

EVALUATION OF KITCHEN SPACE IN  
SELECTED TWO BEDROOM  
CONDOMINIUMS

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## CHAPTER I

### Introduction

A trend in kitchen research began in the 1940's and the 1950's. Researchers then were interested in homemakers' time and motion studies (Steidl and Bratton, 1968) and, as a result, became interested in the kitchen and its functional design.<sup>1</sup> Within recent years, research concerning kitchens has received a renewed interest. This renewed interest is enhanced by an alternative form of housing, the condominium. Also the use of more appliances in the kitchens today, the changing roles of family members, and the fluctuating economy has increased the interest in kitchen design research.

### Purposes

The overall purpose of this descriptive study was to determine the space in the contemporary condominium kitchen and their work centers. The specific purpose was to determine if the work centers and their provisions for equipment met or exceeded the recommended minimum standards according to selected kitchen design references.

<sup>1</sup> Since most research reviewed for this study used the term "homemaker" in relation to kitchen design and use, the term will be used in this review of literature. No gender restrictions are implied.

### Objectives

The objectives of this study were to:

- 1) Identify kitchen design criteria available from the literature.
- 2) Develop a kitchen evaluation instrument based on the identified criteria.
- 3) Evaluate 20, two-bedroom condominium kitchens to determine if the space of the work centers and provisions for equipment met or exceeded the recommended minimum standards according to the kitchen design criteria.
- 4) Score the condominium kitchens using the instrument called How to Score Kitchen Plans (Small Homes Council, 1975).
- 5) Compare the data collected from both instruments.

CHAPTER II  
REVIEW OF LITERATURE

Condominiums

Condominiums have been offered as a form of housing in Europe for many years (HUD, Note 1). In fact, the condominium dates as far back as the 6th century B.C. with the Roman empire. The Romans passed legislation for "homes of communal living" with the provisions that the owner was given a portion of land and the structure on the land for their home (Beyer, 1965).

The concept of the condominium reappeared during the Middle Ages when citizens feared attack from enemies and started living in walled-cities. When the population grew and the availability of land became scarce, citizens started to divide single buildings into many separately owned homes. Condominiums did not reappear until the early 20th century. In 1928, Brazil's government passed legislation providing for "horizontal property". Later Puerto Rico faced a land shortage problem and adopted Brazil's concept of "horizontal property" ("The Condominium Community", 1978).

This land shortage problem prompted the United States to adopt this form of housing. In 1961 the National Housing Act was amended to include Section 234, the



Mortgage Insurance for Individually Owned Units in Multi-family Structures, which includes condominiums and laws protecting them ("United States Statutes at Large", 1961; "The Condominium Community", 1978).

Condominiums did not flourish in the United States until the early 1970's. Condominiums are increasing in popularity every year according to reports from the United States Bureau of the Census (1980). Hickman (1980) has noted that over 180,000 condominiums will be in demand for the first half of the 1980's.

As stated in a HUD publication, a condominium is defined as:

when a individual owns separately one or more dwelling units in a multi-unit project. He and the owners of the other units have an undivided interest in the common areas and facilities that serve the projects. The common areas include such elements as land, roofs, floors, main walls, stairways, lobbies, halls, parking space, and community and commercial facilities (HUD, Note 1).

A condominium complex can be grouped units, high rise units, single structures, or a combination of these types. In most cases condominiums are grouped units of four or more or are high rise units ("The Condominium Community", 1978).

#### Changes in Housing Market

Many consumers in the past have owned condominiums as a vacation home, but with today's higher cost of

construction, the shortage of space, the fluctuating economy, and the changing roles of family members, the condominium is becoming a predominant form of home ownership (Lee, 1978; Hickman, 1980; Rudolph, 1980; U.S. Bureau of the Census, 1980; The Changing American Consumer, 1982; and Wallace, 1982). New home prices have nearly tripled since 1965 from an average price of \$25,110 to \$77,110 (Rudolph, 1980). The interest rate has soared to as high as 18.6% for home mortgages as of October 1981 (Wallace, 1982). These factors are influencing the consumer and their choice of housing (Hickman, 1980). Consumers are finding it increasingly difficult to finance new single-structure housing so in turn are looking toward the condominium and other forms of housing (Lee, 1978; Hickman, 1980).

#### Changes in Housing Consumer

Families in the decades preceding the 1970's were larger in size than current times (Agan, 1956; Steidl and Bratton, 1968; Deiser, 1978; and U.S. Bureau of the Census, 1980). Families were not as mobile as the families are today, so they usually purchased a home to fit their current needs or what they could afford. Today's families are decreasing in size (Keiser, 1978; The Changing American Consumer, 1978). Couples are having children later in life and are concentrating more on both careers (Keiser, 1978;

Trupp, 1982). With these changes the housing market and the house for these families is changing. Some of these noticeable changes are the decreasing number of bedrooms and also the decreasing size of the eating area in the kitchen (Keiser, 1978).

Consumers in the 1980's still want to own their own homes. According to Hickman (1980) the 1980's housing trend is still toward single-family structures. The economy, though, hinders the American dream of home ownership.

#### Importance of Kitchen Design

One of the most important and most used rooms in any home is the kitchen (Agan, 1956; Small Homes Council, 1975; Avery and Null, 1976; Lee, 1978; Gers, 1980 & 1981). Steidl and Bratton (1968) explained that a functionally designed kitchen is one that meets the requirements of the work to be done in the kitchen and the worker that will perform the tasks. The term kitchen refers to:

an area containing the equipment and floor area necessary to prepare and serve meals and to clean up after meals. The kitchen may be a room in itself, or it may be a part of a larger room and open into space for other activities, such as dining or family relaxation (Small Homes Council, 1975 page 2).

The functional design of a kitchen should meet the homemakers' needs to ease the activities of meal preparation. Steidl and Bratton (1968) and the Extension Housing and

Home Furnishings Specialists (1980) noted that any kitchen that is inadequate in size can cause mental and physical fatigue which can lead to stress and wasted energy to whomever uses the kitchen. Homemakers' satisfaction should be a major factor when planning a kitchen (Walker and Woods, 1976).

#### Early Kitchen Design Concepts

A trend in kitchen research began in the 1940's and the 1950's (McCullough and Heiner, 1945; Heiner, 1947; and Steidl and Bratton, 1968). Research in kitchen design was at that time very new. Researchers noticed a lack of consistency in the design of kitchens concerning storage, height, depth, and length of work areas (McCullough and Heiner, 1945). According to Steidl and Bratton (1968), researchers were then interested in time and motion studies which consisted of homemakers' ability to perform tasks efficiently in a kitchen. These studies were a result from realizing that spaces were based on the standards set by men (McCullough and Heiner, 1945). These time and motion studies resulted in an increased interest in the kitchen and its functional design (McCullough and Heiner, 1945; Heiner, 1947; Agan, 1956; American Public Health Association

Committee on the Hygiene of Housing, 1950; Small Homes Council, 1950 & 1964; Ehrenkranz and Inman, 1966; and Steidl and Bratton, 1968).

During the 1940's and the 1950's the kitchen was designed for the homemakers' needs. Much of the planning, preparation and serving of food was done in the kitchen (Agan, 1956). The kitchen served as a place to preserve foods and bake fresh products. These, and many other activities required a spacious and functional kitchen (Agan, 1956; Small Homes Council, 1950). The kitchens were designed according to family size during this period. Usually families had between five to eight members (Small Homes Council, 1950; Keiser, 1978; and U.S. Bureau of the Census, 1980).

#### Contemporary Kitchen Design Concepts

From 1975 to 1981 researchers again became interested in kitchen design research (Small Homes Council, 1975; Walker and Woods, 1976; Cooper and Sims, 1978; and Steidl, 1981). Kitchens during the latter 50's and early 60's became smaller in size (Keiser, 1978). This reduction in size was due to the increasing use of prepared foods, the use of more on-the-counter top appliances, and a changing family lifestyle (Keiser, 1978). Today families are more mobile, both members of a couple usually are employed,

there are newer step-saving appliances, and there is a renewed interest in preparing and preserving foods. This has resulted in new concerns about the use of the kitchen and its design (Keiser, 1978; Trupp, 1982; The Changing American Consumer, 1978).

### Kitchen Design Criteria

There are three principles involved when designing a functional kitchen for a homemaker. First is the homemakers' mental and physical satisfaction; second are the needs of the family and third is the purpose the kitchen will serve (Agan, 1956; Small Homes Council, 1950; Steidl and Bratton, 1968; Small Homes Council, 1975; "The House and Home Kitchen Planning Guide", 1978; and Keiser, 1978). These principles should be considered the most important aspects when planning and designing a kitchen.

### The Kitchen

The arrangement of the three major appliances, the storage space, the counter top space, and the floor areas are the four physical components of a kitchen. These areas must be arranged to ensure a functional and efficient kitchen. The three major appliances - sink, range, and refrigerator - are the three points of the kitchen work triangle. The storage spaces consist of the base and wall cabinets. Sometimes a utility closet or pantry is

considered storage space. The counter top surface space is the area used in-between the three major appliances. Work in these areas includes preparing food, cooking food, serving food, cleaning, and storage. The floor area consists of the space in the kitchen including the cabinets and appliances.

### Specific Criteria

Recommendations for kitchen dimensions were taken from selected references (Appendix A). Recommendations for some dimensions have changed very little from 1948 to 1982. The dimensions from these references formed the basis for the kitchen design criteria developed for the current study.

#### Dimensions Related to Overall Kitchen

The criteria for kitchen dimensions for this study are for a two-bedroom home. The total square footage of a kitchen is determined from the measurement of the wall-to-wall distances. The recommended minimum size of a kitchen for a two-bedroom dwelling is 100 square feet (Appendix A).

The work triangle is formed by measuring the distance between the three major appliances; the sink, the range, and the refrigerator. The distance from the center of each appliance to another appliance should not be less than 4 feet. The work triangle should not be less than 12 feet nor exceed 23 feet (Appendix A).

The traffic flow is the space between cabinets and/or appliances opposite each other. This distance is recommended to be a minimum of 48 inches (Appendix A).

#### Appliance Dimensions

Homemakers have used the sink, range, and refrigerator in their kitchens for years. These are still the three major appliances in the kitchen. Reports have shown increases in the production, shipments, and use of these three major appliances (Shipments, 1981 & 1982; Stewart, 1981; and the U.S. Bureau of the Census, 1980). The increase of newer appliances such as the dishwasher, microwave oven, and the trash compactor have also shown a rise in production and shipments (Shipments, 1981 & 1982; Stewart, 1981; and the U.S. Bureau of the Census, 1980).

Appliances are manufactured in standard dimensions. The recommended minimum appliance widths are: 1) single bowl sink; 24 inches, 2) double bowl sink; 33 inches, 3) range; 30 inches, 4) refrigerator; 30 inches, 5) dishwasher; 24 inches, 6) trash compactor; 14 inches, 7) portable microwave oven; 24 inches, and 8) built-in microwave oven; 30 inches (Appendix A).

#### Work Surface Spaces

The four work centers are the preparation center, the cook center, the cold storage center, and the mixing center.



The recommended minimum length of the work surface or the counter top in each center is: 1) the preparation center right side, 24 inches and left side 21 inches, 2) the cook center both sides 18 inches, 3) the cold storage center one side 15 inches, and 4) the mixing center one continuous 36 inch counter top (Appendix A).

#### Storage Spaces

Recommendations for height and depth of base cabinets were the same in all references reviewed. Recommendations for depth of wall cabinets ranged from 12 to 13 inches. The height from the floor to the bottom shelf of a wall cabinet varied according to their location. Recommendations for wall cabinet height above the counter top was 54 inches, above the sink was 60 inches, and above the range was 60 inches (Appendix A).

Base cabinet frontage is a measurement of the useable cabinet space in the kitchen. The cabinets below the sink and the dishwasher cannot be counted as part of the total cabinet frontage. The recommended minimum linear base cabinet frontage is 72 inches. The total wall cabinet frontage is the measurement of the useable cabinet space in the kitchen. The cabinets above the range, above the refrigerator, or anything over 72 inches in height cannot be included as part of the total wall cabinet frontage.

The recommended minimum linear wall cabinet frontage is 72 inches. The total amount of counter top frontage is a total of each of the work center frontages. This amount can range from 72 to 109 inches (Appendix A).

### Kitchen Design Today

Recent studies have revealed that consumers are dissatisfied with some aspects of their kitchens. Lack of adequate storage and counter top space, and the overall arrangement of the kitchen are some of the sources of dissatisfaction (Walker and Woods, 1976; Cooper and Sims, 1978; and Steidl, 1981).

### Faults in Kitchen Design Revealed by Homemakers

Cooper and Sims' (1978) investigated homemakers' attitudes about their condominiums. The two condominium complexes evaluated ranged in price from \$25,000 to \$29,000. The purpose of this study was to identify the problems of the overall condominium in order for future designers to incorporate the homemakers' suggestions. Results showed that the condominium owners were not satisfied with the overall arrangement of the kitchen. The insufficient amount of kitchen cabinet space was the major complaint in both condominium complexes studied (Cooper and Sims, 1978). The space provided for the kitchen cabinets averaged 24.75 linear feet or approximately 290 linear

inches. Several owners stated that the 12-inch base cabinets by the range were not large enough for storage of pots, pans, and small appliances. Based on their research, Cooper and Sims (1978) recommended 1) more than 25 linear feet of kitchen cabinet space, 2) base cabinets at least 18 inches wide, and 3) a closet located close to the kitchen for storage of cleaning supplies.

The purpose of Walker and Woods' research (1976) was to develop a method of evaluating and measuring household goods and service production. A sample of 1,296 households with varying family characteristics were randomly selected. Results related to the kitchen were concerned with the work space, storage space, equipment, and kitchen satisfaction.

They found that 92% of the sample had at least 36 inches of counter top space, 77% had space on both sides of the sink, and 6% had no space by the sink. Sixty-six percent had space by the range and oven and only 25% had no work space by the range. Forty-one percent had a work space by the refrigerator. Ninety-four percent had storage by the sink, 78% by the range, and 63% by the refrigerator. Nearly every family had an oven and range. Only 30% of the households had a dishwasher and 25% had a garbage disposer. Eighty-three percent of the households rated their kitchen satisfactory for meal preparation, 42% very satisfactory,

17% unsatisfactory, and 6% very unsatisfactory (Walker and Woods, 1976).

Steidl (1981) investigated the relationship between the physical design of the apartments and effort needed to perform certain tasks. According to Steidl (1981), the kitchen area received high scores of increased effort to perform tasks from the 115 homemakers interviewed. This increase of high scores is reflected as being unacceptable to the homemaker when functioning in the kitchen. The five tasks studied related to kitchen design were: 1) meal preparation, 2) meal service, 3) meal clean-up, 4) entertaining guests, and 5) storing groceries. The results of increased effort for these five tasks corresponded significantly ( $< .05$ ) with the following design features: 1) amount of space inadequate (47%), 2) space use was inflexible (63%), 3) kitchen comfortable for only one (72%), 4) awkward if people walk through (61%), 5) amount of counter surface inadequate (44%), 6) shelves hard to reach (63%), 7) amount of storage inadequate (53%), and 8) sound of dishwasher noisy (80%). Steidl (1981) concluded that some of the aspects of the apartment environment did not increase user effort, but the aspect of the kitchen and its design did increase user effort. Steidl (1981) suggested

the need for better design of the kitchen to eliminate these problems.

### Designers' and Builders' Kitchen Design Surveys

The survey entitled "What consumers want in housing in 1979" (1978) revealed the following desired features: 1) trash compactor, 2) microwave oven, 3) ceramic counter tops, 4) garbage disposer, and 5) a stainless steel sink with a single handle-faucet that consumers want in their new homes.

According to the annual Gers survey (1980, 1981) consumers stated they would pay extra for the following items: 1) extra cabinets in the kitchen, 2) a microwave oven, 3) a self-cleaning oven, 4) an ice maker, 5) ceramic tile counter tops, 6) walk-in pantry, and 7) a greenhouse window in the kitchen.

From the report of the 1980 United States Bureau of the Census (1980) there has been an increase in the manufacture of the following counter top appliances from 1970 to 1979: 1) coffeemakers, 2) corn poppers, 3) food processors, 4) griddles/quick grills, 5) mixers, 6) toasters, and 7) waffle irons/sandwich grills. From the same report, the following major kitchen appliances have also increased: 1) dishwashers, 2) disposers, 3) freezers, 4) microwave ovens, 5) electric ranges, 6) refrigerators, and 7) trash compactors. The results from the three survey

reports reflected the demand for these features in a new home. Adding more appliances in new homes will probably result in a higher price for the home. It might be assumed that the more expensive a home the more functional will be the kitchen, but this is not always the case.

Siemion (1981) implied that designers today are not increasing the floor space of the new kitchens being built, rather the space that is provided is being used more efficiently. Designers try to plan functional kitchens for the homemaker, but these kitchens sometimes fail to meet all the needs of the homemaker.

According to Wells (1982), over 800 builders were surveyed to show how they rated the importance of kitchen design in new homes. Over 86% of the builders surveyed indicated that the kitchen was very important to the selling of a home. Wells (1982) noted that 18% of the builders indicated that the kitchen size is becoming larger. Pertaining to kitchen floor plans, in 1981 43.5% of the builders used a 'U' shape floor plan in their kitchens, 26.5% provided an 'L' shape and 18.8% had a two-wall plan (Wells, 1982).

#### Needed Changes

Changes in family values, lifestyles, and size indicate these needed changes in today's kitchens: 1)

larger kitchen, 2) better arranged kitchen, 3) more storage space, and 4) more counter top space. By evaluating existing condominium kitchen designs, the researcher can estimate whether two-bedroom condominium kitchens have met or exceeded the recommended minimum standards according to the kitchen design criteria (Appendix A). Baseline data on a relatively new housing alternative, the condominium, can be useful not only to kitchen designers and builders but to consumers as well.

## CHAPTER III

### RESEARCH PROCEDURE

#### Instrument Development

An instrument called Kitchen Space Evaluation Form (KSEF) was developed by the researcher. It was used to evaluate 20 two-bedroom condominium kitchens. A second instrument call How to Score Kitchen Plans (HSKP Small Homes Council, 1975) was used. Both instruments were used in this study for the purpose of comparing the condominium kitchens evaluated.

#### Instrument 1 - KSEF

An instrument called Kitchen Space Evaluation Form (Appendix B) was developed from the criteria identified from the selected kitchen design references (see Appendix A). Information collected using the KSEF included actual dimensions of condominium kitchen spaces and provisions for equipment and appliances.

The KSEF consisted of three sections. The first section pertained to general information about the condominium: name and location of the condominium, condominium size, and listed selling price. Item number four pertained to the shape of the kitchen. The second section pertained to the provisions for equipment: garbage disposer, electrical outlets, windows, window square footage, traffic



pattern, door swings, location of range, wall protection by range, and if a fire extinguisher was supplied as equipment. It was inferred that if these provisions existed, the kitchen would be more functional than if they did not exist. The third section pertained to actual dimensions of the condominium kitchen. The evaluated items were grouped in the following categories for the third section:

<u>CATEGORY</u>	<u>KSEF ITEM NUMBER</u>
Square footage of kitchen	14
Work triangle distances	15-18
Traffic flow	19
Width of appliances	20-25
Length of work surface space	26-31
Height of work space	32-35
Storage frontages	36-40

#### Instrument 2 - HSKP

The scoring system developed by the Small Homes Council in 1950 was revised in 1975 and is still referred to as How to Score Kitchen Plans (HSKP Small Homes Council, 1975). The revised edition was used for this study (Appendix C). Permission from the University of Illinois, Small Homes Council Research Department was granted for use of their instrument in this study.

HSKP was developed for evaluating kitchens for efficiency of storage and counter top space, arrangement, and safety. By assigning a number to the components of a kitchen and using the rating technique devised for the instrument, a kitchen can be assigned a score which should be an indicator of the kitchens' efficiency. Following are the maximum number of points possible for each component using the HSKP.

<u>COMPONENT</u>	<u>HSKP MAXIMUM POINTS</u>
1. Total base cabinet frontage	17
2. Total wall cabinet frontage	20
3. Length of counter next to refrigerator	5
4. Length of counter, right side of sink	10
5. Length of counter, left side of sink	10
6. Length of counter, right side of range	5
7. Length of counter, next to oven	5
8. Length of counter for mixing	10
9. Total counter top frontage	18
Total Part I	100

<u>COMPONENT</u>	<u>MAXIMUM POINTS</u>
10. Nine drawers	3
11a. Adjustable wall shelves	4
b. 42 inches of wall cabinets within 72 inches of sink	3
c. 72 inches of wall cabinet over counter top	10
d. wall cabinets 15 inches above counter and no higher than 72 inches	6
12. Length of counter from sink to a corner 15 or 9 inches	3
13. If two or more work centers adjoin each other	10
14. If the dishwasher is not more than 72 inches from sink	10
If no dishwasher	10
15. No two centers are seperated by a tall appliance	6
16. If there is a single-bowl or a double-bowl sink and a dishwasher	3

<u>COMPONENT</u>	<u>MAXIMUM POINTS</u>
17. Clearance from front of cabinet to an assembly at a right angle	6
18. Traffic flow between counter/appliances	6
19. Length of work triangle	8/4/0
20. Traffic from front door does not cross work triangle	6
21. Doors do not interfere with work triangle	10/5/0
22. Windows at least 10% of floor area	6
23. If burners on range let pot-handles hang over	deduct 6
24. If fire protection is not given to walls next to range	deduct 15
25. If range is below a window	deduct 10
Total deductions	31
Total Part II	100

After both sections are scored, the sums are rated individually on the following scale:

Excellent	96-100
Good	92-95
Fair	85-91
Poor	84 or less

There were two sections of the instrument HSKP. The first section related to storage: total base cabinet frontage, total wall cabinet frontage, and total counter top frontage (a) by the refrigerator, (b) by the sink, (c) by the range, and (d) the mix center. Scores for each were derived by the relationship of the total house size. Section two related to arrangement of the storage areas, counter top space, appliances, activity space, windows, and safety. Each component in this section is also given points according to the total house size or by occurring. If one of the items did not apply to a kitchen, the maximum points possible were given so that the outcome of the evaluation was not skewed.

#### Selecting Kitchens for Evaluation

A list of existing condominiums located in Dallas, Texas was compiled by visiting the Dallas Living Center. The Dallas Living Center is a service for newcomers or persons wanting to move or relocate in the Dallas-Fort Worth

metroplex. This service lists apartments, condominiums, and homes that are for rent or purchase. Over 35 condominium complexes were listed with this service for the whole metroplex. Selection of twenty condominiums for this research were by the following criteria: 1) located in Dallas, 2) between the price range of \$60,000 to \$150,000, and 3) had two bedrooms. Ten condominium complexes met the criteria. Some of the complexes that were selected had more than one kitchen style. Twenty different kitchen plans were evaluated using ten condominium complexes. The select sample of condominiums were in a residential part of Dallas. This northeast section of the city primarily consists of condominium complexes.

The kitchens that were evaluated were in a model condominium. Consent to evaluate the kitchen was obtained by contacting the manager of the condominium complex. The managers were asked to sign the consent form (Appendix D).

#### Evaluating the Kitchens

Data were collected using the Kitchen Space Evaluation Form by obtaining the needed measurements in the actual kitchens. If a sample floor plan was available to the researcher, it was attached to the KSEF; if not, the kitchen plan was drawn to scale on the back of the evaluation form. The condominium kitchens were scored and rated using the

data collected from the Kitchen Space Evaluation Form for the instrument How to Score Kitchen Plans.

#### Data Analysis

Percentage and frequency counts were calculated to show the mean dimensions from the Kitchen Space Evaluation Form. The data from the second instrument How to Score Kitchen Plans were used to show the mean of the two sections from the rating scale. The actual dimensions related to kitchen space from the Kitchen Space Evaluation Form were contrasted with the first section of How to Score Kitchen Plans.

## CHAPTER IV

### RESULTS

The purpose of this study was to determine if the space in two-bedroom condominium kitchens' work centers and their provisions for equipment met or exceeded the recommended minimum standards according to selected kitchen design criteria. The objectives were to evaluate twenty condominium kitchens with an instrument developed by the researcher and to score the kitchens using a second instrument developed by the Small Homes Council (1975).

#### Kitchen Space Evaluation Form

The Kitchen Space Evaluation Form (KSEF) was used to evaluate 20 two-bedroom condominium kitchens. The three categories used in the KSEF were: the general description of the condominium, provisions for equipment, and actual dimensions of the condominium kitchen.

#### How to Score Kitchen Plans

A second instrument developed by the Small Homes Council (1975) called How to Score Kitchen Plans (HSKP) was also used for this study. Using the instrument HSKP, components of the condominium kitchen were rated and assigned a score which should be an indicator of the kitchen's efficiency. The first section of the instrument



was related to storage and counter space and the second with kitchen arrangement and safety.

#### Description of the Condominiums

Twenty two-bedroom condominiums were evaluated for this study. Shown in Table 1 is the specific listed selling price of the condominium. This price was found by asking the condominium manager or salesman. The price ranged from \$60,950.00 to \$124,950.00. The mean price was \$79,525.00. The size of the condominiums ranged from 840 to 1,708 square feet. The mean was 1,140 square feet.

Table 1  
 SIZE AND PRICE RANGE OF CONDOMINIUMS

Square footage	\$60-69	\$70-79	\$80-89	\$90-99	\$100-150 <sup>a</sup>
840	X				
902		X			
921	X				
925		X			
935	X				
990	X				
1000	X				
1001	X				
1008			X		
1098			X		
1104	X				
1185				X	
1200	X				
1259			X		
1268		X			
1270		X			
1270					X
1454			X		
1454					X
1708					X

N = 20

<sup>a</sup> In thousands

Median Square footage = 1101

Median Price = \$74,450.00

Description of the Condominium Kitchens

Listed in Table 2 are data about the different types of floor plans or shapes and their occurrence. Five different floor plan shapes; the 'U', the 'L', the one-wall, the two-wall or corridor, and the island were found in the kitchens.

Table 2  
KITCHEN FLOOR PLANS

Shape	Occurrence	Percentage
'U'	1	5
'L'	2	10
One-wall	0	0
Two-wall	16	80
Island	1	5

N = 20

Kitchen Dimensions

The recommended minimum size of a kitchen in a two-bedroom home is 100 square feet. Of the kitchens evaluated, 95% were below the minimum standard. The mean size of the condominium kitchens was 76 square feet (Table 3).

Table 3  
KITCHEN DIMENSIONS

Space	Occurrence			Percentage			Minimum	Mean
	*BM	M	AM	BM	M	AM		
Square footage of kitchen	19	0	1	95	0	5	100'	76'
Sink to range	15	0	5	75	0	25	4'	3'6"
Range to ref. <sup>1</sup>	3	2	15	15	10	75	4'	4'9"
Ref. to sink	1	0	19	5	0	95	4'	5'3"
Sum of work triangle	3	1	16	15	5	80	12'	14'
Traffic flow	17	0	3	85	0	15	48"	45"

N = 20

\* BM = Below Minimum; M = Minimum; AM = Above Minimum  
<sup>1</sup> Refrigerator

### Work Triangle

The three points of the work triangle are formed by the sink, the range, and the refrigerator. The recommended minimum distance between each appliance is four feet. The circumference of the work triangle is twelve feet and should not exceed the maximum of twenty three feet. Also shown in Table 3 are the data pertaining to the work triangle. In 80% of the kitchens evaluated, the work triangle exceeded the recommended minimum circumference.

The mean dimension for the work triangle was 14 feet. Note the distance between each of the work centers, between the sink and the range, the dimension was below the recommended minimum while between the sink and the refrigerator the dimension was above the minimum.

#### Traffic Flow

Also shown in Table 3 is data pertaining to the traffic flow or the space between cabinets or appliances that are opposite each other. This distance is recommended to be a minimum of 48 inches. Seventeen of the kitchens were below this minimum.

#### Provisions for Equipment

Data were collected pertaining to the number and location of useable electrical outlets which would facilitate the use of appliances on the counter tops. Only those outlets above the counter tops were counted. The number and location of the useable electrical outlets found in the condominium kitchens are listed in Table 4. Twelve of the twenty condominium kitchens had four above-the-counter top outlets. Some of the larger kitchens had fewer outlets than the smaller kitchens. The mean number of outlets per condominium kitchen was 3.65.

Table 4

## NUMBER AND LOCATION OF USEABLE ELECTRICAL OUTLETS

Condo Sq.Ft.	Kit Sq.Ft.	Number	Located near:		Ref.	Other
			Sink	Range		
840	61	4	2	1	1	0
902	75	4	2	1	1	0
921	65	3	2	0	1	0
925	61	4	2	1	1	0
935	92	5	2	1	1	1
990	82	4	2	1	1	0
1000	52	3	2	1	0	0
1001	54	3	2	0	1	0
1008	63	3	1	1	1	0
1098	76	5	3	1	1	0
1104	84	2	1	1	0	0
1185	67	4	2	1	1	0
1200	67	4	2	1	1	0
1259	73	4	2	1	1	0
1268	68	1	1	0	0	0
1270	62	4	2	1	1	0
1270	72	4	2	1	1	0
1454	71	4	2	1	1	0
1454	71	4	2	1	1	0
1708	194	4	2	1	1	0

N = 20

### Equipment and Appliances

The equipment and appliances included in this study were a sink, range, refrigerator, garbage disposer, trash compactor, microwave oven, and fire extinguisher. Shown in Table 5 is the occurrence of each piece of equipment in the kitchens evaluated. Of the kitchens evaluated, 19 had a double bowl sink with a garbage disposer. All the kitchens had electric ranges with a self-cleaning feature. Built-in microwave ovens were in 18 of the kitchens evaluated one kitchen had a portable microwave oven in a cabinet next to the range. Each kitchen had a frost free refrigerator and ice maker. All twenty kitchens had a dishwasher located in the preparation center. One kitchen had a trash compactor and none had a fire extinguisher.

Table 5  
KITCHEN EQUIPMENT AND APPLIANCES

Equipment or Appliance	Occurrence	Built-in	Portable
Dishwasher	20	20	0
Fire Extinguisher	0	0	0
Garbage Disposer	20	20	0
Microwave oven	19	18	1
Range	20	20	0
Refrigerator	20	20	0
Sink	20	20	0
Trash compactor	1	1	0

N = 20

#### Safety Features of the Kitchen

Certain features of a kitchen are important to safety. Door swings, protection of walls next to the range, and the location of the range in relation to windows were features observed in this study. Information about these features are shown in Table 6. The work triangle should not be interrupted by any door swing from an appliance or cabinet. Neither should the work triangle be interrupted by a door for another traffic pattern. The placement of the range is



also an important safety feature in a kitchen. A range should be placed at least 12 inches from a window and have  $\frac{1}{4}$ " abestos or another fireproof material on the wall behind it for fire protection. The door swing of an appliance or cabinet interrupted the work triangle in 15 of the twenty kitchens. The work triangle was interrupted by another traffic pattern in 2 of the kitchens. Nine of the kitchens had some form of fire protected walls next to the range and in each kitchen the placement of the range was 12 inches from a window.

Table 6  
OCCURRENCE OF KITCHEN SAFETY FEATURES

Kitchen Feature	Occurrence		Percentage	
	Yes	No	Yes	No
Work triangle interrupted by a cabinet or door swing	15	5	75	25
Work triangle interrupted by a door for another traffic pattern	2	18	10	90
Fire protected wall by range	9	11	45	55
Range 12 inches from window	20	0	100	0

N = 20

### Dimensions of Work Spaces

The work spaces consist of the base cabinets, wall cabinets, counter tops, and storage areas in the kitchen. Each area is measured for the total area of storage space.

#### Base and Wall Cabinets

The recommended dimension for base cabinets is 36 inches high and 24 inches deep. All cabinet manufacturers use this standard measurement. The height and depth of the base cabinets in each condominium kitchen were the standard dimensions of 36 inches high and 24 inches deep.

Wall cabinets, however, vary in height and sometimes in depth. Wall cabinets range in depth from 12 to 13 inches. Seventeen of the kitchens were below this minimum with a measurement of 11 inches. The height of wall cabinets vary according to their location. The recommended minimum height from the floor to the first shelf of a wall cabinet above the counter top is 54 inches; above the sink is 60 inches; and above the range is 60 inches. Results listed in Table 7 show that 14 of the kitchens were below the recommended minimum standard of the wall cabinet over the counter top; above minimum in 18 of the kitchens over the sink; and above the minimum over the range in each kitchen.

Table 7  
MINIMUM HEIGHT AND DEPTH OF WORK SPACES

Work Spaces	Occurrence			Percentage			Minimum	Mean
	*BM	M	AM	BM	M	AM		
Base cabinet depth	0	20	0	0	100	0	24"	24"
Base cabinet height	0	20	0	0	100	0	36"	36"
Wall cabinet depth	17	3	0	85	15	0	12"	11"
Wall cabinet height above:								
counter top	6	14	0	30	70	0	54"	53½"
sink	2	0	18	10	0	90	60"	60"
range	0	0	20	0	0	100	60"	71"

N = 20

\* BM = Below Minimum; M = Minimum; AM = Above Minimum

#### Work Center Surfaces

The four primary work centers are the preparation center, the cook center, the cold storage center, and the mixing center. The first three work centers have the three major appliances in them - the sink, the range, and the refrigerator. Located in the mixing center are usually the smaller appliances and equipment used for preparing food. According to the kitchen design criteria (Appendix A),

each work center should have a minimum number of linear counter top inches. The preparation center which consists of the sink and usually the dishwasher should have a minimum of 24 linear inches of counter top on the right side of the sink and 21 linear inches on the left. In the kitchens evaluated, 40% met the criteria for the right side of the preparation center and 10% met the criteria for the left. The cook center which includes the range is recommended to have 18 linear inches of counter top on both sides of the range. Results in Table 8 show that 30% of the kitchens met the right side requirement and 20% met the left side. The cold storage center consists of the refrigerator and the 15 inches of counter top beside the latch side of the refrigerator. Of the kitchens evaluated, 10% met this criteria. The fourth center is the mixing center. Thirty-six linear inches of continuous counter top space should be provided somewhere in the kitchen, usually between one of the other primary work centers. This space cannot include the space allocated to the other centers but can be continuous within. Results showed 90% of the kitchens evaluated were below this criteria (see Table 8).

Table 8  
WORK CENTER SURFACES

Work Center	Occurrence			Percentage			Minimum	Mean
	*BM	M	AM	BM	M	AM		
Preparation center								
right side	4	8	8	20	40	40	24"	25½"
left side	7	2	11	35	10	55	21"	21"
Cook center								
right side	7	6	7	35	30	35	18"	19"
left side	11	4	5	55	20	25	18"	15"
Cold storage center	16	2	2	80	10	10	15"	8"
Mixing center	18	0	2	90	0	10	36"	14"

N = 20

\* BM = Below Minimum; M = Minimum; AM = Above Minimum

### Storage Space

The total amount of linear storage frontage is a measurement of the total base, wall, and counter top frontages. The total amount of linear storage frontages is presented in Table 9. Three storage frontages were evaluated: the base cabinet, the wall cabinet, and the counter top. The recommended minimum linear frontage for the base cabinets is 72 inches. Results showed that 60% fell below this criteria of base cabinet frontages. The

recommended minimum linear frontage for the wall cabinets is also 72 inches. Results showed that 95% of the kitchens evaluated were above this minimum. The recommended minimum linear frontage for the counter tops is 132 inches. All but seven kitchens were below this storage criteria.

Table 9

## LINEAR STORAGE FRONTAGES

Storage Space	Occurrence			Percentage			Minimum	Mean
	*BM	M	AM	BM	M	AM		
Base cabinet frontage	12	0	8	60	0	40	72"	69"
Wall cabinet frontage	1	0	19	5	0	95	72"	128"
Counter top frontage	13	1	6	65	5	30	132"	102"

N = 20

\* BM = Below Minimum; M = Minimum; AM = Above Minimum

Results from How to Score Kitchen Plans

Data collected using the Kitchen Space Evaluation Form (KSEF) were also used to supply information for the second instrument How to Score Kitchen Plans, (HSKP, Small Homes Council, 1975). Each component in the section of storage and arrangement were given a weighted point according to the relationship of the total size of the home. After each

section was completed, the sum was rated on the following scale: Excellent 96-100, Good 92-95, Fair 85-91, and Poor 84 or less. This procedure was done for each of the twenty condominium kitchens that were evaluated using the instrument KSEF.

### Section I: Storage and Counter Space

The first section of How to Score Kitchen Plans (HSKP) was related to storage and counter top space. The nine dimensions included:

1. Total base-cabinet frontage
2. Total wall-cabinet frontage
3. Length of counter next to the refrigerator
4. Length of counter next to right side of sink
5. Length of counter next to left side of sink
6. Length of counter next to range
7. Length of counter next to oven
8. Length of counter frontage for mixing.
9. Total length of counter frontages.

Items 26, 27, 28, 29, 30, 31, 38, 39, and 40 from the KSEF were used to supply the above information.

### Section II: Arrangement

Items 10 through 25 of HSKP were related to storage, counter, appliances, activity space, windows, and safety.

Items 11d., 16, 18, 19, 20, 21, 23, 24, and 25 from HSKP could be answered using the KSEF (see Appendix B and C).

Shown in Table 10 are the results for each section evaluated using the instrument How to Score Kitchen Plans. Shown is the overall rating of the kitchens according to the rating scale of the instrument. Eighteen kitchens were rated poor according to the scoring system. One kitchen with a score of 92 was rated good and one with a score of 86 rated fair. Thirteen kitchens were also rated poor in Section II. Seven kitchens however, were rated fair. The mean rating for Section I was 56 and the mean for Section II was 82.

Table 10  
KITCHEN RATINGS

Rating	Section I Storage and Counter Space	Section II Arrangement
Excellent	0	0
Good	1	0
Fair	1	7
Poor	18	13
Mean	56	82

N = 20



### Discussion

This research provided baseline data on a relatively new subject, condominium kitchen design. Two instruments were used for this study. Data from the Kitchen Space Evaluation Form revealed whether the actual measurements met or exceeded the recommended minimum standards of the kitchen design criteria. Using instrument 2, How to Score Kitchen Plans, a rating for the kitchens ranging from excellent to poor was derived.

Although the most expensive condominium was \$124,950. and was 1,708 square feet, its kitchen was the largest at 194 square feet. Whereas the smallest condominium was 840 square feet and was \$60,950. the kitchen was 61 square feet. Overall there seemed to be no correlation between condominium size and price compared to the size of the kitchen.

The kitchens evaluated averaged 76 total square feet. Previous research has also shown the kitchen to be small in size according to the homemakers' feelings (Cooper and Sims, 1978; Steidl, 1981; Walker and Woods, 1976). A recommended size for the kitchen of a two-bedroom home is 100 square feet (Appendix A). It is assumed that other space requirements in the kitchen may also be below their recommended minimum standards. The other space

requirements are the work triangle, traffic flow, storage, and counter top frontage..

Many of the kitchen design references (Appendix A) recommend the work triangle to be from a minimum of 12 feet to a maximum of 23 feet. The more liberal this measurement, usually the larger the kitchen. Results showed that the mean for 80% of the work triangles was 14 feet which is 2 feet above the recommended minimum. This dimension is rather small and intereferes with the work spaces and the traffic flow. Steidl (1981) found a significant association of homemakers' increased effort with the inadequate amount of space in the kitchen. Steidl (1981) also noted homemakers felt their kitchens were only comfortable for one and awkward if people walked through them. This resulted from inadequate space in the traffic flow. The traffic flow is the space between the appliances and counters opposite each other. The kitchen design references (Appendix A) recommend this distance to be 48 inches. The results from this study revealed a 45 inch average traffic flow. This is a small allowance especially when today many couples now prepare food together in the kitchen.

Base cabinets and wall cabinets are considered storage space in all kitchens. The kitchen design references

(Appendix A) all agree that there should be an adequate amount of storage space in each of the four work centers. The amount of storage though varied in each reference. The recommended minimum amount of storage frontage used in this study was 72 inches for both base and wall cabinets. Results showed that 60% of the base cabinets were below the minimum while 95% of the wall cabinets were above the minimum standards. This difference could have resulted from the many base cabinet appliances such as the range, dishwasher, trash compactor, and the cabinet below the sink. Cooper and Sims (1978) reported 24.75 linear feet of base and wall cabinet in their study of condominium kitchens as a major problem of the homemakers. Their measurement was above the present study's by almost 72 inches. The total counter top frontage recommendations from the kitchen design references (Appendix A) ranged from 50 to 72 inches. In this study 132 inches was used as the total counter top frontage because the researcher felt that if minimum standards were required for each of the four work centers with specific measurements then the sum of the minimum work centers should also be the total counter top frontage. Results showed that 65% of the condominium kitchens evaluated were below the minimum of 132 inches. According

to these figures it can be inferred that not enough work space in the kitchen for ease of meal preparation.

Electrical outlets were also counted in the condominium kitchens. It was assumed that with the rising availability of small counter top appliances, that designers and builders would be increasing the number of electrical outlets in the kitchen. The mean number of outlets found in this study was 3.65. Ehrenkranz and Inman (1966), Keiser (1978), and Abbott (1982) all recommend at least one outlet in each work center or every four feet of wall space. This measurement should average to be approximately 4 to 5 outlets in the kitchen.

#### Comparision of Results from Both Instruments

Using instrument 2 HSKP (Small Homes Council, 1975) every kitchen but 2 were scored poor in section I. This however, should not be an indicator to determine the kitchens's efficiency. Looking at the results from instrument 1 KSEF, it can be noted that some of the kitchens were rated below minimum but these measurements were not always from being the minimum recommended dimension. Instrument 2 HSKP, gave the kitchen a score of '0' if it was below the recommended minimum. This in turn pulls down the total scoring. Those components that were scored very low consistently were the counter top

space by the refrigerator and the length of the mixing center. This low score is also reflected in the results from instrument 1 KSEF (see Table 11).

Section II reflects the results of the arrangement of the kitchen. Data was not collected from instrument 1 KSEF pertaining to items 10, 11, 12, 13, 14, 15, 17, and 23 from instrument 2, HSKP. These items from instrument 2 were given the maximum points possible because they were not applicable to the study. Item 18 was rated very low in both instruments. Item 18 was the traffic flow. The clearance between a base cabinet or appliance opposite each other were usually below the minimum. Of the twenty condominiums evaluated, 13 of the kitchens were scored poor.

The following aspects of kitchen design were not considered as a basis for scores in instrument 2, HSKP:

1) price of housing unit, 2) shape of the kitchen, 3) garbage disposer, 4) number of electrical outlets, 5) fire extinguisher, 6) square footage of kitchen, 7) individual dimensions of each leg of the work triangle, 8) width of all the appliances, 9) height of work spaces, and 10) depth of base and wall cabinets.

Table 11  
CORRESPONDING RESULTS FROM BOTH INSTRUMENTS

Section I		Measurement from Instrument 1 / Score from Instrument 2																			
Storage and Counter Space		Condominiums																			
Items:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		I1	I2	I1	I2	I1	I2	I1	I2	I1	I2	I1	I2	I1	I2	I1	I2	I1	I2	I1	I2
1. Total base cabinet frontage	*BM, 0 BM	0 BM	0 BM	0 BM	0 BM	0 AM	17 AM	17 BM	0 BM	0 BM	0 AM	17 BM	0 BM	0 BM	0 AM	12 BM	0 BM	0 AM	12 AM	12 AM	17
2. Total wall cabinet frontage	AM 17 AM	17 AM	17 AM	20 AM	17 AM	17 AM	17 AM	20 AM	12 AM	12 AM	12 AM	17 AM	17 AM	17 AM	17 AM	20 BM	0 AM	20 AM	20 AM	20 AM	20
3. Length of counter by refrigerator	BM 0 BM	0 BM	0 BM	0 BM	0 BM	0 BM	0 BM	0 BM	0 BM	0 BM	0 AM	5 M	5 BM	0 BM	0 BM	0 M	5 BM	0 BM	0 BM	0 AM	5
4. Length of counter by right side of sink	AM 10 AM	20 M	10 AM	10 M	10 M	10 M	10 BM	6 M	6 BM	0 M	6 AM	6 AM	10 BM	0 AM	6 AM	10 M	6 BM	6 M	3 M	3 AM	10
5. Length of counter by left side of sink	BM 0 AM	10 BM	0 BM	0 BM	0 BM	0 AM	10 BM	0 AM	10 BM	0 M	6 AM	10 BM	0 AM	10 AM	10 AM	6 BM	0 M	6 AM	10 AM	6 AM	10
6. Length of counter by right side of range	BM 5 BM	0 BM	0 BM	0 BM	5 AM	5 AM	5 AM	5 BM	0 M	5 M	5 AM	5 AM	5 BM	0 BM	0 M	5 M	5 AM	5 M	3 M	5 AM	5
7. Length of counter by left side of range	BM 5 BM	0 M	5 BM	5 BM	5 BM	5 BM	5 BM	5 BM	5 BM	0 M	5 BM	0 BM	0 BM	0 BM	0 AM	5 AM	5 BM	0 M	5 AM	5 AM	5
8. Length of counter by mixing center	BM 0 BM	0 BM	0 BM	0 BM	0 BM	0 AM	10 BM	0 BM	0 BM	0 BM	0 BM	0 BM	0 BM	0 BM	0 BM	0 AM	0 AM	7 BM	0 BM	0 BM	0
9. Total length of all counter spaces	BM 18 BM	18 BM	18 BM	18 BM	0 AM	18 AM	18 BM	0 BM	0 BM	0 M	18 BM	13 AM	18 BM	0 BM	0 BM	0 BM	0 AM	7 BM	0 AM	18 AM	18

N = 20  
\* BM = Below Minimum; M = Minimum; AM = Above Minimum

When evaluating a kitchen for efficiency and function, Instrument 1, Kitchen Space Evaluation Form, would give more specific complete data of a kitchen than instrument 2, How to Score Kitchen Plans. HSKP may better be used for those who are planning a kitchen to determine if the major components of storage and arrangement have been met.

## CHAPTER V

### SUMMARY AND RECOMMENDATIONS

#### Introduction

The literature reviewed indicated that homemakers were not satisfied with many aspects of their kitchens. Some of the major criticisms were: lack of storage, lack of counter top space, and undersized kitchens.

#### Purpose and Objectives

The purpose of this study was to determine if space in two-bedroom condominium kitchens' work centers and provisions for kitchen equipment met or exceeded the recommended minimum standards according to selected kitchen design references. The objectives were to: 1) identify the selected kitchen design criteria, 2) develop a kitchen evaluation instrument based on the identified criteria, 3) evaluate 20 two-bedroom condominium kitchens to determine if the work center space and equipment provisions met or exceeded the recommended minimum standards according to the kitchen design references, 4) evaluate the condominium kitchens using the scoring instrument How to Score Kitchen Plans (Small Homes Council, 1975), and 5) compare the results from both instruments.



### Summary of Literature Review

There is an apparent lack of recent kitchen design research. Past studies have reported homemakers' attitudes toward their kitchens. These results indicated that changes in kitchen design are needed. According to the kitchen design criteria chart compiled for this research project, (Appendix A) kitchen designs have not changed to reflect the changing needs of user of the kitchen. The increased use of small appliances in the kitchen, increased interest in entertainment, and more dual career families the kitchen and their standards should either be changed to meet the standards or new space allocations should be developed.

### Summary of Findings

Although a 'U' or 'L' shape kitchen is recommended for maximum efficiency and function, all but four of the kitchens evaluated had two-wall floor plans. Lack of storage, counter top space, and undersized space in the condominium kitchens evaluated for this research project are consistent with problems identified in earlier research. The counter top beside the refrigerator was one of the major kitchen components that were below the recommended minimum standard. The mixing center space also was below minimum. Rarely was adequate space provided for the mixing center.

Almost every kitchen contained the major appliances that kitchen users ordinarily want with the exception of a trash compactor. The number of electrical outlets was low in contrast to what consumers use for small equipment.

In general, the researchers criteria for a two-bedroom condominium were not met in most instances. Perhaps an analysis of existing standards and what is being built should be investigated or revised to reflect the changing lifestyles and the increase cost of housing. Or some consideration should be given to the amount of space allocated to the kitchen and the amount of useable space in the condominium.

### Recommendations

Based on the results of this study possibilities for further research and suggestions for builders and designers have been identified.

#### Recommendations for research:

- 1) Compare kitchen user types to the quality of the kitchen by evaluating the standards with whats available.
- 2) Evaluate the condominium size and space allocated to the kitchen work centers to single-family separate detached dwelling kitchens and mobile home kitchens.
- 3) Describe the choice of placement of the microwave oven in relation to the work centers.

4) Evaluate kitchens in a higher or lower price range condominium.

5) Compare relationship between the kitchen evaluation rating and user satisfaction.

6) Compare space allocation of kitchen to other spaces in the home such as the sleeping area and social area.

7) Evaluate or update criteria materials related to kitchen design.

Recommendations for builders and designers:

1) Design kitchens using the recommendations from this research or combined with the HUD minimum property standards.

2) Design kitchens to incorporate more electrical outlets, more quality storage, larger space, and more work surface areas.

## APPENDICES

APPENDIX A  
KITCHEN DESIGN CRITERIA CHART

KITCHEN DESIGN CRITERIA	KITCHEN DESIGN REFERENCES															
	Abbott, 1982	Agan, 1948	Am. Pub. Health Ass. Hygiene of Housing, 1950	Avery and Null, 1976	DeChiara and Kappelman, 1975	Designing Kitchens for Safety, 1974	Ehrenkranz and Imman, 1966	Ext. Housing & Home Furn. Spec., 1980	HUD Min. Standards, 1973	Keiser, 1978	SHC, Handbook of Kitchen Design, 1950	SHC, Kitchen Ind. Tech Manual, 1975	SHC, Kitchen Planning Standards, 1964	Steidl and Bratton, 1968	House & Home Kitchen Plan. Guide, 1978	Synthesized Criteria to be used for this study, 1982
Square footage of kitchen	-	100	76	100	60	-	-	100	-	-	-	-	-	-	100	100
Distance from sink to range	-	-	-	4-6	-	-	-	4-6	4-6	5	4-6	-	-	-	4+	4
Distance from range to refrigerator	-	-	-	4-9	-	-	-	4-9	4-9	5	4-9	-	-	-	4+	4
Distance from refrigerator to sink	-	-	-	4-7	-	-	-	4-7	4-7	5	4-7	-	-	-	5-8	4
Total Work Triangle	13-22	-	-	12-22	-	-23	-23	12-26	12-23	15-22	12-22	-	-23	-	13-22	12-23
Traffic Flow	-	48	48	48-60	-	48	-	48-60	48	40-48	48	48-60	48	-	48-64	48
Width of sink	-	-	30	30-36	-	-	-	24-42	24	24-30	24-36	24-42	24-36	-	21-33+	24-33
Width of range	-	-	12 sqft	21-42	-	-	-	30-48	30	30	42	30-48	30	-	24-36	30
Width of refrigerator	-	-	11 sqft	30-36	-	-	-	30-42	36	32	36	30-42	36	-	30-42	30
Width of dishwasher	-	-	-	24-30	-	-	-	24-27	24	24	-	24-27	-	-	24	24
Width of trash compactor	-	-	-	-	-	-	-	14-18	-	15	-	15-18	-	-	15-18	14
Width of microwave oven	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24-30	24-30
Depth of base cabinet	-	-	-	24	24	24	24	24	24	24	-	24	24	24	24	24
Depth of wall cabinet	-	-	-	12	4-18	12	13	12-13	12	12	-	12-15	12	-	12	12
Length of Work Centers: Preparation right side	24	36	36	36	-	-	36	24-32	21	21-24	36	24-36	24	36-42	30	24
Preparation left side	18	32	32	30	-	-	30	21-30	21	21-24	30	18-30	18	18-42	30	21
Cook center right side	15	-	21	15-24	-	18	21-24	21-30	18	15-15	24	15-24	15	21	24	18
Cook center left side	12	-	-	15-24	-	18	-	15-18	18	18-24	-	12-18	15	24	12	18
Cold storage	15	-	15	15-18	-	15	15-18	15-18	15	15	15	15-18	15	18	15-18	15
Mixing	36	36	-	36	-	36	39-42	36-42	36	33-36	36	36-42	36	36-42	36-48	36
Height of base cabinet	-	-	-	36	30-38	-	36	36	36	36	-	36	36	36	36	36
Height of wall cabinet over counter top	-	-	-	54	-	51	-	54	51	51	-	51	51	-	51	54
over sink	-	-	-	60	-	-	-	60	60	-	-	54	-	-	60	60
over range	-	-	-	60	-	-	-	60	60	-	-	54	-	-	60	
Total linear base cabinet frontage	-	-	60	-	-	-	-	70	52	-	30	72-120	72	-	55	72
Total linear wall cabinet frontage	-	-	60	-	-	-	-	70	52	-	30	72-120	72	-	55	72
Total linear counter top frontage	-	-	-	-	-	-	-	-	-	-	-	72-109	72-109	-	-	132

APPENDIX B  
KITCHEN SPACE EVALUATION FORM

Developed by Cindy Czeschin, 1982  
Texas Woman's University  
Department of Home Economics Education and Consumer Sciences

KITCHEN SPACE EVALUATION FORM

The purpose of this evaluation form is to collect actual dimensions of two-bedroom condominium kitchen spaces in the work centers and the provisions made for equipment and determine the extent to which the condominium kitchen meets or exceeds the recommended minimum kitchen standards according to the criteria from the kitchen design references.

THE CONDOMINIUM

1. Name and location of the condominium being evaluated

\_\_\_\_\_

2. Total square footage of the condominium \_\_\_\_\_

3. Listed selling price of the condominium \_\_\_\_\_

4. Check which style or shape the kitchen represents:

a. L shape _____	c. One-wall _____	e. Island _____
b. U shape _____	d. Two-wall _____	f. Floor plan _____
	attached	Yes _____ No _____

PROVISIONS FOR EQUIPMENT

5. A complete garbage disposer Yes \_\_\_\_\_ No \_\_\_\_\_

6. Number of electrical outlets available above counter top

\_\_\_\_\_

7. Number of windows in the kitchen \_\_\_\_\_

8. Square footage of window area \_\_\_\_\_

9. Is the work triangle interrupted by a door for another traffic pattern? Yes \_\_\_\_\_ No \_\_\_\_\_

10. Do any door swings from appliances or cabinets interfere with the work triangle or entrance? Yes \_\_\_\_\_ No \_\_\_\_\_



11. Is the range at least 12" from a window? Yes \_\_\_ No \_\_\_
12. Is proper fire protection given for the wall and cabinets above the range? Yes \_\_\_ No \_\_\_
13. Is a fire extinguisher supplied as equipment? Yes \_\_\_ No \_\_\_

### ACTUAL DIMENSIONS

The figures recorded should reflect actual dimensions. Use the following key to compare actual dimensions with the kitchen design criteria given: KDC = Minimum Kitchen Design Criteria; BM = Below Minimum; M = Minimum; AM = Above Minimum.

SPACE	KDC	ACTUAL DIMENSION	BM	M	AM
<u>SQUARE FOOTAGE</u>					
14. Total wall to wall square footage of kitchen.....	100'	_____	___	___	___
15. Distance from center of sink to center of range.....	4'	_____	___	___	___
16. Distance from center of range to center of refrigerator.....	4'	_____	___	___	___
17. Distance from center of refrigerator to center of sink.....	4'	_____	___	___	___
18. Sum of the work triangle total of 15, 16, and 17.	12'	_____	___	___	___

SPACE	KDC	ACTUAL DIMENSION	BM	M	AM
<u>TRAFFIC FLOW</u>					
19. Distance of floor space between appliances or cabi- nets opposite of each other.....	48"	_____	___	___	___
<u>WIDTH OF APPLIANCES</u>					
20. Sink, single bowl....	24"	_____	___	___	___
double bowl....	33"	_____	___	___	___
21. Range.....	30"	_____	___	___	___
22. Refrigerator.....	30"	_____	___	___	___
23. Dishwasher.....	24"	_____	___	___	___
24. Trash Compactor.....	14"	_____	___	___	___
25. Microwave oven, port. built-in...	24"	_____	___	___	___
<u>LENGTH OF WORK SURFACES</u>					
26. Preparation center right side....	24"	_____	___	___	___
27. left side....	21"	_____	___	___	___
28. Cook center right side....	18"	_____	___	___	___
29. left side....	18"	_____	___	___	___
30. Cold Storage center one side.....	15"	_____	___	___	___

SPACE	KDC	ACTUAL DIMENSION	BM	M	AM
31. Mixing center one side.....	<u>36"</u>	_____	—	—	—
<u>HEIGHT OF WORK SPACE</u>					
32. Height of counter tops from floor.....	<u>36"</u>	_____	—	—	—
Height from floor to bottom shelf of wall cabinet over a center					
33. Over sink.....	<u>60"</u>	_____	—	—	—
34. Over counter top.....	<u>54"</u>	_____	—	—	—
35. Over range.....	<u>60"</u>	_____	—	—	—
<u>STORAGE</u>					
36. Depth of base cabinet	<u>24"</u>	_____	—	—	—
37. Depth of wall cabinet	<u>12"</u>	_____	—	—	—
38. Total base cabinet frontage.....	<u>72"</u>	_____	—	—	—
39. Total wall cabinet frontage.....	<u>72"</u>	_____	—	—	—
40. Total amount of counter to frontage..	<u>132"</u>	_____	—	—	—

COMMENTS:

## APPENDIX C

### HOW TO SCORE KITCHEN PLANS

## HOW TO SCORE KITCHEN PLANS \*

This scoring system, based on recommended principles, has been devised by the Small Homes Council as a guide for judging kitchen designs. The standards are adaptable to any residential kitchen using conventional storage cabinets. Although most of the principles set forth are applicable in large houses, it is not the intent of this scoring system to analyze custom kitchens. In order to make fair judgments it is important to recognize that some planning faults are more serious than others. The points assigned to each factor below have been weighted accordingly. All of the requirements of Part II of the scoring system are not applicable in every kitchen arrangement. When a requirement does not apply, score the maximum number of points to avoid penalizing a kitchen unnecessarily. The liberal kitchen is desirable in a large house, but may be an extravagant use of space in a small house. Therefore, several items in the scoring system have three separate ratings to evaluate the kitchen according to the total house area.

The scoring system is divided into two parts. Part I is used to evaluate the amount of storage and counter space. Part II is used to evaluate the arrangement of such space.

### RATING

Excellent	96-100
Good	92-95
Fair	85-91
Poor	84 or less

### \* Researchers Note

This instrument developed by the Small Homes Council (1975) was re-typed to fit the guidelines for this research project. The content has not been changed and permission to use the instrument was obtained.

PART I Storage and Counter Space

Find your score from the  
tables at left, and enter  
points here

POINTS

STORAGE

1. Total base-cabinet frontage  
Cabinets must have at least one drawer and two shelves not less than 20 inches deep. Drawers are preferable to shelves.  
  
Include: Storage below built-in surface unit and below built-in oven if the storage space is at least 20 inches high.  
Each inch of frontage in a full-height storage wall at least 20 inches deep as equal to two inches of base cabinet.

Do not include: Cabinet space under sink.

Drawers in ranges.

Corner cabinets with stationary shelves.

House size	less than 72"	72" to 95"	96" to 119"	120" or more
less than 1,000 sq.ft.	0	17	17	17
1,000-1,400 sq.ft.	0	12	17	17
over 1,400 sq.ft.	0	7	12	17

2. Total wall-cabinet frontage  
Cabinets must have 3 or more shelves at least 10 inches deep.

Include: Each inch of frontage in a full-height storage wall at least 12 inches deep as equal to two inches of wall cabinet

Do not include: Cabinets over ranges, refrigerators, built-in ovens, and sinks.

Corner cabinets with stationary shelves.

House size	less than 72" to 96" to 120" to 144" to 168"				
	72"	95"	119"	143"	167" or more
less than 1,000 sq.ft.	0	17	17	20	20
1,000-1,400 sq.ft.	0	12	17	17	20
over 1,400 sq.ft.	0	7	12	17	20

#### Counter Frontage

The "length of counter" refers to the total frontage for a section of counter that extends between appliances or that extends from an appliance to the end of the counter. This may be the combined frontage of a continuous counter on two adjoining walls.

The frontage of any section of counter can be scored for more than one of the following needs.

- Length of counter frontage adjacent to the latch side of the refrigerator \_\_\_\_\_ inches
 

House size	less than 15"	15" to 17"	18" or more
less than 1,000 sq.ft.	0	5	5
1,000-1,400 sq.ft.	0	5	5
over 1,400 sq.ft.	0	2	5
- Length of counter frontage to the right of the sink bowl\*\* \_\_\_\_\_ inches
 

House size	less than 24"	24" to 29"	30" to 35"	36" or more
less than 1,000 sq.ft.	0	10	10	10
1,000-1,400 sq.ft.	0	6	10	10
over 1,400 sq.ft.	0	3	6	10

5. Length of counter frontage to the left of the sink bowl**					_____ inches
House size	less than 18"	18" to 23"	24" to 29"	30" or more	
less than 1,000 sq.ft.	0	10	10	10	
1,000-1,400 sq.ft.	0	6	10	10	
over 1,400 sq.ft.	0	3	6*	10	_____

\*If a dishwasher is used score 10 points.

\*\*These counter requirements assume a right-to-left dishwashing sequence.

6. Length of counter frontage to either side of the range or built-in surface unit.					_____ inches
House size	less than 15"	15" to 17"	18" to 23"	24" or more	
less than 1,000 sq.ft.	0	5	5	5	
1,000-1,400 sq.ft.	0	3	5	5	
over 1,400 sq.ft.	0	1	3	5	_____

7. Length of counter frontage to either side of oven.					_____ inches
House size	less than 15"	15" to 17"	18" or more		
less than 1,000 sq.ft.	0	5	5		
1,000-1,400 sq.ft.	0	5	5		
over 1,400 sq.ft.	0	2	5		_____

8. Length of counter frontage for mixing.					
House size	less than 36"	36" to 41"	42" to 47"	48" to 53"	54" or more
less than 1,000 sq.ft.	0	7	10	10	10
1,000-1,400 sq.ft.	0	7	10	10	10
over 1,400 sq.ft.	0	7	5	7	10



9. Total amount of counter frontage.					_____ inches
House size	less than 72"	72" to 95"	96" to 107"	108" or more	
less than 1,000 sq.ft.	0	18	18	18	
1,000-1,400 sq.ft.	0	13	18	18	
over 1,400 sq.ft.	0	8	13	18	
Total, Part I					_____

## PART II Arrangement

### STORAGE

10. Base Cabinet  
If there are at least 9 drawers or pull-out trays (one at least 24 inches wide and 12 inches deep with vertical pan dividers and another not more than 3 inches deep inside):  
score 3 points \_\_\_\_\_
11. Wall Cabinet
- a) If wall cabinets have adjustable shelves:  
score 4 points \_\_\_\_\_
  - b) If there are at least 42 inches of wall cabinets within 72 inches of the center front of the sink:  
score 3 points \_\_\_\_\_
  - c) If there are at least 72 inches of wall cabinets over the counter space:  
score 10 points \_\_\_\_\_
  - d) If the wall cabinets are at least 15 inches above the counter top and if the third shelf is no more than 72 inches above the floor:  
score 6 points \_\_\_\_\_

## COUNTER

12. If the length of the counter front between the edge of the sink and the corner of a counter is:  
at least 15 inches in a house larger than 1,400 sq.ft., or  
at least 9 inches in a house smaller than 1,400 sq.ft.

score 3 points

IF A KITCHEN HAS A SINK WITHOUT COUNTER SPACE ON EITHER SIDE, IT SHOULD BE RATED POOR

## APPLIANCES

13. If two or more of the primary work centers (sink, range-serve, refrigerator) adjoin each other: \_\_\_\_\_  
score 10 points

14. If the center front of a built-in dishwasher is not more than 72 inches from the center front of the sink: \_\_\_\_\_  
score 10 points

If a portable dishwasher is stored so that it does not interfere with usage of any cabinets or appliances: \_\_\_\_\_  
score 10 points

If there is no dishwasher, these requirements are not applicable, therefore: \_\_\_\_\_  
score 10 points

15. If no two work centers are separated by a tall appliance (refrigerator or built-in oven) or a full-height storage wall: \_\_\_\_\_  
score 6 points

16. If there is a double-bowl sink or a single-bowl sink and an automatic dishwasher (front opening) in a liberal or medium kitchen, or a single-bowl sink in a minimum kitchen: \_\_\_\_\_  
score 3 points

# ACTIVITY SPACE

17. Clearance to provide access between the front of a cabinet or appliance and the blank face of an assembly at right angles to it. inches

House size	less than 30"	30" to 33"	34" to 37"	38" or more	NA
less than 1,000 sq.ft.	0	6	6	6	6
1,000-1,400 sq.ft.	0	4	6	6	6
over 1,400 sq.ft.	0	2	4	6	6

18. Clearance for the work area between base cabinets or appliances opposite each other. The same clearance is required from a counter front to a table, wall, or face of a storage wall if the space is a work area. inches

House size	less than 48"	48" to 53"	54" to 59"	60" or more
less than 1,000 sq.ft.	0	6	6	6
1,000-1,400 sq.ft.	0	4	6	6
over 1,400 sq.ft.	0	2	4	6

19. If the length of the work triangle (sum of the distances between the center front of the sink, refrigerator, and the surface cooking unit) is:
  - less than 23 feet score 8 points
  - 23 to 26 feet score 4 points
  - more than 26 feet score 0 points

20. If the traffic from the front door or service entrance to the rest of the house does not cross the work triangle or there is an alternate route outside of the work triangle that does not conflict with other activities: score 6 points

21. If all doors including the refrigerator door swing so they do not interfere with the work area in front of counters or appliances: score 10 points  
 If only one door interferes score 5 points  
 If two or more doors interfere score 0 points

#### WINDOWS

22. If the total glass area in windows (widths times height) is at least 10% of the total floor area of the kitchen: score 6 points  
 If height of glass cannot be measured, assume 36 inches. If a wall of the kitchen opens into a dining or family room, the windows need not be in the kitchen, but they should equal 10% of the combined room area. Total

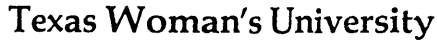
#### SAFETY

23. If the burners of the range or built-in surface units are arranged so that the pot handles over hang the front or side of the counter or extend over other burners: deduct 6 points
24. If the vertical clearance above the range or built-in cook top to cabinets is less than 30 inches or if the vertical clearance to cabinets protected with  $\frac{1}{4}$ -inch asbestos millboard covered either with sheet metal or a metal ventilating hood is less than 24 inches: deduct 15 points
25. If the range or built-in surface unit is below a window deduct 10 points  
 Total deductions

Final score Part II

Excellent	96-100	Fair	85-91
Good	92-95	Poor	84 or less

APPENDIX D  
CONSENT FORM



COLLEGE OF NUTRITION, TEXTILES, AND HUMAN DEVELOPMENT  
DEPARTMENT OF HOME ECONOMICS EDUCATION AND CONSUMER SCIENCES

This research study is being conducted through the Department of Home Economics Education and Consumer Sciences at the Texas Woman's University. The purpose is to measure actual dimensions of a kitchen to determine the amount of space and the provisions for equipment in the contemporary condominium. The final report will not identify any specific condominium.

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Condominium Manager
Date

Cindy Czeschin, Researcher Date

### 7.3

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