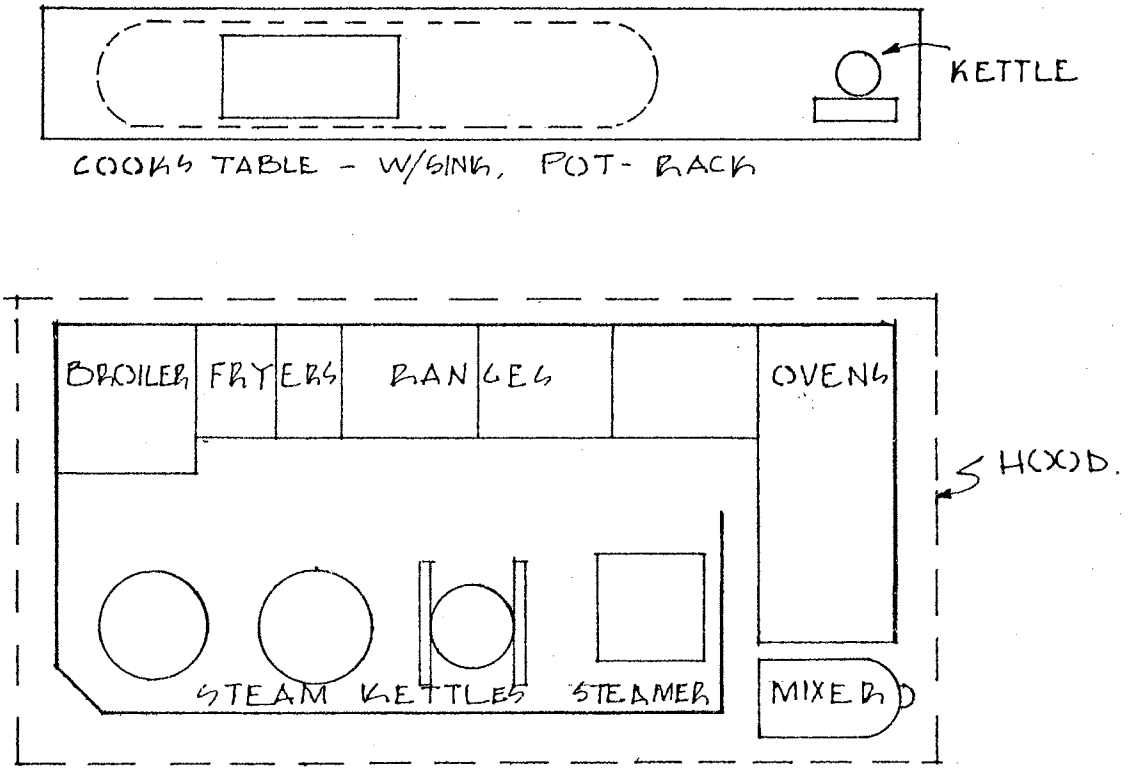
Appendix Figure 3. Island Arrangement



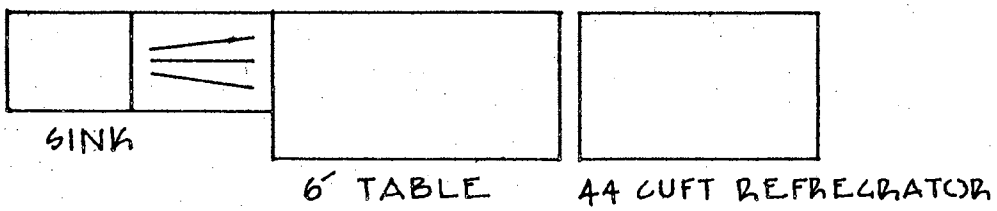
Appendix Figure 4. (A) L-Shaped Arrangement



Appendix Figure 4. (B) U-Shaped Arrangement

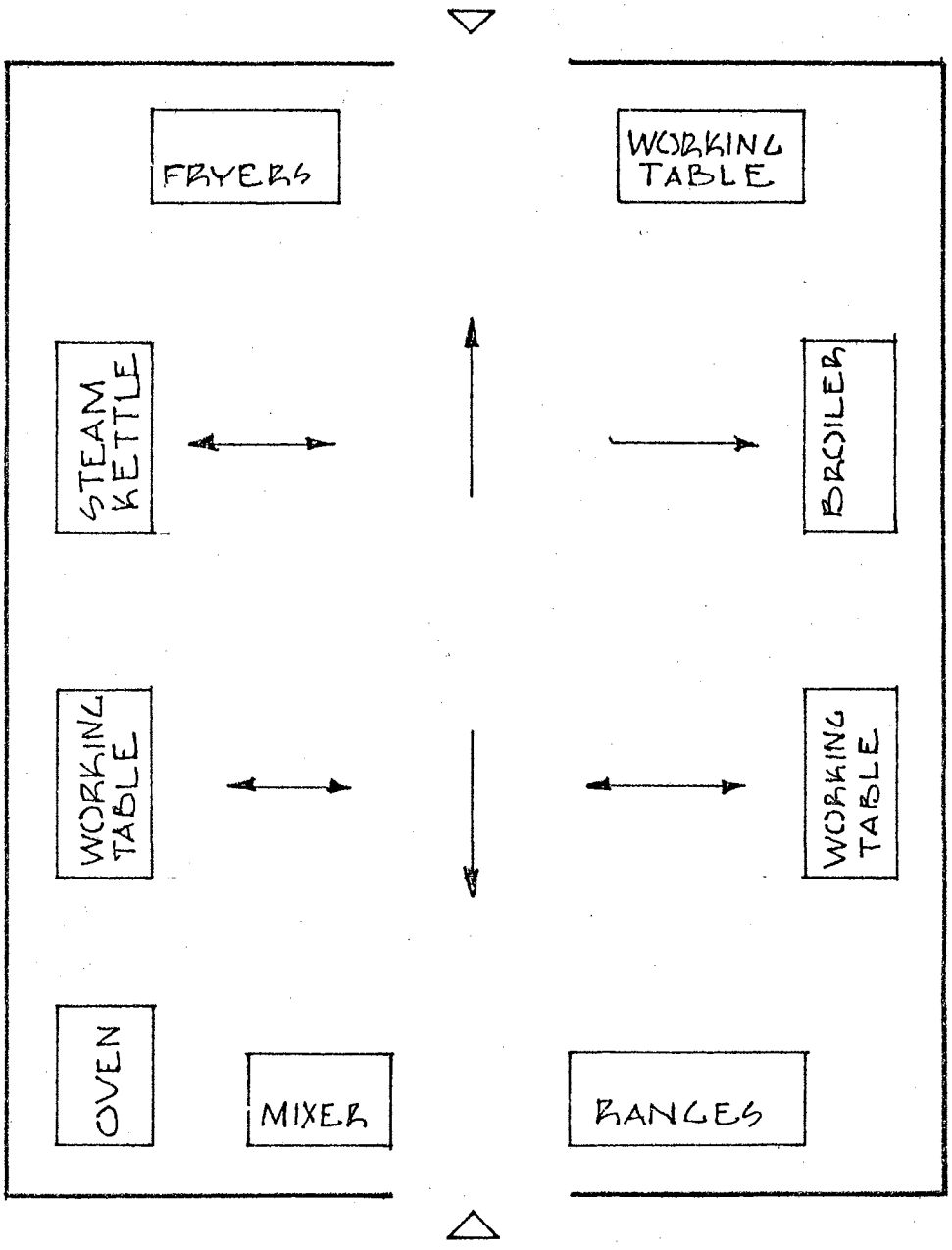


Appendix Figure 5. Parallel Back-to-Back Arrangement

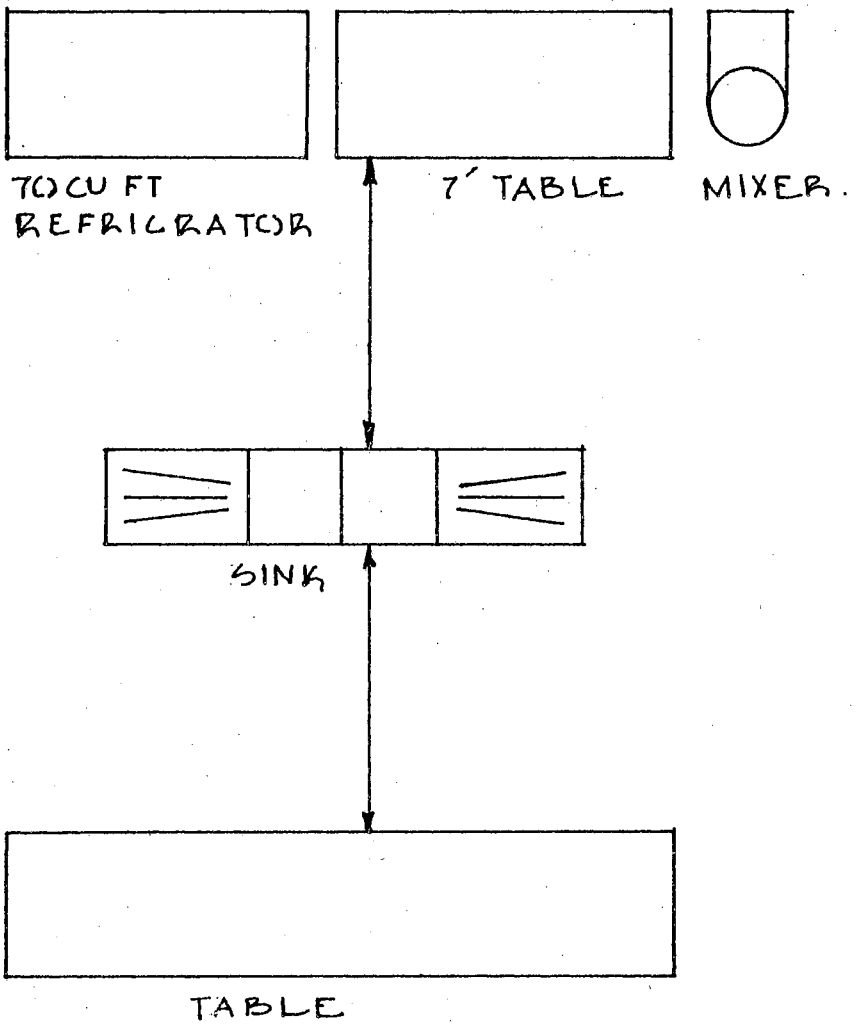


SCALE : 1/4" = 1'-0"

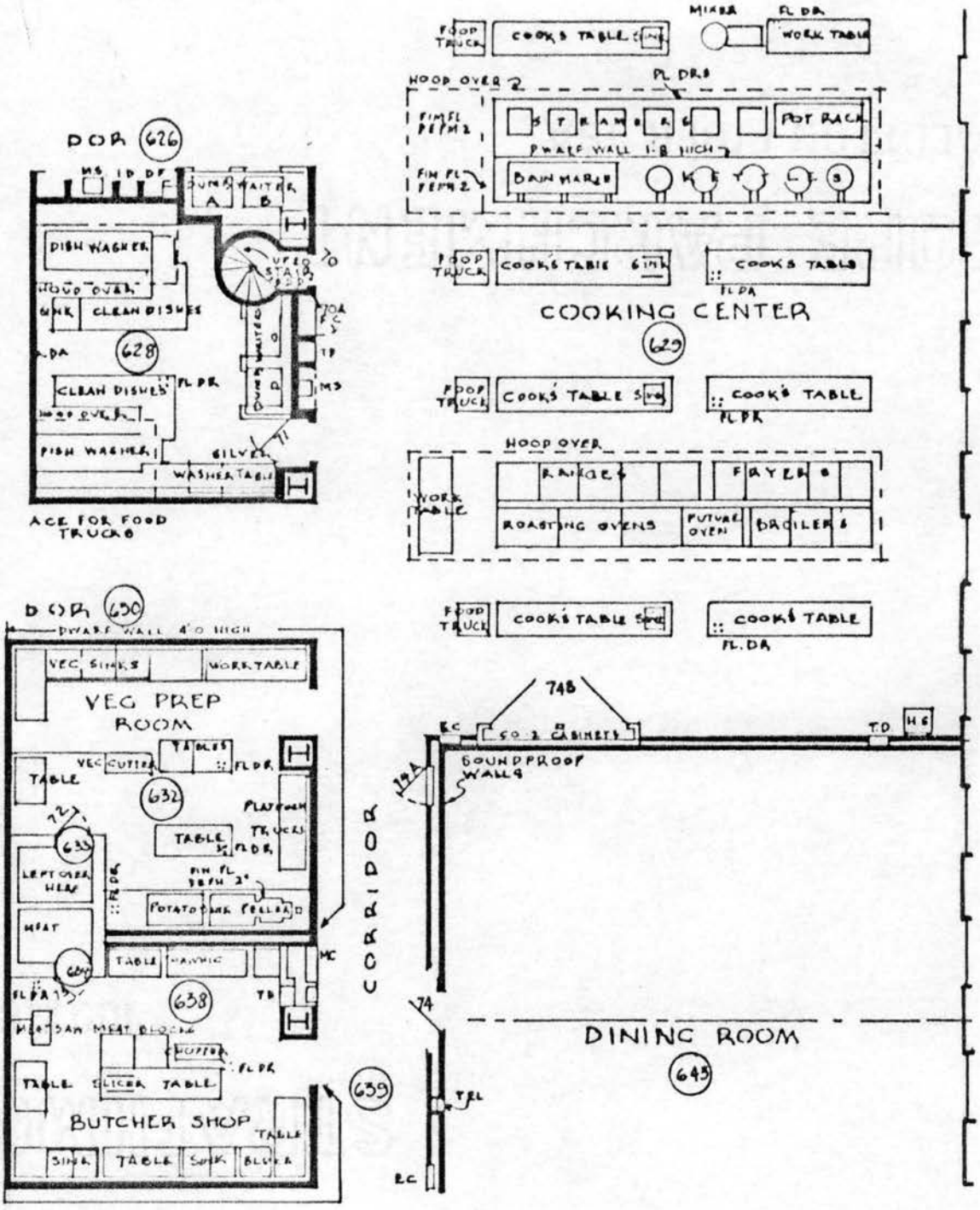
Appendix Figure 6. Linear



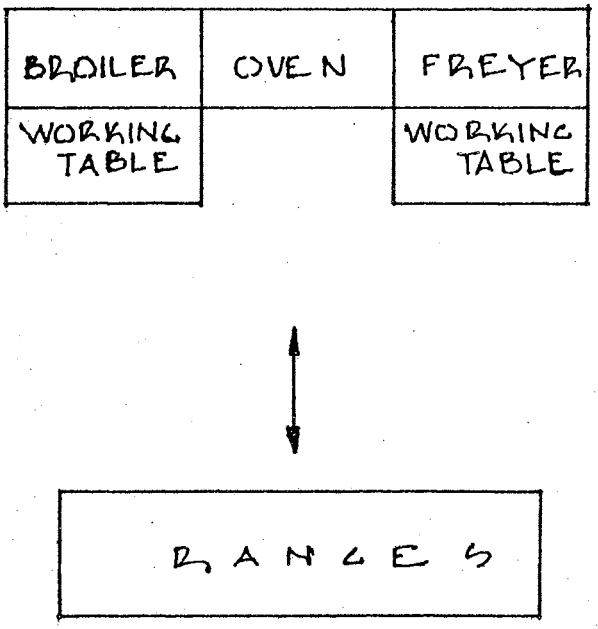
Appendix Figure 7. Square Arrangement



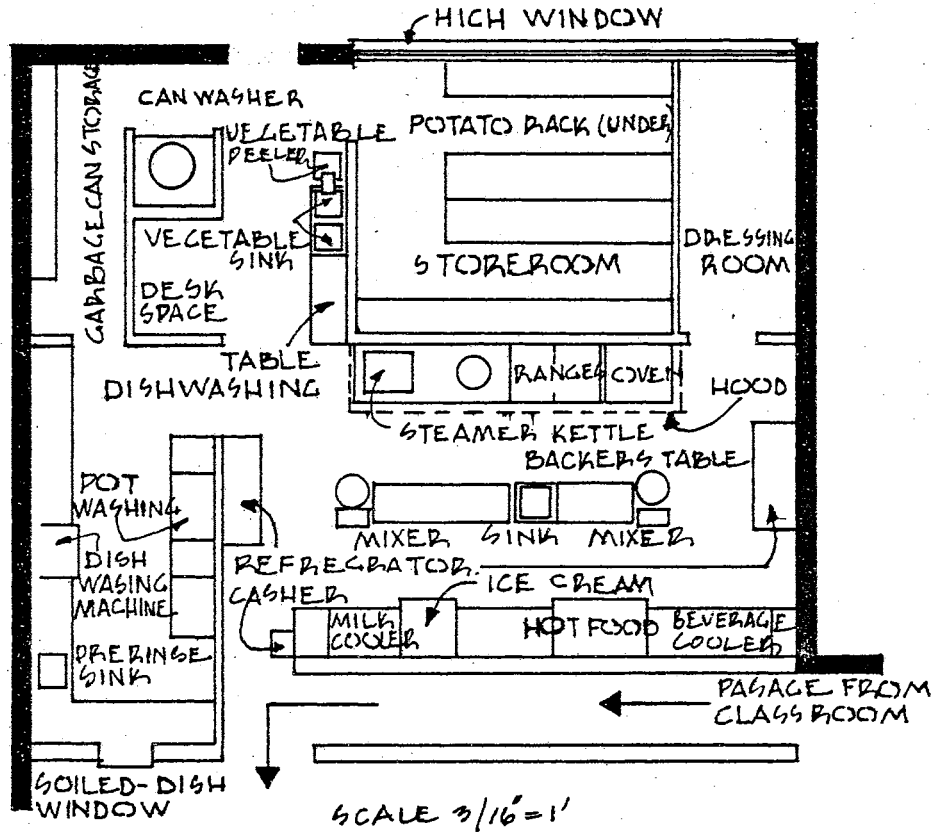
Appendix Figure 8. Parallel Facing Arrangement



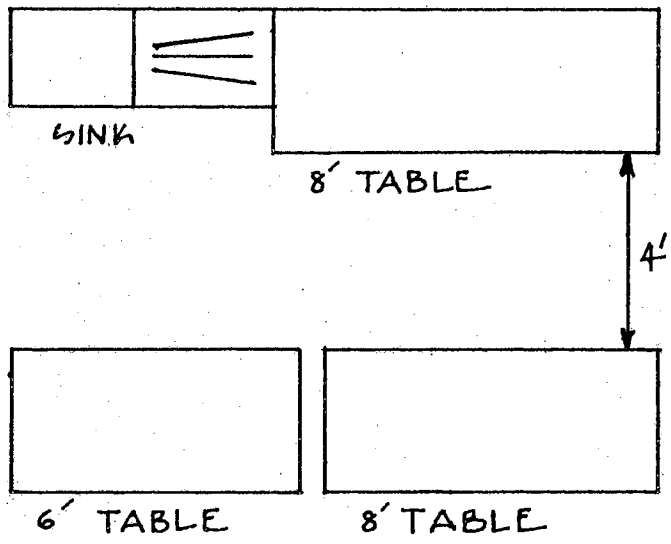
Appendix Figure 9. Work Center Arrangement



Appendix Figure 10. Combination Arrangement



Appendix Figure 11. Improper Arrangement



SCALE: 1/4' = 1'-00"

Appendix Figure 12. Parallel Arrangement

APPENDIX B

DEFINITE EQUIPMENT SPECIFICATIONS

DEFINITE SPECIFICATIONS NECESSARY

ITEM NO. I

Name of the item - Garland Commercial Table Gas Range

Quantity: One (1)

Model number - No. 94-29 Open to Table Range

Dimensions -

Height - 33" Width - 34"

Depth - 42" Shpp. Wt. - 302 lb.

Manifold Size: 1 1/4"

Gas (Natural) Consumption - Maximum

Burners (4) - - - - - 15,000 B.T.U. per hour

Materials and Construction:

Garland Commercial Table Gas Range or Equal. The body material must be stainless steel and the heating units should be made of heavy cast iron alloys; must be equipped with four star-shaped burners which apply the heat directly upward to the bottom surface of utensils. The burners must be flexible to permit intense or low heat, and be equipped with safety pilots so they will light automatically. There must be two oblong reflector trays of ribbed cast-iron which should be bowl-shaped around each two burners. Each burner must have a removable

grate. The ribs of grates must slope very slightly toward the centers. There must be two oblong drip pans under each of the two top burners. Range top will be mounted on a galvanized, painted frame equipped with a shelf which will be furnished by others.

ITEM NO. V

Name of the item - Keating Gas Deep Fat Fryer

Quantity: One (1)

Model number - 10 x 11 Counter Model "A"

Dimensions -

Height - 20 3/4" Depth - 15 1/2"

Width - 12 1/2"

Materials and Construction:

Model "A" only Keating Instant Recovery Fryer or Equal. It must consist of a fat containing vessel 10" x 11" having a splash deck and splash back installed in a cabinet equipped with gas burners and an automatic temperature control mechanism, all arranged and designed for the proper frying of food in deep fat. The vessel shall be made of 18 gauge stainless steel and shall have a fat capacity of 18 pounds. It must be equipped with two horizontal heating tubes which shall be 3" wide and 5" high, spaced above the bottom of the vessel so that the bottom is unheated. The splash shall slope toward the fat containing vessel and shall have vertical sides 3" high to

prevent the fat from boiling over. The splash deck and side walls shall be made of 18 gauge stainless steel. The splash back shall be made of 22 gauge stainless steel and be equipped with two horizontal stainless steel rods 5/16" in diameter designed to hold the frying basket. The cabinet is to be made of not less than 18 gauge stainless steel. A door, made of 22 gauge stainless steel, shall cover the front of the cabinet. The door shall be the full width of the cabinet (12 1/2"), shall open to a full 90° angle, and shall be so hinged that additional space alongside the cabinet is not required in order to open the door. Each of the two heating tubes shall be equipped with a gas burner having a fixed orifice capable of burning to complete combustion 20,000 B.T.U. per hour. The fryer must have Robertshaw Gas thermostatic control, which is capable of controlling the temperature of the frying fat to within 3° of dial settings between 300° and 350° F. Production capacity per hour shall be 70 - 90 pounds of food.

The following accessories are desired equipment:

Two (2) - split baskets to fit the fryer -

4 3/4" x 10 1/2"

One (1) - older style screen of woven wire mesh to cover the tubes -

9 1/2" x 10 1/2"

One (1) - grid type screen to cover tubes - 9 1/2" x 10 1/2"

One (1) - single basket - 9 1/2" x 10 1/2"

One (1) - goofer stick to open fryer drain.

ITEM NO. III

Name of the item - Garland Gas Griddle with Broiler Attachment

Quantity: One (1)

Model number - No. 22 - 7 or equal

Dimensions:	Width	Depth	Height
Griddle top	29"	42" inside	33"
		34" inside	
Broiler grid	22"	38"	
		28" inside	

Manifold Size: 1 1/4"; with a gas consumption of 11,000 B.T.U. per hour.

Materials and Construction:

Garland Gas Griddle with Broiler or Equal. The grill top shall be 1/2" thick, of cast iron, and with grease groves on each side draining toward the front, thence to an easily cleaned grease drawer located in the front panel. Must be heated by three tubular burners, each with separate valve. The corners of the grill must be slightly elevated.

Broiler shall have grids made of cast iron and ceramic radiant tubular burners. The grids shall be easy to adjust to three different height positions from 1 1/2" to 8" from

the heat source, and a self-cooling stainless steel handle; shall pull in and out easily and safety stop locks must be provided. Must have a sloping grease trough under the grid which is easily removable.

Both griddle and broiler must have separate thermostatic heat controls ranging from 250°F to 850°F; and have safety pilots and automatic lighting.

ITEM NO. VII

Name of the item - Vecatire Convection Oven

Quantity: One (1)

Model number - Model 115

Dimensions of oven -

Height - 29 1/2" Width - 26"

Depth - 27" Shpp. Wt. 675 lbs.

Dimensions of base -

Height - 15" Width - 26"

Depth - 27"

Materials and Construction:

Vecatire Convection Oven. The interior shall be lined with reinforced 16 gauge stainless steel, shall have plated 9 position rack guides which are removable, and interior will be furnished with two lights, operated by quick acting automatic door switch; this switch panel also automatically controls the fan motor. The burner must be duplex-type manually operated with a batch timer. All

controls to be located within an insulated, vented, recessed compartment with the control panel easily accessible. The control system shall consist of a thermostat, liquid pressure-type, with steel capillary tube; and a 100% sheet safety pilot, liquid pressure-type mercury filled. The motor must be pancake type, air cooled, 3/4 H.P., 110V., single phase, ball bearing, sealed with high temperature grease. The doors shall be twin-type, one counterbalancing the other and edged with silicon seals; must have viewing window of heat-tempered glass in each door. Insulation to consist of a one-inch thickness of thermobestos and six pounds of fiberglass. Must have fire-box panel which is easily removable without use of screws and a draft diverter for direct connection to 6" oval vent. Outside body must be 18 gauge stainless steel attached to solid stainless steel supports. The frame of the separate base must be 14 gauge stainless steel, provide 9 position removable rack guides and have adjustable feet. Front of base will be open with finish of 18 gauge stainless steel; other sides of base to be in gray hammertone enamel. Standard equipment: five aluminum racks, 26" x 27" with non-tip feature and a raised rear support.

ITEM NO. X

Name of the item - Mixing Machine, Mechanical

Quantity: One (1)

Model - Hobart C - 10 Mixer

Quart capacity - 10 Qt.

Horsepower - 1/8 H.P.; with cord and plug

Dimensions -

Height - 26 7/8" Depth - 12 1/4"

Width - 15 3/4" Weight - 90 lbs.

Materials and Construction:

Model C - 10 Hobart or Equal. The standard of quality, the characteristic of design, and construction desired by the owner (Hobart built, bronze bearing enclosed, ventilated) and upon which the determination of "or Equal" will be based is the Hobart Model C - 10. The mixer is to have standard equipment of one 10 qt. bowl, one flat beater, one wire whip, and the following extra equipment is desired:

One (1) - 10 qt. bowl (total of 2) - this stainless mixing bowl is pressed from sheet steel. The bottom is indented so the bowl will stand on the table and also handle small quantities of food, if desired.

One (1) - "B" flat beater (total of 2)

One (1) - "D" wire whip (total of 2)

One (1) - Pastry knife.

ITEM NO. XVI

Name of the item - Semi-Automatic Dishwashing Machine

Quantity: One (1)

Model - Hobart Model L M - 2, Dishwasher

Motor - 1/3 H.P. Hobart - built, splash-proof, ventilated type with grease packed ball bearings. Single phase is capacitor start type. Direct current is compound wound.

Pump - Integral with motor. Pump is self draining. Capacity 80 gallons per minute (Weir Test).

Dimensions -

Length - 24 1/4" Width - 24 1/4"

Weight - 566 lbs.

Materials and Construction:

Hobart Model L M - 2 Dishwasher or Equal. Designed as semi-automatic rack type, floor model, with balanced hood for straight through operation. The tank to be constructed of 14 gauge stainless steel. Welded steel gusseted frame with adjustable legs fitted with sliding neoprene sleeves. Tank capacity 22 gallons. Operation of wash and rinse cycle may be manual or automatically controlled, must have revolving wash arm with unrestricted openings. Wash arms easily removable for cleaning without the use of tools, and all other parts should be removable for cleaning. Tank fitted with readily removable wing-type sprayers above and revolving rinse arms below which are externally controlled by self-closing, rapid-action valve with renewable nickle alloy seat. Machine equipped with vacuum breaker on downstream side of rinse valve

mounted 6" above uppermost rinse opening. Fill valve with stainless steel seat installed on upstream side of rinse line vacuum breaker. Single handle for wash and rinse with interlock arrangement to prevent operation of wash or rinse while hood is in raised position. Universal joint between single handle control and wash valve rotor. Drain valve constructed of Ni-Resist and stainless steel parts to eliminate the possibility of sticking, binding, or corroding. Overflow with large skimming surface provided. Pump sump fitted with stainless steel perforated strainer box of one-piece construction. Standard Equipment includes four (two number 109-A P and two no. 101-A P) 19 3/4" x 19 3/4" chrome wire racks. Motor switch must be equipped with protective cover. Must have efficiency gas burner of 34 cubic feet per hour or an optional steam injection. Wash and rinse thermometers mounted on machine. (Temperature control for final rinse should be set for 180°F.)

ITEM NO. XVII

Name of the item - Three Compartment Pot and Pan Sink

Quantity: One (1)

Dimensions -

Height - 34" Width - 66"

Depth - of two compartments - 10"x 26" x 29"

sanitizing sink (on the right) - 12"x 21" x 28"

Material and Construction:

The body of sink to be of no. 14 gauge stainless steel, extended up in rear from sink and drainboard forming a uniform 12" high splash back, which is flanged over 2" at top and sides, allowing space behind for water pipes. Edges of sink at working height formed into a 1 1/2" diameter rolled rim. All corners of sink full length, width and depth coved to a 3/4" radius by curving the sides and bottom sheets, the intersection of coved parts being spherical in shape. All joints to be welded, ground and polished where visible. Exposed exterior including high back down to rim has no. 8 finish. Interior of sink has brush finish.

Drainboard, 36"x 26", of 14 gauge stainless steel with sufficient pitch for good drainage mounted on the right side and welded to splash back. Drainboard edges on end and front to be raised 3/8" before forming fully rounded edge of 1 1/2" in diameter.

Pump in first sink on left must have water capacity of 400 gallons per minute and have resilient mounted motor of 1/2 H.P. 110-volt alternating current.

Sink partitions to be same material and gauge as body and made of two sheets welded in place and curved or rounded to a 3/4" radius where same abutts the body of sink. Top of partition to be hemmed.

All three sinks will be provided with overflow outlets of 1 1/4" diameter, with bronze fittings, stainless

steel strainers and white brass piping leading from outlets to drain.

Sink to be mounted on 1 1/4" diameter iron pipe legs, screwed into a nickel bronze casting, riveted to a triangular shaped reinforcing plate that is welded to bottom of sink. Legs have a painted finish and are fitted with adjustable bell shaped feet made of nickel bronze.

Holes centered in splash back for faucet. Plug on chain in each compartment. Faucets, traps, and valves furnished by other unless specified.

Three drains, each recessed 4", of 14 gauge stainless steel or nickel bronze, fitted with locking, perforated stainless steel or nickel strainer baskets, 2" in diameter.

ITEM NO. XVIII

Name of the item - Sinks (Vegetable and Meat)

Quantity: Two (2)

Model number - No. 2448 - 14E S

Two Compartment - Working Height - 34"

Dimensions -

30" long	46" high over-all
30" wide	14" deep inside

Material and Construction:

No. 2448 - 14E S Sink with body made of no. 14 gauge stainless steel extended up in rear forming a 12" high splash back which is flanged over 2" at top and sides,

allowing space behind for water pipes. Edges at working height rolled. All corners of sink full length, width and depth coved to a 3/4" radius by curving the side and bottom sheets, the intersection of coved parts being spherical in shape. All joints welded, ground, and polished where visible. Exposed exterior including high back down to rim has no. 8 finish.

Sink mounted on four 1 3/4" diameter iron pipe legs, screwed into nickel bronze castings, riveted to triangular shaped reinforcing plates welded to bottom of sink. Legs have a painted finish and are fitted with adjustable bell-shaped feet made of cast nickel bronze.

Holes in splash back for faucets and bottom fitted with a 2" nickel bronze waste drain with plug and chain in each compartment.

Faucets, traps, and valves furnished by other unless specified.

ITEM NO. XIX

Name of the item - Portable Rack for Pots and Pans

Quantity: One (1)

Model - Union Steel Model R71-3 or Equal

Dimensions -

Width - Left to Right - 63"

Depth - F. to B. at Top - 15"

Depth - F. to B. at Top - 24"

Over-all Height - - - 75"

Clearance bet. upright 60"

Material and Construction:

Union Steel Rack for Pots and Pans or Equal. Must have 4" diameter ball bearing swivel casters. Must have 6 shelves, 3 of which are adjustable with stainless steel adjustable clip brackets, all shelves are slotted to permit proper drainage. One end bar of top shelf constructed of extra heavy angle iron fitted with cast iron, drop-forged pot hooks, riveted on 4" centers. The entire rack is constructed of heavy band and angle iron and is hot galvanized after fabrication to give it a rust resistant finish. Handles of 1 1/4" cast iron pipe on each end of rack to be constructed integrally with center stationary shelf will extend 5" beyond frame of rack.

ITEM NO. XX

Name of the item - Cart

Quantity: Four (4)

Model - Colson Model No. S-1362

Dimensions -

Length over-all - 40" Width over-all - 22 1/2"

Height over-all - 35" Shelf size - - 20" x 36"

Clearance bet. shelves - 14 3/8"

Wheel equipment - 1 - 5570 - B C F

Weight net - - - 45 lbs.

Weight shipping - - - 86 lbs.

Finish - - - - - - - - No. 2 D. 1

Material and Construction:

Colson Stainless Steel Dish Cart or Equal. The body must be 18 gauge stainless steel, with two shelves 20 gauge, stainless steel No. 2 D. 1 finish with edges double folded.

ITEM NO. XXI

Name of the item - Rotary Toaster - Savory Conveyor Type

Quantity: One (1)

Model - Model PQ - Gas Operated or Equal

Dimensions -

Height - 29 3/8" Width - 19 1/8"

Depth - 16 5/8"

Capacity per minute - 6 slices - 360 slices per hour

Gas B.T.U. - input per hr. - 12,000

Material and Construction:

Rotary Savory Conveyor - Type Gas Toaster or Equal. Must be finished in stainless steel or black enamel. Equipped for use of natural gas as fuel and requiring a maximum of 30 watts electrical consumption for operation, must have 4 inch flue pipe which is connected at the top. Also, must have ceramic radiants to direct heat to the bread as it travels on small chain-driven platform.

ITEM NO. XXII

Name of the item - Edlund Heavy Duty Can Opener or Equal

Quantity: One (1)

Model - Heavy Duty number 2 table model

Material and Construction:

Edlund Heavy Duty Number 2 Table Can Opener or Equal. Must be cast iron construction with hardened and tempered steel knife and gear; must be furnished with table base.

Standard Equipment:

1. Knife (with one extra knife)
2. Gear
3. Knifeholder (with rivet)
4. Base Plate
5. Handle (with rivet)
6. Sliding bar casting only (with rivet)
7. A bar with rivet
8. Bushing
9. Spring and Washer
10. Knife adjusting screw.

ITEM NO. XXIII

Name of the item - Portion Control (Ounce) Net Weight Scales or Equal

Quantity: Two (2)

Model - Pelouze Y G - 400, Wayette Scale 25 - lb. Capacity

Dimensions -

High - 8 1/2" Wide - 6 1/2" Deep - 6 1/2"

Material and Construction:

Pelouze Portion Control Scales or Equal. Capacity of 25 pounds by 1 ounce graduations; accurate to 1/8 ounce: white enamel finish easy to clean with removable platform of stainless steel. The dial printed counter clockwise, hairline indicator on flat pointer mounted behind glass face shows exact portion weight. Scale adjuster covered for security with removable stainless steel housing.

DESIRABLE EQUIPMENT

ITEM NO. A

Name of the item - High Compression Steamer (15 lb. pressure)

Quantity: One (1)

Model - Market Forge Steam-it, Model St- G, Gas or Equal

Capacity - 3 Cafeteria pans 12" x 20" x 2 1/2" (perforated or solid pan)

Cooks - 30 to 35 pounds of food.

Dimensions -

Floor space - 19"x 25" Height - 27"

Shpp. Wt. - 145 lbs. 25,000 Gas B.T.U.

Material and Construction:

Market Forge Steam-it, Model St- G, Gas or Equal, must have seamless aluminum cooking cylinder with polished 18

gauge stainless steel exterior. Must have its own 14 gauge stainless steel stand which provides room for storing pans. Cooker to be equipped with safety valve, blowout plug, low water cut-off, thermostatic steam trap, automatic steam vent and timer.

ITEM NO. B

Name of the item - Glasswasher Machine

Quantity: One (1)

Model - Hobart Model BW - 3 Glasswasher or Equal

Dimensions -

Length at table height - 21"

Over-all width - - - - - 23"

Working level - - - - - 33"

Shipping weight - - - - 300 lbs.

Material and Construction:

Hobart Glasswasher Model BW - 3 or Equal. The construction (internal weld) must be 16 gauge highly polished stainless steel - tank, side panels, top rim and cover for wash compartment. Must have revolving brush-type glasswasher with dip-type rinse tanks. Wash compartment at front of machine equipped with two revolving brush units. All drains to be equipped with removable strainers.

The motor and driving parts to be fully enclosed with removable panels on all four sides. Must have dip-rinse tank equipped with separate drain control and overflow

into scrap tank. The drain outlets for wash, rinse and scrap compartments are separately controlled but connected to one common outlet. Swinging type double faucets supply hot and cold water to rinse and scrap tanks.

The legs must be equipped with pear-shaped adjustable feet. Operated by 1/4 H.P. Hobart built, grease-packed, ball bearing, drip-proof motor, rigidly mounted. The two center and four side brushes, which are standard equipment, are designed with metal backs, removable for cleaning; one set of extra center brushes (2) and one set of side brushes (4) to be furnished as extra equipment.

ITEM NO. C

Name of the item - Slicer

Quantity: One (1)

Model - Hobart Model 1512 Slicer or Equal

Dimensions -

Height - 19 1/4" Net weight - 89 lbs.

Over-all measurements - 18 1/2 x 25 1/4

Domestic shipping weight - 125 lbs.

Material and Construction:

Slicer Model 1512 or Equal. The finish must be Standard Hobart Gray. All exposed metal parts must be stainless steel. The knife must be Hobart Stay-Sharp, solid stainless steel, diameter, 11 3/4"; edge well protected. Both sides of knife quickly and completely

accessible for cleaning. Must have 1/4 H.P. motor Hobart built, enclosed, splash proof, integral with slicer. Shielded ball bearings are self-lubricated. Slide bearings are self-aligning and self-lubricated. The feed trough will take food up to 10" in width and slice any thickness up to 3/4". The slice thickness regulator must be white plastic dial type, self-locking, easily set. Be equipped with removable two-stone type sharpener and hone; the angle of the sharpening stone is adjustable. The sharpener unit is stored on slicer base when not in use. Hand grip which swings out of way when not in use may be used as top clamp on irregular shapes. The receiving tray must be lustrous white plastic. Slicers must have all smooth surfaces -- no holes or crevices in which food can lodge.

ITEM NO. D

Name of the item - Waffle Baker Unit

Quantity: One (1)

Model - McGraw-Edison Co. Model 2E2 Waffle Baker or Equal

Dimensions -

Waffle Size - 7" in diameter Height (closed 7 1/2)

Width - - - 20" Height (opened 19")

Depth - - - 14 1/2"

Watts Rating 1650

Material and Construction:

McGraw-Edison Co. Waffle Baker Model 2E2 or Equal; two

bakers per unit made of high polish chromium finish, the round baking grids to be no-stick, rapid-even-heat-conducting metal. Each base equipped with indented edge to prevent overflow. Individual waffle irons equipped with bell timers, signal lights, preheat switches, automatic temperature and shut off controls. Also, must have removable drip pans to catch spillage. Handles must be heat resisting materials and should be large enough to take hold of easily.

LUXURY EQUIPMENT

ITEM NO. E

Name of the item - Ice Machine (Automatic)

Quantity: One (1)

Model - Flake King No. 863 - Junior Kube King or Equal

Dimensions -

Height - 40 1/4" Width - 24" Depth - 30"

Material and Construction:

Storage Capacity - 75 lbs.

24 Hour Production - 125 lbs.

Water Usage - 5 quarts per freezing

Interior - 2B stainless steel

Exterior - Top and front no. 4 polish stainless steel; remainder baked gray hammertone enamel.

Mechanical - 1/3 H.P. air-cooled Copelametic Condensing Unit, 115V

Equipment - 60 cycle, 1 Ph. A.C. Freon 12 Refrigerant

4" Adjustable legs.

All corners should be welded and rounded, with 2" waste outlet and standing overflow, stand pipe outlet.

Tank fitted with 18 gauge stainless steel hinged cover, with handle.

VITA

Amelia Rivera Panes

Candidate for the Degree of

Master of Science

Thesis: REVISION OF THE LAYOUT AND FORMULATION OF EQUIPMENT CLASSIFICATION AND SPECIFICATION FOR A COFFEE SHOP IN THE PHILIPPINES

Major Field: Food, Nutrition and Institution Administration

Biographical:

Personal Data: Born at San Fernando, La Union, Philippines, September 13, 1935, the daughter of Mr. and Mrs. Guillermo Dulay Panes.

Education: Attended grade school in San Fernando Elementary School, San Fernando, La Union, Philippines; graduated in High School from La Union, Philippines in 1953; received the Degree of Bachelor of Science in Food and Nutrition from the Philippines Women's University in 1957; completed the requirements for the Degree of Master of Science at Oklahoma State University in May, 1965.

Professional Experience: Completed three months voluntary training at Institute of Nutrition, Manila, Philippines, in 1957. Dietary Researcher at Foods and Nutrition Research Center, Manila, Philippines from February, 1958, to July, 1961. Nutritionist at Rolling Pin Bake Shop, Manila, Philippines from August, 1961, to June, 1962. Completed an Administrative Dietetic Internship at Oklahoma State University, Stillwater, Oklahoma, August, 1963. Part-time Assistant Dietitian at Willard Dining Hall, Oklahoma State University, Stillwater, Oklahoma from Fall to Spring ending May, 1964.

Professional Organizations: Member of the Philippine Nutrition Association, the Oklahoma Dietetic Association, and the American Dietetic Association. Recipient of Presidential Scholarship, Oklahoma State University, 1963-64.