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OPEN AND STORAGE SPACE PREFERENCES OF FORTY HOMEMAKERS LIVING
IN RANCH TYPE HOUSES OF APPROXIMATELY 1,400 SQUARE FEET
IN THE PIEDMONT AREA OF NORTH CAROLINA

by

Sylvia Freeman Davis

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DAVIS, SYLVIA FREEMAN. Open and Storage Space Preferences of Forty Homemakers Living in Ranch Type Houses of Approximately 1,400 Square Feet in the Piedmont Area of North Carolina. (1964) Directed by: Dr. Clara A. Ridder. pp. 99.

After living in a house, a family often finds that some spaces for living and for storage are inadequate while other spaces could be reduced. The purpose of this study was to determine how homemakers would reapportion the amount of living space and storage space provided for the different rooms in the house in which they live.

House plans chosen for study ranged from 1,293.84 to 1,571.14 square feet. Excluding the space for walls, the floor space ranged from 1,118.57 to 1,322.82 square feet. Each plan had ten different rooms or areas.

In order to test whether space preferences were consistent rather than due to individual idiosyncrasies, the study of each of the ten house plans was repeated four times with four different homemakers; thus, a total of forty interviews were made.

When suggesting changes, the homemakers were limited to the existing outside dimensions of their houses. Based on the preferences of the majority of the forty homemakers interviewed, the recommended storage, open, and total spaces were:

Room or Area	Suggested Space Allocations		
	Storage	Open	Total
		Square Feet	
Kitchen ^a	31.0	110.0	160.0
Dining-Family	9.0	180.0	189.0
Living	11.0	250.0	261.0
Master Bedroom	25.0	175.0	200.0
Second Bedroom	18.0	145.0	163.0
Third Bedroom	15.0	125.0	140.0
Main Bathroom ^b	5.0	26.0	52.0
Second Bathroom ^c	4.0	22.0	46.0
Hall ^d	18.0	110.0	133.0
Storage-Utility ^e	0.0	70.0	78.0

- ^aTotal includes app. 19 sq. ft. for kitchen appliances.
^bTotal includes app. 21 sq. ft. for bathroom fixtures.
^cTotal includes app. 20 sq. ft. for bathroom fixtures.
^dTotal includes app. 5 sq. ft. for furnace in 5 of the house plans.
^eTotal includes app. 8 sq. ft. for laundry equipment and hot water heater in 5 of the house plans.

In order to meet the needs of the majority, the recommended size of the house became slightly larger than 1,400 square feet, as some homemakers preferred more space in one room, some in another.

All of the forty homemakers wanted additional storage space in the house, though all did not suggest additional storage for the same rooms. The homemakers particularly desired a large amount of storage space in the kitchen, the master bedroom, the second bedroom, the hall, and the third bedroom.

The analysis of variance indicated that the homemakers could distinguish in which rooms or areas they felt storage was most important and in which rooms or areas they felt open space was most important. The analysis of variance also indicated that the results were not influenced by differences between the house plans or differences between the families.

It is recommended that similar studies of houses of various square footages be undertaken to determine preferences of homemakers for open spaces and for storage spaces. For example, a study of preferences of homemakers living in two story houses of approximately 1,400 square feet would be of interest. It may be that preferred locations and amounts of storage and open spaces would differ between one and two story houses of approximately the same size.

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CHAPTER I

INTRODUCTION AND PURPOSE

Introduction

Home building, America's oldest and biggest industry, is staking its future on America's youngest and smallest research program. Progress by chance and happenstance is a poor and unproductive substitute for progress by plan and design. Home building's future growth depends on the plan and design that only research can produce.(1:64)

When families move into new houses, they may be unaware of lacks in particular kinds of space allocations. The novelty of a different house may temporarily subordinate needs for space which may later become more apparent. After living in a house for a period of time, inadequacies in space allocations may be accepted or they may be intensified.

The need for well planned space has been pointed out by Pickett: technical guides for space planning and widespread understanding of the principles underlying the formulation of such criteria are essential if families are to acquire efficiently arranged space in their housing.(2:35)

Lack of mechanization in the area of home construction has contributed to the continued rise in the costs of housing. According to F. W. Dodge Corporation, building costs went up again in 1962 gaining approximately 200 per cent since 1939.(3:20)

While the costs of new houses have been mounting, the amount of space within the house has been decreasing. Today many families lack adequate space. As pointed out in Better Homes and Gardens, they need room--room for doing things together as a family, as well as room for

entertaining and room for outdoor living.(4:41) As pointed out in House and Home, how space is used is as important as amount of space. "You can't judge a house by its square footage--it's the accommodations that count."(5:69)

Previous research on space requirements recommend storage and living space needs for particular areas of the house. However, a small house may not permit all the recommendations and furthermore all may not be equally important. Homemakers who are living in small houses may be able to point up the living and storage requirements which they feel to be most important.

This study focuses on preferences for space allocations that forty homemakers would like to have in their respective houses, without increasing the over-all dimensions of the house.

Purpose

After living in a house, a family often finds that some spaces for living and for storage are inadequate while other spaces could be reduced. The purpose of this study was to determine how homemakers would reapportion the amount of living and storage space provided for the different rooms after having lived in the houses. An additional purpose was to determine the preferred relationships of rooms to one another and the preferred location of outside doorways. This information may provide a basis for suggesting the space allocations of houses planned and built in the future to better meet the needs of families.

It was possible the space preferences were influenced by differences between families, differences between rooms or areas, and differences between house plans. Therefore the following null hypotheses were to be tested:

1. There were no statistically significant differences between the families in the homemakers' preferences for storage space and for open space.
2. There were no statistically significant differences between the rooms or areas in the homemakers' preferences for storage space and for open space.
3. There were no statistically significant differences between the house plans in the homemakers' preferences for storage space and for open space.

The results of the study indicate that the homemakers' preferences for storage space and open space are not significantly different across the various rooms or areas of the house. This suggests that the overall layout and design of the house may be more important than the specific location of storage and open space.

The study also found that the homemakers' preferences for storage space and open space are not significantly different between the various house plans. This indicates that the overall design and layout of the house are more important than the specific details of the storage and open space. The results of the study suggest that the overall layout and design of the house are more important than the specific details of the storage and open space.

These findings have several implications for the design of new homes. First, they suggest that the overall layout and design of the house are more important than the specific details of the storage and open space. This means that designers should focus on creating a well-proportioned and functional overall layout rather than worrying about the specific details of the storage and open space.

CONCLUSION

The findings of this study indicate that the overall layout and design of the house are more important than the specific details of the storage and open space. This suggests that designers should focus on creating a well-proportioned and functional overall layout rather than worrying about the specific details of the storage and open space.

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CHAPTER II

REVIEW OF LITERATURE

Most of the research to date concerning the use of floor space in houses has been concerned with rural houses as it has been sponsored by the Agricultural Experiment Stations in Land Grant Colleges. Little research has been concerned with urban housing; therefore, the research reviewed is mainly concerned with rural housing.

Many of the studies on space planning were concerned with adequate size spaces since the size of the storage space and how planned determines to a large extent, the success of the small house plan. The importance of storage was indicated by Pollman, "storage is a basic essential living requirement, and in planning a house it should be considered second only to the structural and mechanical units.(6:273) Surveys have shown that one of the features of the small house that appealed most to the prospective buyer was "adequate space for storing those thousand and one items which the average family keeps in the home."(7:128)

Space requirements determined by research are summarized according to rooms or areas.

The Kitchen

The kitchen has been considered the core of most family activities-- indoor or outdoor, everyday and holiday.

Space needed for activities involved in meal preparation and service is related to the size of the people, their possessions, their customs,

and their habits of work. The kind and quantity of possessions is related to the socio-economic status, family size and the length of time a family has been organized.(8:4)

In a publication prepared by the Southern Regional Housing Committee, Planning Guides for Southern Rural Homes, the committee recommended limited and liberal amounts of space for counter widths in kitchens.(9:9)

COUNTER WIDTH REQUIREMENTS

Work Center	Counter widths	
	Limited	Liberal
	inches	
Mix		
Straightline	36	42
Between turn of counter and sink or range	24	36
Between turn of counter and refrigerator	28	36
Left of Sink		
Straightline	18	36
Between turn of counter and sink	6	18
Right of sink		
Straightline	24	36
Between turn of counter and sink	6	18
Range-serve, hot food		
Straightline	12	24
Between turn of counter and range	8	8
Refrigerator, serve, cold food		
Straightline	15	18
Between turn of counter and refrigerator	21	24

The dimensions of counter space as recommended by a similar North-eastern Committee in Farmhouse Planning Guides consists of minimum requirements for food preparation.(10:11)

MINIMUM COUNTER SPACE REQUIREMENTS FOR FOOD PREPARATION

Center	Minimum width inches
Refrigerator-at open side	15
Sink-no dishwasher	
at left side of bowl	32
at right side of bowl	36
Dishwasher-top opening	
if dish storage nearby	18
if dish storage elsewhere	33
-front opening	
if dish storage nearby	0
if dish storage elsewhere	18
Mix-free standing	36
adjacent to another center	28
Range	21
Serve-free standing	
for salad plates	28
for dinner plates	36

A study by Mize, Bland, Hood and Simons, Space Requirements and Designs for Baking Centers, reports that twenty to twenty-four inches of front linear space was the most frequently used work space.(11:22) The conventional depth is twenty-four inches; however, according to Heiner and McCullough, the maximum desirable depth of work surface in the kitchen is twenty inches. The additional four inches was generally used for counter storage of frequently used items.(10:11)

A study of 1,149 families in eleven western states revealed that 30 per cent would store more foods if they had more space.(12:14)

Planning Guides for Southern Rural Homes made the following recommendations for storing food supplies, dinnerware and glassware, and serving dishes:(9:34)

STORAGE OF FOOD SUPPLIES, DINNERWARE AND GLASSWARE AND SERVING SUPPLIES

Wall Storage Units	Limited	Liberal
	inches	
Glassware and mix supplies	46	58
Dinnerware and sink supplies	22	28
Glassware and sink supplies	25	37-1/2
Dinnerware and serve supplies	24	40-1/2
Glassware and serve supplies	30	36
Glassware, sink and serve supplies	33-1/2	..
Serving dishes, range supplies	17-1/2	31-1/2
Glassware without pitcher and sink supplies	19-1/2	19-1/2
Glassware without pitcher and serve supplies	27	30
Serving dishes and serve supplies	21	36-1/2
Pitchers and serve supplies	14-1/2	20-1/2
Glassware without pitcher, sink, and range supplies	30	39

Base Storage Units (Utensils)	Limited	Liberal
	inches	
Pots and pans--shelves	18--22-1/2	29-1/2--34-1/2
Pots and pans--shelves with drawers for tools	26	34-1/2
Pots and pans with mix utensils--shelves, drawers, files	48-1/2	71
Mix utensils and tools--shelves, drawers, files, or sliding shelves	22--29-1/2	39
Pots, pans, and fry pans--shelves, or sliding shelf	27--31-1/2	45
Fry pans and range tools--shelves and drawers	11	11
Fry pans and range tools--files and drawers	10	16
Fry pans and mix utensils--files and drawers	36	..
Fry pans and 2 saucepans	14	19
Saucepans	14--20	23--30
Saucepans	22-1/2--25-1/2	37-1/2--45-1/2

"The floor space required in front of the kitchen units is determined by the minimum clearance necessary in traffic lanes."(13:77) If thirty inches of free circulation are allowed for, one worker can

apparently move about with comfort. Space required for each of 230 women was reported in Space Standards for Household Activities. On the basis of these requirements thirty-six inches of floor space was recommended for using the kitchen base cabinets, using a wall oven and using the refrigerator.(14:4)

The Homemaker's Institute of Servel, Incorporated conducted research on eighty-four typical meals, which included all types of food preparation. The following recommendations were made for minimum work-storage spaces near each appliance: refrigerator unit, thirty-six inches; sink unit, eighteen inches on each side; range unit, eighteen inches.(15:15)

Davis, in a study composed of twenty homemakers living in houses of approximately 1,100 square feet, found that 32 square feet of storage space in the kitchen would meet the preferences of 90 per cent. These homemakers designated preferred space allotments for open and for storage spaces without being allowed to increase the overall size of their houses. The open space in the kitchens needed was reported to be at least 35 square feet if the majority of homemakers' preferences were met. Overall a kitchen of 84 square feet, including 41 square feet for open floor space, 24 square feet for storage space, and approximately 19 square feet for appliances, would satisfy the majority of the homemakers.(16:39)

Planning Guides for Southern Rural Homes recommended from four to six linear feet for body clearance between opposite appliances in the kitchen.(9:12-14) The Federal Housing Administration requires three linear feet six inches for minimum clearance.(17:32)

The minimum kitchen size approved by the Federal Housing Administration in a three bedroom house is 70 square feet. It also

requires a minimum of 30 square feet of shelving in wall and base cabinets with not less than 10 square feet in either wall or in base cabinets. The minimum drawer area is 5 square feet; the minimum counter top is 7 square feet.(18:16-17)

In comparing the recommended amounts of counter space and storage space for kitchens, there is a difference of five linear feet three inches. Planning Guides for Southern Rural Homes recommended a total of eight linear feet nine inches for storage in the kitchen. Farmhouse Planning Guides recommended a total of fourteen linear feet for storage in the kitchen.

The Dining Room

Dining space requirements were reported by Johnson and Hurley in a study Indoor Dining Areas for Rural Homes in the Western Regions. They suggest a minimum width for the dining table of thirty-six inches, based on the leg room used by over half of the eighty-four men and women studied. Little room was available for the serving dishes on a thirty-six inch wide table. They further report that a table forty-two inches in width was ample. This size of table allows more space for serving dishes.(19:2,10)

The minimum length recommended for an individual cover is twenty-one inches with a minimum depth of fourteen and one half inches for the place setting. The minimum depth recommended for leg room is eighteen inches.(10:16)

The cover space recommended for each person ranges from twenty-one inches to twenty-nine inches. This allows for elbow expansion.(20:2)

Space Standards for Home Planners recommended that the dining area for four plus persons should be ten by ten and one half feet with two feet added to the table and the length of the room for each additional seating unit.(20:1)

The minimum length of table reported in Indoor Dining Areas for Rural Homes in the Western Regions follows:(19:10)

LENGTH OF TABLE IN INCHES

Number to be seated	<u>Covers 21" long</u>		<u>Covers 25" long</u>	
	One at each end of table	No one at table ends	One at each end of table	No one at table ends
4	60	42 ^a	60	60
6	72	72(60) ^b	84	84(72) ^c
8	96	84	108	108(96) ^c
10	120	108	132	132(120) ^c
12	132	132(120) ^b	156	156(144) ^c

^aA table 42" square is ample in size

^bCovers 20" long and slight crowding

^cCovers 24" long

The minimum space recommended for passing between pieces of furniture and the wall is twenty-two inches. A satisfactory range would be twenty-two to twenty-five inches.(19:10)

The minimum dining areas reported in Farmhouse Planning Guides follows:(10:16)

DINING AREAS RECOMMENDED FOR SEATING SPECIFIED NUMBER OF
PERSONS WITH MINIMUM COVER SPACE AND CLEARANCE

Number to be served	Total area including table and chairs with passage behind chairs on:*	
	One side	Two sides
6	7'7" x 6'10"	9' x 6'10"
8	8'10" x 7'7"	9' x 8'10"
10	10'10" x 7'7"	10'10" x 9'
12	12'10" x 7'7"	12'10" x 9'

*Table 42" wide, covers 21" long, chair 19" wide x 19-1/2"

Planning Guides For Southern Rural Homes made the following suggestions for space requirements for the individual place settings and clearance around the table.(9:53)

SPACE REQUIREMENTS FOR INDIVIDUAL PLACE SETTINGS
AND CLEARANCES AROUND THE TABLE

Item	Minimum inches	Liberal inches
Space for individual place settings		
Width, side-to-side	24	29
Depth	12	15
Clearances--table edge to wall		
Getting up	24	30
Serving	30	36

The Federal Housing Administration requires that a dining room in a three bedroom house should be a minimum of 90 square feet.(18:16)

The Bedrooms

The fourth annual National Executive Marketing Conference of the Homebuilding Industry presented the Consumer's Side of the Story in 1960. Of approximately forty consumers, "66 per cent said that bedrooms were too small and that they preferred free standing furniture. The bedrooms were named as one of the two areas that needed more storage space."(21)

The Farmhouse Planning Guides suggested the following clearances required at the side and the end of the bed.(10:29)

CLEARANCES REQUIRED AT SIDE AND END OF BED

Activity	Dimension			
	Women End	Side	Men End	Side
	inches			
Sitting on the bed		12		14-1/2
Getting up from the bed		14		18-3/4
Making bed	13-1/2	22-1/2	18	30-3/4
Cleaning under bed				
minimum		44		
maximum		51		

In 1948, 751 owner-operator farm families cooperated in a study on Rod Closets For Southern Farm Homes conducted by Philson. Rod closets should never be less than twenty-four inches deep; Philson recommended thirty inches which would include coat storage. The height of the rod was determined by adding six inches to the height required by the longest garment. In a child's room, this rod should be adjustable in height. The length of the rod should be calculated by the user's greatest anticipated

need. Shelving, hooks, and special racks in the closet added to its convenience by providing space for storing items such as hats, shoes, ties, and belts. Philson stated:

For homes with unassigned bedrooms, the rod allowance for the minimum level should be three to three and one half feet per person; for moderate level, four to four and one half feet per person; and for the liberal level, four and one half to five and one half feet per person. When men hang all their shirts and their work pants, the liberal rod length requirement increases to about five and one half to six and one half feet per person(22:18,19)

McCullough recommended minimum space requirements for hanging clothes storage:(23:55)

MEASUREMENTS FOR HANGING CLOTHES STORAGE

	Dimensions inches
Length per person	48
Depth for garments on hangers	24
Per woman's garment	2
Per man's garment	2-1/2
Per heavy coat	4

In the Northeastern study, limited and liberal dimensions for four arrangements of clothing storage facilities were recommended in two-, three-, and four- bedroom houses.(10:30)

CLOTHING STORAGE REQUIREMENTS FOR NORTHEASTERN FARMHOUSES: LIMITED AND
LIBERAL DIMENSIONS FOR FOUR ARRANGEMENTS OF CLOTHING STORAGE
FACILITIES IN TWO-, THREE-, AND FOUR- BEDROOM HOUSES.

Location of Storage	Limited to liberal dimensions for			
	Plan I	Plan II	Plan III	Plan IV
feet				
2-Bedroom houses				
Length of rod in				
Master bedroom				
Wife's closet	2-1/2--3-1/2	3-1/2--4	3-1/2--4-1/2	4--5-1/2
Husband's closet*	3-1/2--4-1/2	4--5	4--5	4--5-1/2
Bedroom #2	6-1/2--8	7-1/2--10	7-1/2--9-1/2	9--12
Coat closet	3-1/2--4	3-1/2--4	None	None
Closet for out-of-season garments	2-1/2--4	None	2-1/2--4	None
Hooks in chore clothes closet	17--22	17--22	Number 17--22	17--22

feet				
3-Bedroom houses				
Length of rod in				
Master bedroom				
Wife's closet	2-1/2--3-1/2	3-1/2--4	3--4-1/2	4--5-1/2
Husband's closet*	3-1/2--4-1/2	4--5	4--5	4--5-1/2
Bedroom #2	6-1/2--8	7-1/2--10	7-1/2--9-1/2	9--12
Bedroom #3	6--8	6--10	6-1/2--9-1/2	6-1/2--11
Coat closet	4--5-1/2	4--5-1/2	None	None
Closet for out-of-season garments	2-1/2--5-1/2	None	2-1/2--5-1/2	None
Hooks in chore clothes closet	25--31	25--31	Number 25--31	25--31

feet				
4-Bedroom houses				
Length of rod in				
Master bedroom				
Wife's closet	2-1/2--3-1/2	3-1/2--4	3--4-1/2	4--5-1/2
Husband's closet*	3-1/2--4-1/2	4--5	4--5	4--5-1/2
Bedroom #2	6-1/2--8	7-1/2--10	7-1/2--9-1/2	9--12
Bedroom #3	6--8	6--10	6-1/2--9-1/2	6-1/2--11
Bedroom #4	6--8	6--10	6-1/2--9-1/2	6-1/2--11

CLOTHING STORAGE REQUIREMENTS FOR NORTHEASTERN FARMHOUSES--Continued

Location of Storage	Limited to liberal dimensions for			
	Plan I	Plan II	Plan III	Plan IV
Coat closet	4-1/2--6-1/2	4-1/2--6- ^{feet} 1/2	None	None
Closet for out-of-season garments	2-1/2--7	None	2-1/2--7	None
Hooks in chore clothes closet	34--39	34--39	Number 34--39	34--39

*Length of rod in husband's closet can be decreased one foot if clean work shirts are stored in drawers; decrease two feet if neither dress or work shirts are stored on hangers.

Davis found that half of the twenty homemakers, living in houses averaging 1,100 square feet, wanted additional storage space in the bedrooms. Based on the indicated preferences of these homemakers, Davis suggested storage space for the three bedrooms as follows: 15 square feet for bedroom I, 14 square feet for bedroom II, and 12 square feet for bedroom III. The majority of these homemakers preferred total bedroom sizes as follows: bedroom I--153 square feet, bedroom II--152 square feet, and bedroom III--142 square feet. (16:48, 50, 53)

The total minimum requirement for all bedrooms as recommended by the Federal Housing Administration in 1959 were:

FEDERAL HOUSING ADMINISTRATION MINIMUM STANDARDS FOR ALL BEDROOMS

Number of bedrooms	Size
	square feet
One	120
Two	200
Three	280
Four	380
For a bedroom in the two, three, or four bedroom living unit	80

The Federal Housing Administration's minimum storage space requirement for closets is two feet deep and three feet in length for each bedroom closet.(17:32)

The Bathrooms

Nicholson studied bathroom storage requirements using a sample of twenty-four families. Three types of storage: shallow, deep, and supplementary were recommended. Shallow storage for cosmetics, dental hygiene, hair grooming, shaving items, first aid and medical supplies could be provided in numerous ways. Two cabinets from nineteen to thirty inches from top to bottom were needed for shallow storage near the lavatory. The difference in size varied with the depth and length of shelves that might be used. Deep storage for linens, extra supplies and cleaning supplies could be provided as closets, shelves or drawers. Two depths, twelve or sixteen inches were suggested. The length of the shelves or drawers was determined from the linear requirement of the items stored. A total of 144 linear inches of twelve inch deep shelves or 101 linear

SPACE REQUIRED AT THE TOILET

Measurement	Minimum	Dimensions -- Adequate	
		Used by one person	Used by two persons
		Inches	
Toilet stall			
Width: center axis to adjacent wall	..	18	22
Depth: front of bowl rim to opposite wall	..	30	36
Toilet in bathroom			
Width: center axis to side of 18" deep lavatory	..	14	16
side of 22" deep lavatory	14	16	18
side of tub	14	18	18
end of tub	14	16	18
Depth: front of bowl rim to opposite tub	..	24	..
opposite lavatory	24	30	30
opposite wall	..	30	34

The Essentials of a Good Bathroom emphasized the importance of having enough space around the fixtures for traffic and for cleaning purposes. The minimum size bathroom recommended was five feet by seven feet and would include a tub instead of a shower. A bath which is six feet by eight feet was considered a better size.(25:1)

Davis reported in a study of small houses that all but two of the twenty homemakers interviewed wanted up to 8 square feet of floor space allocated to bathroom storage. However, 5 square feet would satisfy the majority of homemakers. The majority of the homemakers indicated that they would be satisfied with a bathroom of approximately 58 square feet. This floor space would include 5 square feet for storage, approximately 20 square feet for the bathroom fixtures, and the remainder for movement.(16:56)

The Federal Housing Administration suggests that "a satisfactory bathroom has a convenient arrangement of the three essential fixtures." (26:22) The minimum amount of space between opposite fixtures is one and one half feet.

The Family Room and Living Room

Very few studies have reported the space requirements for the family room or the living room.

In a study on The Use of the Family Room for Individual and Group Activities, Hinson reported the ten homemakers interviewed preferred the family room having a minimum width of fourteen feet.(27:69)

Davis reported that if 10 square feet of floor space were allotted for storage in the living room, the projected needs of the majority of the homemakers would be met. The living room, including the 10 square feet for storage space, would need to be 230 square feet to meet the suggestions of the majority of the homemakers living in small houses of the size studied.(16:45)

The Federal Housing Administration in 1959 required the following space needs in the living room:(17:32)

FEDERAL HOUSING ADMINISTRATION MINIMUM LIVING ROOM STANDARDS*

Number of bedrooms	Sizes Square feet
One	160
Two	160
Three	170
Four	180

*Minimum width: 11 feet

Children's Play Centers and Toy Storage

"Child development is one of the primary functions of the home, yet many existing houses and many of those built do not adequately serve the needs of children."(28:3)

Planning Guides for Southern Rural Homes suggests that play areas should provide furnishings and activity space. To permit free movement during play, the width of the play area should be not less than three and one half feet. Play centers of 20 square feet are satisfactory as minor centers; those of 35 square feet are large enough for comfortable play for only one child. Recommendations for floor space for pre-school children's play were:(9:61,63)

TOTAL FLOOR SPACE FOR PRE-SCHOOL CHILDREN'S PLAY
BY THE NUMBER OF SOCIAL ROOMS IN THE HOUSE

Number of social rooms in the house	Minimum	Floor Space	
		Moderate Square Feet	Liberal
None	35	50	..
One	35	50	70
Two	..	70	90
Three or four	..	90	170+

In a study by Johnson, 116 rural families were interviewed to determine where children under five years of age played when they were in the house, what play materials they had and where these were stored, what space was available for unfinished play projects, and whether the present plans for storage and play space were adequate. The following recommendations for minimum storage units resulted:(29:182-184)

MINIMUM SHELF UNITS FOR STORAGE OF TOYS

Room	Floor space inches		
	Length	Depth	Width
Children's bedroom	61-1/2	8-3/4	29-1/4
Living room	16	13	11
Kitchen	18	6	12
Bathroom	16	7	4

Planning Guides For Southern Rural Homes includes the suggested sizes of the various play activities:(9:63)

SUGGESTED SIZE OF SEPARATE PLAY AREAS BY LOCATION

Location in house	Floor space		
	Minimum	Moderate	Liberal
Square Feet			
Bedroom-living room	35 ^a	50	..
Kitchen-utility area	20 ^b	35 ^a	50
Family social room	20 ^b	50	70
Child's bedroom	20 ^b	50	70

^aApproximately for one child

^bMinor play center for one child. Smallest floor dimension should not be less than 3'6".

Farmhouse Planning Guides recommends the minimum floor area in the three most frequently used rooms:(10:34)

MINIMUM FLOOR AREA FOR THE VARIOUS TYPES OF PLAY ACTIVITIES

Room	Floor space square feet
Kitchen	7 ^a
Living room	13-1/2 ^b
Child's bedroom*	15 ^c

*Twenty six square feet desirable

^aTwo feet minimum dimension

^bThree feet minimum dimension

^cThree feet minimum dimension

Space Standards for Home Planners recommend the following amounts of space for toy storage for the pre-school child:(20)

SPACE FOR TOY STORAGE

Area	height	Minimum depth inches	length	height	Desirable depth inches	length
Kitchen	6	11	..	..	..	..
Bathing	7	4	..	..	..	..
Living	13	11	16	22	11	8
	..	..	..	13	11	36
	..	..	..	8	11	36
Sleeping	12	11	48	5	11	48
	12	11	60	9	11	48
	..	..	..	12	11	48
	..	..	..	16	11	48

The Hall

Space Standards for Home Planners recommended the following measurements for storage of household textiles:(20)

HOUSEHOLD TEXTILE STORAGE

Number of shelves and/or sliding shelves for:	Width	Dimensions	
		inches	Length
Kitchen linens 3 sliding shelves	20		26
Table linens 2-6 sliding shelves	16 or 20		22 or 26
Bath linens 3 shelves	16		18
Bedding 6 shelves	20		26 or 38
Central linen storage 6 shelves	20		40

The minimum space recommendations represents the minimum amount of space that should be allowed for linens in the planning of farmhouses according to Woolrich, White and Richards. They indicate that storage facilities which provide for the liberal supplies will meet the needs of a large portion of families.(30:26)

DIMENSIONS OF STORAGE FACILITIES FOR LIMITED
AND LIBERAL SUPPLIES OF HOUSEHOLD TEXTILES

Items stored alone	Limited amount		Surface required number	Liberal amount		Surface required number
	Depth of surface inches	Width of surface inches		Depth of surface inches	Width of surface inches	
Bath linens	12	18-22	2	12	26	3
	16	28-34	1	..	36	2
	..	18-22	2	16	18-24	3
	..	..	.	..	28-34	2
Bed linens	12	24-30	2	12	24-36	3
	16	30-38	1	16	26-32	2
	..	18-22	2	..	..	.
Bed covers	16	22-38	5	..	..	.
	20	26-38	4	20	30-44	4
	24	22-38	5	24	28-38	6
	28	26	5	28	28-26	6
	..	..	.	..	50	3
Kitchen linens	12	26	2	12	32-30	2
	..	18-20	3	..	24-22	3
	16	24-26	2	16	24-30	2
	..	..	.	..	18-22	3
	20	22-26	2	20	22-30	2
	..	16-20	3	..	16-22	3
Table linens	16	22-40	2	16	22-38	6
	20	20-30	2	20	26-40	4
All linens and bedcovers stored.. together	16	30-44	8	16	28-38	15
	..	..	.	..	38-48	12
	20	40-50	6	20	36-50	10
	..	28-38	9	20	..	..
	..	..	.	..	28-40	13

Modular depths of four inches were found satisfactory for bath linens which required twelve and sixteen inches, bedcovers which required sixteen, twenty, twenty-four and twenty-eight inches, kitchen linens which required twelve, sixteen and twenty inches and table linens which required sixteen and twenty inches. Surfaces of less than twelve inches in depth were not included because of their limited functional use. In the above table, the mid-way widths were recommended:(30:25-29)

The Federal Housing Administration required a central linen closet having a minimum depth of fourteen inches and a minimum width of eighteen inches.(17:34) This is less than two square feet of floor space.

The Laundry Area

An Experimental Approach to Housing Research indicated that families "liked the laundry arrangement in the hall area because it is handy to the kitchen for soaking, close to the work center, and out of sight but available.(31:100)

Many people picture the modern home laundry as having one room-- housing all the facilities for the complete laundry process, from storage of soiled clothing to ironing. In a study by Johnston it was found that few homes had this sort of laundry; instead, homemakers were likely to use different parts of the house for the various steps in the laundry process. Thirty-five per cent of the homemakers interviewed reported that they had no storage or work space near the washer for supplies which are used there. Several women reported that ironing was done "all over the house." Few homes had good storage space for the iron and ironing board.(32:36-39)

Mize, Bland, Ritchie and Simons summarize minimum and maximum dimensions of present day laundry equipment.(33:32)

DIMENSIONS OF EQUIPMENT

Type	Width		Depth		Height	
	minimum	maximum	minimum	maximum	minimum	maximum
			inches			
Washers						
non-automatic	22	27	26	30	42	49
automatic						
top-opening	24-1/4	29	25	28-1/16	49	54 ^a
front opening	25	31	41-1/2 ^a	43-1/2	36	36
combination						
washer-dryer	27	36	38 ^a	47-1/4	36	44
dryers	24-1/4	31-1/2	39 ^a	47-1/4 ^a	36	43-3/8 ^b

^aMeasurements were made with door open.

^bDryers have 36-inch work surface; the maximum dimension is to the top of the console.

Counter space requirements suggested in Planning Guides for Southern Rural Homes are:(9:57)

COUNTER REQUIREMENTS FOR LAUNDRY ACTIVITIES

Activity	Counter width ^a	
	Limited	Liberal
Sorting soiled clothing loads	24	46
Folding clean, dry articles	20	30

^aCounter depth of 25 inches

Presumably counter requirements could be met by the surface made available by the top of a dryer.

Clearances required in front of the different laundry facilities as reported in Space Standards for Home Planners are:(20:1-3)

CLEARANCE REQUIREMENTS IN FRONT OF DIFFERENT LAUNDRY FACILITIES

Facility	Floor space	
	Adequate	Liberal inches
Cart or counter	38	42
Washer-Dryer combination	38	42
Washer or dryer separate	36	40
Laundry table	36	..
Table opposite washer-dryer	48	60

Different shapes or arrangements of the laundry areas require varying amounts of the floor space. However, a study of Laundry Work Areas for Southern Rural Homes, recommends overall floor space from 44 to 75 square feet. (33:30-31)

Researchers have been seeking to uncover the space needs of people in housing as a guide in setting up some space standards. A compilation of findings to date should be of value to builders in the planning of houses.

Differences in research methodology and the variety of measurements used in research studies make it difficult to compare findings. As pointed out earlier, little research has been done in certain areas, especially in the family and living rooms; therefore few space recommendations for such areas are available.

In an effort to get an overall picture of recommended allocations of floor space, the reviewed literature is summarized according to rooms or areas. Storage space, open space and total space for each room is listed separately. Blank spaces indicate areas that have not been studied to date to the author's knowledge.

SUMMARY OF RECOMMENDED ALLOCATIONS OF FLOOR SPACE REVIEWED FROM
THE LITERATURE ACCORDING TO ROOMS OR AREAS

Room or area	Open Space	Storage Space	Total
Kitchen	Between opposite appliances: 4-6 feet(9)	Limited Square feet 15.0(15)	Limited Square feet 70.0(18)
	In front of base cabinets and for opening the refrigerator door 3 feet(14)	Liberal 26.0(9) 17.5(9) 28.0(10) 24.0(16) 20.0(18)	Liberal 84.0(16)
	Total open space: 41 square feet(16)	Kitchen linens: 3 sliding shelves (20)	
		Width Length inches 20 26	
Dining	Dining table(19) Minimum for four persons Width: 3 feet Length. 5 feet	Table linens: 2-6 Width Length inches 16 or 20 22 or 26	Dining area for four plus persons(20) 105 square feet
	Limited Liberal inches Passing between pieces of furniture and wall(19) 22 25		Minimum cover space and clearance(10) Number total area to be served including table and chairs with passage behind chairs
	Individual place settings(9) 24 29		
	Clearance from table edge to wall for:(9) getting up 24 30 serving 30 36		

*Table 42 inches wide, covers 21 inches long, chair 19 inches wide by 19-1/2 inches deep.

Minimum 90 square feet
(18)

SUMMARY--Continued

Room or area	Open Space	Storage Space	Total
Bedrooms	Clearances required at side and end of bed(10)	Closet rod allowance per person(22)	Limited Liberal square feet
	Dimension	Min. Mod. Liberal linear feet	80.0(17)
	Women Men	3-31/2 4-41/2 41/2-51/2	BR-1--153.0(16)
	End Side End Side		BR-2--152.0(16)
	inches	Closet Space	BR-3--142.0(16)
	Sitting on bed	Limited Liberal square feet	
	12 14-1/2	6.0(17) 24.0(10)	
	Getting up from bed	12.0(10) BR-1--15.0(16)	
	14 18-3/4	BR-2--14.0(16)	
	Making bed	BR-3--12.0(16)	
	13-1/2 22-1/2 18--30-3/4		
	Cleaning under bed:		
	44 minimum		
	51 maximum		
	Limited Liberal square feet	Rod closet depths linear feet	
BR-1--138(16)	minimum Liberal		
BR-2--138(16)	2(22) 2-1/2(22)		
BR-3--130(16)			
Bathroom	Space required at bathroom fixtures(10)	Two wall cabinets between studs--	square feet
	Dimensions	require no floor space(24)	48.0(25)
	Minimum Adequate inches		58.0(16)
	Tub to opposite wall	144 linear inches of twelve inch deep shelves or	
	30 34	101 linear inches of sixteen inch deep shelves for cleaning, linens and extra supplies(24)	
	Lavatory to opposite wall		
	34 ..		
	Toilet to opposite wall used by used by		
	1 person 2 persons		
	30 34	square feet	5.0(16)
Minimum space between opposite fixtures(26)			
Linear feet	Bath linens-3 shelves(20)		
1-1/2	Width Length		
Square feet	16 inches 18		
33.0(16)			

SUMMARY--Continued

Room or area	Open Space	Storage Space	Total
Family room	Minimum width feet 14.0(27)		
Living room	Minimum width feet 11.0(17) Square feet 220.0(16)	Square feet 10.0(16)	Square feet 170.0(17) 230.0(16)
Children's play centers and toy storage	Minimum width feet 3-1/2(9)	Minimum shelf units for storage of toys (29) Floor space <u>Length Depth Width</u> inches Children's bedroom 61-1/2 8-3/4 29-1/4 Living room 16 13 11 Kitchen 18 6 12 Bathroom 16 7 4	Square feet satisfactory as minor play center(9) 20 Comfortable play area for one child(9) 35 Liberal play areas for three or four rooms(9) 170+ Suggested size of separate play areas by location(9) <u>Minimum shelf space(20)</u> <u>Minimum Desirable</u> h. d. w. h. d. w. inches Bedroom-living room 35 50 Kitchen-utility area 20 35 50 Family social room 20 50 70 Child's bedroom 20 50 70
		13 11 16 22 11 88 13 11 36 8 11 36	

SUMMARY--Continued

Room or area	Open Space	Storage Space	Total
Children's play centers and toy storage- Continued		Minimum Desirable h. d. w. h. d. w. inches	
		Sleeping	
		12 11 48 5 11 48	
		12 11 60 9 11 48	
		12 11 48 16 11 48	
Hall		Number of shelves and/or sliding shelves for:(20)	
		Width Length inches	
		Bedding-6 shelves	
		20 26 or 38	
		Central linen storage-6 shelves	
		20 40	
		All linens and bedcovers stored together in 16" deep surface(30)	
		Limited Liberal inches	
		No. 8 No. 15 30-44 28-38	
		Central linen closet-limited amount square feet 1.75(17)	
Laundry	Counter require- ments for laundry activities(9)		Square feet 44.0 to 75.0(33)
	Counter width Limited Liberal inches		
	Sorting soiled clothing loads 24 46		

SUMMARY--Continued

Room or area	Open Space	Storage Space	Total
Laundry- Continued	Counter width		
	Limited	Liberal	
	inches		
	Folding clean, dry articles		
	20	30	
	Clearances required in front of the dif- ferent laundry facilities(20)		
	Floor Space		
	Adequate	Liberal	
	inches		
	Cart or counter		
	38	42	
	Washer-dryer combination		
	38	42	
	Washer or dryer separate		
	36	40	
	Laundry table		
	36	..	
	Table opposite washer-dryer		
	48	60	

CHAPTER III

PROCEDURE

Six builders co-operated in this study by furnishing numerous floor plans of popular size houses, and names and addresses of families living in each of the houses. Ten plans, each of approximately 1,400 square feet, were selected for the study.

House plans were chosen in which the location of rooms varied from one another within the plan. This made it possible to test whether the homemakers' preferences for open space and storage space were influenced by how rooms were arranged in the house plan.

House plans with the same kind and number of rooms or areas were chosen so that the space preferences of the homemakers could be compared without the influence of additional housing spaces. Each of the ten house plans had a kitchen, a dining-family room, a living room, three bedrooms, two baths, a hall, an outside storage-utility room and no carport nor basement.

In order to test if space preferences were consistent rather than due to individual idiosyncrasies, the study of each of the ten house plans was repeated four times with four different homemakers. A total of forty interviews were made in Charlotte, Greensboro, and Winston-Salem, North Carolina.

Since housing needs may vary with different sizes of families, this study was limited to families having either two or three children. The age and sex of these children were not controlled; however, the children did have to be living at home.

The overall size of the ten house plans ranged from 1,293.84 to 1,571.14 square feet. There are certain parts of every house which can be classified as neither open space nor storage space, such as those used for the kitchen appliances, the bathroom fixtures, the furnace, the washer, the dryer and the hot water heater. The space that these appliances and fixtures occupied was subtracted from the total space for each area of the house. Some of the plans had the kitchen, dining-family room combined. In these cases the combined area was divided into spaces belonging to each area. One third of the built-in sink and lavatory area was considered storage space since it was possible to use the space under the sink and in front of the pipes for storage. The space occupied by inside walls and outside walls were subtracted from the total square footage of the house because it is neither open floor space nor storage space. The total usable square footage for the ten house plans ranged from 1,045.57 to 1,249.82 square feet. Including the appliances the square footage for the ten house plans ranged from 1,118.57 to 1,322.82. The range in square footage according to the rooms or areas of the ten house plans were:

Room or Area	Square Feet
Kitchen	48.56 to 165.67
Dining-Family	112.00 to 189.75
Living	196.86 to 281.10
Master Bedroom	156.28 to 210.73
Second Bedroom	123.56 to 177.70
Third Bedroom	109.30 to 149.96
Main Bath	16.33 to 31.10
Second Bath	13.85 to 29.90
Hall	49.39 to 135.34
Storage-Utility	31.83 to 75.80

Since this study was planned to expand the scope of Davis' previous findings on preferred space allocations, it was thought desirable to use a similar questionnaire in order that the results could be compared. A questionnaire, following the pattern set by Davis, with minor modifications was constructed. See Appendix. This questionnaire was filled out during each interview. The homemakers offered suggestions for reallocations of both open floor space and storage space within the individual areas. The homemakers were not allowed to project an increase in the overall size of their houses. The floor plan for each house was used in conjunction with the questionnaire during the interview to enable the homemaker and the interviewer to see the homemaker's suggested changes. These changes were recorded for each area of the house. The total of these changes for each family was checked on a summary sheet.

In addition, the homemakers' preferences for adjacent location of rooms, location of outside doorways, and the room in which a passageway was least objectionable were recorded. General information was recorded on the families' occupations, ages and sex of children, length of occupancy in the house, most liked and least liked parts of the house, and the type of house preferred.

The analysis of variance was used to test the hypotheses that the homemakers' indicated preferences for total open spaces and for total storage spaces, as well as the amount of changes in the open spaces and storage spaces, were not statistically significant between the families, between the house plans, and between the rooms or areas. The law of probability was used to determine if the room relationships, the locations of outside doorways, and the room in which a passageway would be least objectionable were greater than chance.

Floor space terms used throughout this study were always square footages of floor space. For the purposes of this study, square feet of floor space were differentiated as follows:

1. Open floor space. Open floor space is living space that is used for movement and activities, or furniture--other than built-in storage.
2. Storage space. Storage space is that floor space used for built-in storage such as closets, cabinets, and shelves.
3. Existing space. Existing space is open and storage space present in the houses at the time this study was made.
4. Space alteration. Space alteration is a suggested change preferred by a homemaker.
5. Adjusted space. An adjusted space is an existing space plus or minus the desired space alteration.

CHAPTER IV

DESCRIPTIVE ANALYSIS

The Families

Forty families participated in this study. Each family was composed of a mother, a father, and two or three children. The age of the children ranged from three months to nineteen years. There were forty-five boys and forty-four girls.

TABLE I

AGES, SEX AND NUMBER OF CHILDREN

Years	Number	
	Boys	Girls
1 and under	4	3
2 to 5	20	21
6 to 9	12	10
10 and over	9	10

All of the husbands were employed full time. In twenty-nine of the forty families (72.5 per cent), the husbands were salesmen. The occupations of the remaining husbands varied from semi-skilled to professional.

Thirty-six of the forty homemakers were full time homemakers. Three of the homemakers were employed part time, two as secretaries and one as a seamstress. Only one homemaker of the forty was employed full time outside of the home. She was a high school English teacher.

The families had lived in their present houses from two weeks to three and one half years. Fifteen of the forty homemakers had lived in their houses less than one year.

TABLE 2

LENGTH OF TIME THE FAMILIES HAD BEEN LIVING
IN THEIR PRESENT HOUSES

Length of time	Number	Per cent
Less than 6 months	6	15.0
6 to 12 months	9	22.5
1 year	12	30.0
2 years	7	17.5
3 years	6	15.0

The Houses

All of the houses studied were of the ranch type and were approximately 1,400 square feet in overall size. The homemakers were asked what type of house they would buy next. Eighty per cent of the homemakers replied they preferred the ranch type house, 12.5 per cent preferred a two story house and 7.5 per cent preferred a split level house. The greater preference for the ranch type house may be affected by their present house since they all are living in the ranch type.

When asked what they liked most about their house, a majority (65 per cent) of the homemakers indicated the kitchen. In addition, the combined dining-kitchen area, the fireplace, the arrangement of the rooms, the living room and the two baths were indicated by some of the homemakers as being most liked.

There was little sameness of reply to the question of what was disliked most about their homes. Among the replies were lack of storage space, which was mentioned by 25 per cent of the homemakers. The smallness of the dining room, the smallness of the bedrooms, the smallness of the baths, the combination of the dining-kitchen area, and the difficulty

of access to the storage-utility area were mentioned also as being disliked.

The Kitchen

Storage Space. Twenty-one of the forty homemakers expressed a desire for additional storage space in the kitchen. This suggested additional space ranged from approximately 1.0 to 21.0 square feet of floor space. Excluding the extremes, the additional storage suggested by the homemakers ranged from approximately 5.0 to 9.0 square feet of floor space. Eighteen of the forty homemakers appeared satisfied with the present amount of kitchen storage space and one preferred less storage space in the kitchen. See Table 3.

The adjusted storage space as suggested by the forty homemakers ranged from approximately 15.0 to 39.0 square feet. Excluding the extremes, the adjusted storage space ranged from approximately 19.0 to 31.0 square feet of floor space. See Table 4.

Thirty-one square feet of floor space would satisfy the projections of 85 per cent of the forty homemakers interviewed. Translated into ordinary kitchen base and wall cabinets, this would be 15 linear feet of storage space.

Open Space. One-half of the forty homemakers suggested that they would prefer to change open space in the kitchen to additional storage space. The amount of open floor space the homemakers were willing to change in the kitchen ranged from approximately 1.0 to 21.0 square feet. Excluding the extremes, the homemakers were willing to give up from approximately 3.0 to 9.0 square feet of open floor space in order to obtain additional storage space in the kitchen. See Table 3, p. 40.

TABLE 3

KITCHEN FLOOR SPACE: ALTERATIONS SUGGESTED BY THE FORTY HOMEMAKERS

Storage Space			Open Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent
-5.0 to -3.1	1	2.5	Less than -11.0	1	2.5
-3.0 to -1.1	0	0.0	-11.0 to -9.1	2	5.0
-1.0 to .9	18	45.0	- 9.0 to -7.1	2	5.0
1.0 to 2.9	2	5.0	- 7.0 to -5.1	9	22.5
3.0 to 4.9	3	7.5	- 5.0 to -3.1	3	7.5
5.0 to 6.9	10	25.0	- 3.0 to -1.1	3	7.5
7.0 to 8.9	3	7.5	- 1.0 to .9	20	50.0
9.0 to 10.9	2	5.0			
11.0 and over	1	2.5			

TABLE 4

KITCHEN FLOOR SPACE: ADJUSTMENTS DESIRED BY THE FORTY HOMEMAKERS

Storage Space			Open Space			Total Space ^a		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent		Number	Per cent
15.0 to 16.9	2	5.0	20.0 to 29.9	6	15.0	60.0 to 69.9	4	10.0
17.0 to 18.9	1	2.5	30.0 to 39.9	2	5.0	70.0 to 79.9	0	0.0
19.0 to 20.9	6	15.0	40.0 to 49.9	1	2.5	80.0 to 89.9	4	10.0
21.0 to 22.9	3	7.5	50.0 to 59.9	3	7.5	90.0 to 99.9	4	10.0
23.0 to 24.9	8	20.0	60.0 to 69.9	0	0.0	100.0 to 109.9	0	0.0
25.0 to 26.9	6	15.0	70.0 to 79.9	5	12.5	110.0 to 119.9	4	10.0
27.0 to 28.9	2	5.0	80.0 to 89.9	4	10.0	120.0 to 129.9	4	10.0
29.0 to 30.9	6	15.0	90.0 to 99.9	7	17.5	130.0 to 139.9	7	17.5
31.0 to 32.9	0	0.0	100.0 to 109.9	4	10.0	140.0 to 149.9	5	12.5
33.0 to 34.9	2	5.0	110.0 to 119.9	0	0.0	150.0 to 159.9	0	0.0
35.0 to 36.9	2	5.0	120.0 to 129.9	1	2.5	160.0 to 169.9	0	0.0
37.0 to 38.9	2	5.0	130.0 to 139.9	5	12.5	170.0 to 179.9	4	10.0
			140.0 to 149.9	2	5.0	180.0 to 189.9	4	10.0

^aTotal includes approximately 19 square feet for kitchen appliances.

The adjusted open space in the kitchen ranged from approximately 20.0 to 150.0 square feet. Excluding the extremes, the adjusted open space ranged from approximately 30.0 to 110.0 square feet. See Table 4, p. 41.

The suggested open floor space was projected to meet the preferences of the majority of homemakers. One hundred ten square feet of floor space allocated for open space in the kitchen would satisfy the projected needs of 80 per cent of the forty homemakers.

Total Space. The total size of the kitchens suggested by the forty homemakers ranged from approximately 60.0 to 190.0 square feet. Excluding the extremes, the total adjusted space for the kitchens ranged from approximately 80.0 to 150.0 square feet. On the basis of these house plans, a kitchen of approximately 160.0 square feet would satisfy the majority of homemakers interviewed. This space would include approximately 31.0 square feet for storage, 110.0 square feet for open space and 19.0 square feet for the kitchen appliances.

The Dining-Family Room

Storage Space. Thirty-four of the homemakers were satisfied with the storage space in the dining-family room and did not wish to make any changes even though twenty-three of these homemakers did not have any storage space in this area. Of the seventeen remaining homemakers, six expressed a desire for additional storage space. The suggested space alterations ranged from approximately 7.0 to 23.0 square feet of floor space. The additional storage space suggested by the homemakers averaged approximately 9.0 square feet of floor space. See Table 5.

The adjusted storage space as suggested by the forty homemakers

TABLE 5

DINING-FAMILY FLOOR SPACE: ALTERATIONS SUGGESTED BY THE FORTY HOMEMAKERS

Storage Space				Open Space			
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families			
	Number	Per cent		Number	Per cent		
-1.0 to .9	34	85.0	-13.0 to -11.1	2	5.0		
1.0 to 2.9	0	0.0	-11.0 to - 9.1	1	2.5		
3.0 to 4.9	0	0.0	- 9.0 to - 7.1	2	5.0		
5.0 to 6.9	0	0.0	- 7.0 to - 5.1	1	2.5		
7.0 to 8.9	2	5.0	- 5.0 to - 3.1	3	7.5		
9.0 to 10.9	1	2.5	- 3.0 to - 1.1	1	2.5		
11.0 to 12.9	0	0.0	- 1.0 to .9	30	75.0		
13.0 and over	3	7.5					

ranged from approximately 5.0 to 31.0 square feet. Excluding the extremes, the adjusted storage space ranged from approximately 9.0 to 13.0 square feet of floor space. See Table 6.

Slightly over half of the homemakers did not suggest a need for storage space in the dining-family room. It may be that these homemakers prefer movable to built-in storage or that they had never experienced built-in storage in this area.

Nine square feet of floor space allocated for storage in the dining-family room would satisfy 80 per cent of the homemakers interviewed.

Open Space. Thirty of the forty homemakers interviewed were not willing to give up any open floor space in the dining-family room. The remaining ten homemakers were willing to give up approximately 1.0 to 13.0 square feet. Excluding the extremes, these suggested changes ranged from 3.0 to 11.0 square feet. See Table 5, p. 44.

The adjusted open floor space in the dining-family room would range from approximately 100.0 to 190.0 square feet if the suggested changes of the homemakers were carried out. Excluding the extremes, the adjusted open floor space ranged from 120.0 to 180.0 square feet. See Table 6, p. 45.

One hundred eighty square feet of floor space allocated for open space in the dining-family room would satisfy the projected needs of 73 per cent of the forty homemakers interviewed.

Total Space. The total size of the dining-family room as suggested by the forty homemakers ranged from approximately 110.0 to 204.0 square feet. Excluding the extremes, the size of the dining-family rooms preferred ranged from approximately 120.0 to 190.0 square feet. The majority

TABLE 6

DINING-FAMILY FLOOR SPACE: ADJUSTMENTS DESIRED BY THE FORTY HOMEMAKERS

Storage Space			Open Space			Total Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent		Number	Per cent
-3.0 to .9	23	57.5	100.0 to 109.9	4	10.0	110.0 to 119.9	8	20.0
1.0 to 4.9	0	0.0	110.0 to 119.9	4	10.0	120.0 to 129.9	2	5.0
5.0 to 8.9	9	22.5	120.0 to 129.9	6	15.0	130.0 to 139.9	6	15.0
9.0 to 12.9	6	15.0	130.0 to 139.9	2	5.0	140.0 to 149.9	0	0.0
13.0 to 16.9	0	0.0	140.0 to 149.9	0	0.0	150.0 to 150.9	4	10.0
17.0 to 20.9	1	2.5	150.0 to 159.9	6	15.0	160.0 to 169.9	2	5.0
21.0 and over	1	2.5	160.0 to 169.9	2	5.0	170.0 to 179.9	2	5.0
			170.0 to 179.9	5	12.5	180.0 to 189.9	15	37.5
			180.0 to 189.9	11	27.5	190.0 to 199.9	0	0.0
						200.0 to 209.9	1	2.5

of homemakers interviewed, all of whom lived in houses of approximately 1,400 square feet, suggested that 189.0 square feet of their housing space be allocated for the dining-family room. This space would include 9.0 square feet for storage and 180.0 square feet for open space.

The Living Room

Storage Space. Thirty-four of the forty homemakers were satisfied with the storage space in the living room. Three of the homemakers indicated they would be willing to reallocate storage space in the living room to other parts of the house. The remaining three homemakers indicated a desire to increase the storage space in the living room. The suggested increase in storage space ranged from approximately 3.0 to 10.0 square feet of floor space. See Table 7.

The adjusted storage space, as suggested by the forty homemakers, ranged from approximately 3.0 to 20.0 square feet of floor space. Excluding the extremes, the adjusted storage space ranged from approximately 7.0 to 13.0 square feet of floor space. Assuming adjustments were made in the storage space as suggested, 30 per cent of the homemakers still did not prefer storage space in the living room. See Table 8.

The suggested storage space was projected to meet the preferences of the majority of homemakers. Eleven square feet of floor space allocated for storage in the living room would satisfy the projected needs of 85 per cent of the forty homemakers.

Open Space. Twenty-two of the forty homemakers interviewed indicated a willingness to decrease the open space in the living room. These homemakers indicated a willingness to relinquish from approximately 1.0 to 23.0 square feet of floor space. Excluding the extremes, the homemakers

TABLE 7

LIVING ROOM FLOOR SPACE: ALTERATIONS SUGGESTED BY THE FORTY HOMEMAKERS

Storage Space			Open Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent
-7.0 to - 5.1	1	2.5	Less than -13.0	2	5.0
-5.0 to - 3.1	1	2.5	-13.0 to -11.1	3	7.5
-3.0 to - 1.1	1	2.5	-11.0 to - 9.1	2	5.0
-1.0 to .9	34	85.0	- 9.0 to - 7.1	3	7.5
1.0 to 2.9	0	0.0	- 7.0 to - 5.1	4	10.0
3.0 to 4.9	1	2.5	- 5.0 to - 3.1	7	17.5
5.0 to 6.9	0	0.0	- 3.0 to - 1.1	1	2.5
7.0 and over	2	5.0	- 1.0 to .9	18	45.0

TABLE 8

LIVING ROOM FLOOR SPACE: ADJUSTMENTS DESIRED BY THE FORTY HOMEMAKERS

Storage Space			Open Space			Total Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent		Number	Per cent
+1.0 to .9	12	30.0	170.0 to 179.9	1	2.5	170.0 to 179.9	1	2.5
1.0 to 2.9	0	0.0	180.0 to 189.9	0	0.0	180.0 to 189.9	0	0.0
3.0 to 4.9	4	10.0	190.0 to 199.9	7	17.5	190.0 to 199.9	3	7.5
5.0 to 6.9	4	10.0	200.0 to 209.9	0	0.0	200.0 to 209.9	4	10.0
7.0 to 8.9	11	27.5	210.0 to 219.9	4	10.0	210.0 to 219.9	2	5.0
9.0 to 10.9	3	7.5	220.0 to 229.9	6	15.0	220.0 to 229.9	7	17.5
11.0 to 12.9	3	7.5	230.0 to 239.9	10	25.0	230.0 to 239.9	7	17.5
13.0 to 14.9	2	5.0	240.0 to 249.9	5	12.5	240.0 to 249.9	5	12.5
15.0 and over	1	2.5	250.0 to 259.9	4	10.0	250.0 to 259.9	4	10.0
			260.0 to 269.9	1	2.5	260.0 to 269.9	3	7.5
			270.0 to 279.9	2	5.0	270.0 to 279.9	1	2.5
						280.0 to 289.9	3	7.5

were willing to give up from approximately 3.0 to 13.0 square feet of floor space in the living room. The remaining eighteen homemakers did not wish to alter the open space in the living room. See Table 7, p. 47.

If the suggested changes of the homemakers were carried out, the adjusted open floor space in the living room would range from approximately 170.0 to 280.0 square feet. Excluding the extremes, the adjusted open floor space would range from approximately 190.0 to 260.0 square feet. See Table 8, p. 48.

The suggested open floor space was projected to meet the preferences of the majority of homemakers. Two hundred fifty square feet of floor space allocated for open space in the living room would satisfy the projected needs of 83 per cent of the forty homemakers.

Total Space. The total size of the living rooms suggested by the forty homemakers ranged from approximately 170.0 to 290.0 square feet. Excluding the extremes, the total adjusted space for the living rooms ranged from approximately 190.0 to 270.0 square feet. On the basis of these house plans, a living room of approximately 261.0 square feet would satisfy the projected needs of the majority of the homemakers. This space would include 11 square feet for storage and 250.0 square feet for open space.

The Master Bedroom

Storage Space. Twenty-four of the forty homemakers were satisfied with the storage space in the master bedroom. Fifteen of the remaining sixteen homemakers expressed a desire for additional storage space in the master bedroom. This suggested space alteration ranged from 1.0 to 15.0 square feet of floor space. Excluding the extremes, the additional storage space suggested by the homemakers ranged from approximately 3.0 to 11.0

square feet. The remaining homemaker was willing to relinquish approximately 4.0 square feet of storage in the master bedroom. See Table 9.

The total storage space suggested by the forty homemakers ranged from approximately 10.0 to 37.0 square feet. Excluding the extremes, the desired storage space ranged from approximately 13.0 to 28.0 square feet. See Table 10.

Twenty-five square feet of storage space would satisfy the projected needs of 80 per cent of the forty homemakers interviewed.

Open Space. Forty-eight per cent of the forty homemakers interviewed were not willing to give up any open space in the master bedroom. The remaining homemakers were willing to give up approximately 1.0 to 10.0 square feet of floor space. Excluding the extremes, these suggested changes ranged from 3.0 to 7.0 square feet. See Table 9, p. 51.

The adjusted open space in the master bedroom would range from approximately 135.0 to 190.0 square feet if the suggested changes of the homemakers were carried out. Excluding the extremes, the adjusted open space ranged from 140.0 to 180.0 square feet. See Table 10, p. 52.

If 175.0 square feet of floor space were allocated for open space in the master bedroom the projected needs of 80 per cent of the forty homemakers interviewed would be satisfied.

Total Space. The total size of the master bedroom as suggested by the forty homemakers ranged from approximately 150.0 to 220.0 square feet. Excluding the extremes, the total adjusted space for the master bedroom ranged from approximately 160.0 to 200.0 square feet. On the basis of these house plans, a master bedroom of approximately 200.0 square feet would satisfy the majority of homemakers. This space would include 25.0

TABLE 9

MASTER BEDROOM FLOOR SPACE: ALTERATIONS SUGGESTED BY THE FORTY HOMEMAKERS

Storage Space			Open Space		
Square feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent
- 5.0 to - 3.1	1	2.5	Less than -9.0	2	5.0
- 3.0 to - 1.1	0	0.0	-9.0 to - 7.1	0	0.0
- 1.0 to .9	24	60.0	-7.0 to - 5.1	5	12.5
1.0 to 2.9	1	2.5	-5.0 to - 3.1	10	25.0
3.0 to 4.9	3	7.5	-3.0 to - 1.1	4	10.0
5.0 to 6.9	6	15.0	-1.0 to .9	19	47.5
7.0 to 8.9	0	0.0			
9.0 to 10.9	2	5.0			
11.0 and over	3	7.5			

TABLE 10

MASTER BEDROOM FLOOR SPACE: ADJUSTMENTS DESIRED BY THE FORTY HOMEMAKERS

Storage Space			Open Space			Total Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent		Number	Per cent
10.0 to 12.9	3	7.5	135.0 to 139.9	1	2.5	150.0 to 159.9	3	7.5
13.0 to 15.9	15	37.5	140.0 to 144.9	6	15.0	160.0 to 169.9	11	27.5
16.0 to 18.9	5	12.5	145.0 to 149.9	10	25.0	170.0 to 179.9	10	25.0
19.0 to 21.9	3	7.5	150.0 to 154.9	3	7.5	180.0 to 189.9	7	17.5
22.0 to 24.9	6	15.0	155.0 to 159.9	4	10.0	190.0 to 199.9	5	12.5
25.0 to 27.9	4	10.0	160.0 to 164.9	1	2.5	200.0 to 209.9	3	7.5
28.0 to 30.9	2	5.0	165.0 to 169.9	5	12.5	210.0 to 219.9	1	2.5
31.0 to 33.9	1	2.5	170.0 to 174.9	2	5.0			
34.0 to 36.9	1	2.5	175.0 to 179.9	2	5.0			
			180.0 to 184.9	3	7.5			
			185.0 to 189.9	3	7.5			

square feet for storage and 175.0 square feet for open space.

The Second Bedroom

Storage Space. Thirty-three of the forty homemakers (83 per cent) were satisfied with the storage space in the second bedroom. Five of the remaining seven homemakers would increase the storage space and the remaining two homemakers were willing to relinquish some storage space in the second bedroom. See Table 11.

The adjusted storage space as suggested by the forty homemakers ranged from approximately 6.0 to 36.0 square feet. Excluding the extremes, the adjusted storage space ranged from approximately 9.0 to 24.0 square feet of floor space. See Table 12.

Eighteen square feet of storage space in the second bedroom would satisfy the projected needs of 80 per cent of the forty homemakers.

Open Space. Seventy per cent of the forty homemakers interviewed were not willing to give up any open space in the second bedroom. The remaining homemakers were willing to give up approximately 1.0 to 12.0 square feet of floor space in the second bedroom. Excluding the extremes, these suggested changes ranged from 5.0 to 9.0 square feet. See Table 11, p. 54.

The adjusted open space in the second bedroom would range from approximately 105.0 to 155.0 square feet if the suggested changes of the homemakers were carried out. Excluding the extremes, the adjusted open space ranged from 115.0 to 145.0 square feet. See Table 12, p. 55.

If 145.0 square feet of floor space were allocated for open space in the second bedroom the projected needs of 85 per cent of the forty homemakers interviewed would be satisfied.

TABLE 11

SECOND BEDROOM FLOOR SPACE: ALTERATIONS SUGGESTED BY THE FORTY HOMEMAKERS

Storage Space			Open Space		
Square feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent
Less than -7.0	1	2.5	Less than -11.0	1	2.5
- 7.0 to -5.1	1	2.5	- 11.0 to - 9.1	2	5.0
- 5.0 to -3.1	0	0.0	- 9.0 to - 7.1	2	5.0
- 3.0 to -1.1	0	0.0	- 7.0 to - 5.1	5	12.5
- 1.0 to .9	33	82.5	- 5.0 to - 3.1	1	2.5
1.0 to 2.9	0	0.0	- 3.0 to - 1.1	1	2.5
3.0 to 4.9	0	0.0	- 1.0 to .9	28	70.0
5.0 to 6.9	2	5.0			
7.0 and over	3	7.5			

TABLE 12

SECOND BEDROOM FLOOR SPACE: ADJUSTMENTS DESIRED BY THE FORTY HOMEMAKERS

Storage Space			Open Space			Total Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent		Number	Per cent
6.0 to 8.9	4	10.0	105.0 to 109.9	5	12.5	120.0 to 129.9	8	20.0
9.0 to 11.9	15	37.5	110.0 to 114.9	0	0.0	130.0 to 139.9	5	12.5
12.0 to 14.9	8	20.0	115.0 to 119.9	3	7.5	140.0 to 149.9	14	35.0
15.0 to 17.9	5	12.5	120.0 to 124.9	1	2.5	150.0 to 159.9	6	15.0
18.0 to 20.9	4	10.0	125.0 to 129.9	11	27.5	160.0 to 169.9	4	10.0
21.0 to 23.9	2	5.0	130.0 to 134.9	6	15.0	170.0 to 179.9	3	7.5
24.0 to 26.9	1	2.5	135.0 to 139.9	2	5.0			
27.0 to 29.9	0	0.0	140.0 to 144.9	6	15.0			
30.0 to 32.9	0	0.0	145.0 to 149.9	5	12.5			
33.0 to 35.9	1	2.5	150.0 to 154.9	1	2.5			

Total Space. The total size of the second bedroom as suggested by the forty homemakers ranged from approximately 120.0 to 180.0 square feet. Excluding the extremes, the total adjusted space for the second bedroom ranged from approximately 130.0 to 160.0 square feet. On the basis of these plans, a second bedroom of approximately 163.0 square feet would satisfy the majority of homemakers. This space would include 18.0 square feet of storage and 145.0 square feet for open space.

The Third Bedroom

Storage Space. Thirty of the forty homemakers were satisfied with the storage space in the third bedroom. Nine of the remaining ten homemakers expressed a desire for additional storage space in the third bedroom. This suggested space alteration ranged from 3.0 to 21.0 square feet of floor space. Excluding the extremes, the additional storage space suggested by the homemakers ranged from approximately 5.0 to 9.0 square feet. The remaining homemakers were willing to relinquish approximately 4.0 square feet of storage in the third bedroom. See Table 13.

The adjusted storage space as suggested by the forty homemakers ranged from approximately 6.0 to 39.0 square feet. Excluding the extremes, the adjusted storage space ranged from approximately 9.0 to 21.0 square feet of floor space. See Table 14.

Fifteen square feet of storage space would meet the projected needs of 83 per cent of the forty homemakers interviewed.

Open Space. Eighty per cent of the forty homemakers interviewed were not willing to give up any open space in the third bedroom. The remaining homemakers were willing to give up approximately 1.0 to 21.0 square feet of floor space in the third bedroom. See Table 13, p. 57.

TABLE 13

THIRD BEDROOM FLOOR SPACE: ALTERATIONS SUGGESTED BY THE FORTY HOMEMAKERS

Storage Space			Open Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent
-5.0 to -3.1	1	2.5	Less than -13.0	3	7.5
-3.0 to -1.1	0	0.0	-13.0 to -11.1	1	2.5
-1.0 to .9	30	75.0	-11.0 to - 9.1	0	0.0
1.0 to 2.9	0	0.0	- 9.0 to - 7.1	2	5.0
3.0 to 4.9	3	7.5	- 7.0 to - 5.1	0	0.0
5.0 to 6.9	2	5.0	- 5.0 to - 3.1	1	2.5
7.0 to 8.9	1	2.5	- 3.0 to - 1.1	1	2.5
9.0 and over	3	7.5	- 1.0 to .9	32	80.0

TABLE 14

THIRD BEDROOM FLOOR SPACE: ADJUSTMENTS DESIRED BY THE FORTY HOMEMAKERS

Storage Space			Open Space			Total Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent		Number	Per cent
6.0 to 8.9	4	10.0	90.0 to 94.9	1	2.5	105.0 to 109.9	3	7.5
9.0 to 11.9	17	42.5	95.0 to 99.9	0	0.0	110.0 to 114.9	0	0.0
11.0 to 14.9	12	30.0	100.0 to 104.9	5	12.5	115.0 to 119.9	2	5.0
15.0 to 17.9	2	5.0	105.0 to 109.9	6	15.0	120.0 to 124.9	17	42.5
18.0 to 20.9	2	5.0	110.0 to 114.9	7	17.5	125.0 to 129.9	3	7.5
21.0 to 23.9	0	0.0	115.0 to 119.9	8	20.0	130.0 to 134.9	1	2.5
24.0 to 26.9	1	2.5	120.0 to 124.9	7	17.5	135.0 to 139.9	7	17.5
27.0 to 29.9	1	2.5	125.0 to 129.9	3	7.5	140.0 to 144.9	4	10.0
30.0 to 32.9	0	0.0	130.0 to 134.9	0	0.0	145.0 to 149.9	3	7.5
33.0 to 35.9	0	0.0	135.0 to 139.9	3	7.5			
36.0 to 38.9	1	2.5						

The adjusted open space in the third bedroom would range from approximately 90.0 to 140.0 square feet if the suggested changes of the homemakers were carried out. Excluding the extremes, the adjusted open space ranged from 100.0 to 130.0 square feet. See Table 14, p. 58.

The suggested open space was projected to meet the preferences of the majority of homemakers. If 125.0 square feet of floor space were allocated for open space in the third bedroom the projected needs of 85 per cent of the forty homemakers interviewed would be satisfied.

Total Space. The total size of the third bedroom as suggested by the forty homemakers ranged from approximately 105.0 to 150.0 square feet. Excluding the extremes, the total adjusted space for the third bedroom ranged from approximately 115.0 to 140.0 square feet. On the basis of these house plans, a third bedroom of approximately 140.0 square feet would satisfy the majority of homemakers studied. This space would include 15.0 square feet for storage and 125.0 square feet for open space.

The Main Bathroom

Storage Space. Fifteen of the forty homemakers were satisfied with the storage space in the main bath. The remaining twenty-five homemakers indicated a desire to increase the storage in the main bath. This suggested space alteration ranged from 1.0 to 5.0 square feet of floor space. Excluding the extremes, the additional storage space suggested by the homemakers ranged from 2.0 to 4.0 square feet. See Table 15.

The adjusted storage space as suggested by the forty homemakers ranged from approximately 1.0 to 9.0 square feet. Excluding the extremes, the adjusted storage space ranged from approximately 2.0 to 5.0 square feet of floor space. Two of the forty homemakers indicated they were satisfied with no storage in the main bath. See Table 16,

TABLE 15

MAIN BATH FLOOR SPACE: ALTERATIONS SUGGESTED BY THE FORTY HOMEMAKERS

Storage Space			Open Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent
.0 to .9	15	37.5	-5.0 to -4.1	2	5.0
1.0 to 1.9	4	10.0	-4.0 to -3.1	0	0.0
2.0 to 2.9	9	22.5	-3.0 to -2.1	3	7.5
3.0 to 3.9	9	22.5	-2.0 to -1.1	4	10.0
4.0 to 4.9	3	7.5	-1.0 to - .1	0	0.0
			.0 to .9	30	75.0
			1.0 and over	1	2.5

TABLE 16

MAIN BATH FLOOR SPACE: ADJUSTMENTS DESIRED BY THE FORTY HOMEMAKERS

Storage Space			Open Space			Total Space ^a		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent		Number	Per cent
.0 to .9	2	5.0	14.0 to 15.9	2	5.0	30.0 to 34.9	1	2.5
1.0 to 1.9	3	7.5	16.0 to 17.9	6	15.0	35.0 to 39.9	8	20.0
2.0 to 2.9	8	20.0	18.0 to 19.9	5	12.5	40.0 to 44.9	16	40.0
3.0 to 3.9	8	20.0	20.0 to 21.9	6	15.0	45.0 to 49.9	9	22.5
4.0 to 4.9	16	40.0	22.0 to 23.9	8	20.0	50.0 to 54.9	4	10.0
5.0 to 5.9	0	0.0	24.0 to 25.9	5	12.5	55.0 to 59.9	2	5.0
6.0 to 6.9	2	5.0	26.0 to 27.9	7	17.5			
7.0 and over	1	2.5	28.0 and over	1	2.5			

^aTotal includes approximately 21 square feet for bathroom fixtures.

Five square feet of storage space would satisfy the projected needs of 93 per cent of the forty homemakers.

Open Space. Seventy-five per cent of the forty homemakers interviewed were not willing to give up any open space in the main bath. The remaining homemakers were willing to give up approximately 1.0 to 5.0 square feet of floor space in the main bath. Excluding the extremes, these suggested changes ranged from 2.0 to 3.0 square feet. Only one homemaker indicated a desire for additional open space in the main bath. See Table 15, p. 60.

The adjusted open space in the main bath would range from approximately 14.0 to 41.0 square feet if the suggested changes of the homemakers were carried out. Excluding the extremes, the adjusted open space ranged from 16.0 to 28.0 square feet. See Table 16, p. 61.

If 26.0 square feet of floor space were allocated for open space in the main bath the projected needs of 80 per cent of the forty homemakers would be satisfied.

Total Space. The total size of the main bath as suggested by the forty homemakers ranged from approximately 30.0 to 60.0 square feet. Excluding the extremes, the total adjusted space for the main bath ranged from approximately 35.0 to 55.0 square feet. On the basis of these house plans, a main bath of approximately 52.0 square feet would satisfy the majority of homemakers. This space would include 5.0 square feet for storage, 26.0 square feet for open and 21.0 square feet for bathroom fixtures.

The Second Bathroom

Storage Space. Twelve of the forty homemakers were satisfied with the amount of storage in the second bath. The remaining twenty-eight

homemakers expressed a desire for additional storage space, ranging from 1.0 to 8.0 square feet. Excluding the extremes, the additional storage space suggested by the homemakers ranged from approximately 2.0 to 5.0 square feet. See Table 17.

The adjusted storage space as suggested by the forty homemakers ranged from approximately 1.0 to 12.0 square feet. Excluding the extremes, the adjusted storage space ranged from approximately 2.0 to 9.0 square feet of floor space. See Table 18.

Four square feet of storage space would satisfy the projected needs of 78 per cent of the forty homemakers interviewed.

Open Space. Seventy-three per cent of the forty homemakers interviewed were not willing to give up any open space in the second bath. The remaining homemakers were willing to give up approximately 1.0 to 5.0 square feet of floor space in the second bath. Excluding the extremes, these suggested changes ranged from 2.0 to 4.0 square feet. See Table 17, p. 64.

The adjusted open space in the second bath would range from approximately 13.0 to 25.0 square feet if the suggested changes of the homemakers were carried out. Excluding the extremes, the adjusted open space ranged from 14.0 to 22.0 square feet. See Table 18, p. 65.

If 22.0 square feet of floor space were allocated for open space in the second bath the projected needs of 83 per cent of the forty homemakers would be satisfied.

Total Space. The total size of the second bath as suggested by the forty homemakers ranged from approximately 30.0 to 48.0 square feet. Excluding the extremes, the total adjusted space for the second bath ranged from approximately 32.0 to 44.0 square feet. On the basis of these house

TABLE 17

SECOND BATHROOM FLOOR SPACE: ALTERATIONS SUGGESTED BY THE FORTY HOMEMAKERS

Storage Space			Open Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent
.0 to .9	12	30.0	-5.0 to -4.1	3	7.5
1.0 to 1.9	2	5.0	-4.0 to -3.1	2	5.0
2.0 to 2.9	10	25.0	-3.0 to -2.1	4	10.0
3.0 to 3.9	9	22.5	-2.0 to -1.1	2	5.0
4.0 to 4.9	4	10.0	-1.0 to - .1	0	0.0
5.0 to 5.9	0	0.0	.0 to .9	29	72.5
6.0 to 6.9	2	5.0			
7.0 to 7.9	1	2.5			

TABLE 18
 SECOND BATH FLOOR SPACE: ADJUSTMENTS DESIRED BY THE FORTY HOMEMAKERS

Storage Space			Open Space				Total Space ^a		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families		Square Feet of Floor Space	Families		
	Number	Per cent		Number	Per cent		Number	Per cent	
.0 to .9	8	20.0	13.0 to 13.9	6	15.0	30.0 to 31.9	2	5.0	
1.0 to 1.9	6	15.0	14.0 to 14.9	5	12.5	32.0 to 33.9	6	15.0	
2.0 to 2.9	8	20.0	15.0 to 15.9	2	5.0	34.0 to 35.9	8	20.0	
3.0 to 3.9	9	22.5	16.0 to 16.9	6	15.0	36.0 to 37.9	4	10.0	
4.0 to 4.9	2	5.0	17.0 to 17.9	5	12.5	38.0 to 39.9	6	15.0	
5.0 to 5.9	0	0.0	18.0 to 18.9	3	7.5	40.0 to 41.9	3	7.5	
6.0 to 6.9	2	5.0	19.0 to 19.9	3	7.5	42.0 to 43.9	5	12.5	
7.0 to 7.9	1	2.5	20.0 to 20.9	2	5.0	44.0 to 45.9	3	7.5	
8.0 to 8.9	1	2.5	21.0 to 21.9	1	2.5	46.0 to 47.9	3	7.5	
9.0 to 9.9	0	0.0	22.0 to 22.9	0	0.0				
10.0 to 10.9	2	5.0	23.0 to 23.9	0	0.0				
11.0 to 11.9	1	2.5	24.0 to 24.9	7	17.5				

^aIncludes approximately 20 square feet for bathroom fixtures

plans, a second bath of approximately 46.0 square feet would satisfy the majority of homemakers interviewed. This space would include 4.0 square feet for storage, 22.0 square feet for open and 20.0 square feet for the bathroom fixtures.

The Hall

Storage Space. Nineteen of the forty homemakers were satisfied with the present amount of storage in the hall. Twenty of the remaining twenty-one homemakers expressed a desire for additional storage space in the hall. This suggested space alteration ranged from 1.0 to 10.0 square feet of floor space. Excluding the extremes, the additional storage space suggested by the homemakers ranged from approximately 3.0 to 7.0 square feet. The remaining homemaker was willing to relinquish approximately 4.0 square feet of storage in the hall. See Table 19.

The adjusted storage space as suggested by the forty homemakers ranged from approximately 2.0 to 38.0 square feet. Excluding the extremes, the adjusted storage space ranged from approximately 6.0 to 26.0 square feet of floor space. See Table 20.

Eighteen square feet of storage space would satisfy the projected needs of 80 per cent of the forty homemakers interviewed.

Open Space. Seventy-eight per cent of the forty homemakers interviewed were not willing to give up any open space in the hall. The remaining homemakers were willing to give up approximately 2.0 to 5.0 square feet of floor space in the hall. See Table 19, p. 67.

The adjusted open space in the hall would range from approximately 30.0 to 130.0 square feet if the suggested changes of the homemakers were carried out. Excluding the extremes, the adjusted open space ranged from 40.0 to 110.0 square feet. See Table 20, p. 68.

TABLE 19

HALL FLOOR SPACE: ALTERATIONS SUGGESTED BY THE FORTY HOMEMAKERS

Storage Space			Open Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent
-5.0 to -3.1	1	2.5	-5.0 to -4.1	5	12.5
-3.0 to -1.1	0	0.0	-4.0 to -3.1	3	7.5
-1.0 to .9	19	47.5	-3.0 to -2.1	1	2.5
1.0 to 2.9	2	5.0	-2.0 to -1.1	0	0.0
3.0 to 4.9	14	35.0	-1.0 to - .1	0	0.0
5.0 to 6.9	3	7.5	.0 to .9	31	77.5
7.0 and over	1	2.5			

TABLE 20

HALL FLOOR SPACE: ADJUSTMENTS DESIRED BY THE FORTY HOMEMAKERS

Storage Space			Open Space			Total Space ^a		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent		Number	Per cent
2.0 to 5.9	12	30.0	30.0 to 39.9	1	2.5	40.0 to 49.9	1	2.5
6.0 to 9.9	7	17.5	40.0 to 49.9	4	10.0	50.0 to 59.9	5	12.5
10.0 to 13.9	12	30.0	50.0 to 59.9	7	17.5	60.0 to 69.9	2	5.0
14.0 to 17.9	1	2.5	60.0 to 69.9	5	12.5	70.0 to 79.9	9	22.5
18.0 to 21.9	0	0.0	70.0 to 79.9	7	17.5	80.0 to 89.9	7	17.5
22.0 to 25.9	4	10.0	80.0 to 89.9	0	0.0	90.0 to 99.9	0	0.0
26.0 to 29.9	0	0.0	90.0 to 99.9	6	15.0	100.0 to 109.9	4	10.0
30.0 to 33.9	2	5.0	100.0 to 109.9	6	15.0	110.0 to 119.9	0	0.0
34.0 to 37.9	2	5.0	110.0 to 119.9	0	0.0	120.0 to 129.9	3	7.5
			120.0 to 129.9	4	10.0	130.0 to 139.9	3	7.5
						140.0 to 149.9	6	15.0

^aTotal includes approximately 5 square feet for the furnace in 5 of the house plans.

If 110.0 square feet of floor space were allocated for open space in the hall the projected needs of 90 per cent of the forty homemakers would be satisfied.

Total Space. The total size of the hall ranged from approximately 40.0 to 150.0 square feet. Excluding the extremes, the total adjusted space for this area ranged from approximately 60.0 to 140.0 square feet. On the basis of these house plans, a hall of approximately 133.0 square feet would satisfy the majority of homemakers. This space would include 18.0 square feet for storage, 110.0 square feet for open and 5.0 square feet for the furnace.

The Storage-Utility Room

Storage Space. Thirty-seven of the forty homemakers were satisfied with their present arrangement for storage in the storage-utility room. Three homemakers indicated a desire for additional space in this area. See Table 21.

The adjusted storage space was determined by adding the suggested alteration to the existing storage in the storage-utility room. After adjustments were made in the storage space, 83 per cent of the forty homemakers did not indicate a desire for built-in storage in this area. See Table 22.

Open Space. Eighty per cent of the forty homemakers interviewed were not willing to alter the open space in the storage-utility room. Five homemakers were willing to give up some open space in this area. This amount ranged from approximately 3.0 to 10.0 square feet. The remaining three homemakers expressed a desire for additional open space in the storage-utility room. See Table 21, p. 70.

TABLE 21

STORAGE-UTILITY FLOOR SPACE: ALTERATIONS SUGGESTED BY THE FORTY HOMEMAKERS

Storage Space			Open Space		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families	
	Number	Per cent		Number	Per cent
-1.0 to .9	37	92.5	Less than -7.0	2	5.0
1.0 to 2.9	0	0.0	-7.0 to -5.1	2	5.0
3.0 to 4.9	0	0.0	-5.0 to -3.1	1	2.5
5.0 to 6.9	1	2.5	-3.0 to -1.1	0	0.0
7.0 and over	2	5.0	-1.0 to .9	32	80.0
			1.0 to 2.9	0	0.0
			3.0 to 4.9	0	0.0
			5.0 to 6.9	0	0.0
			7.0 and over	3	7.5

TABLE 22

STORAGE-UTILITY FLOOR SPACE: ADJUSTMENTS DESIRED BY THE FORTY HOMEMAKERS

Storage Space			Open Space			Total Space ^a		
Square Feet of Floor Space	Families		Square Feet of Floor Space	Families		Square Feet of Storage Space	Families	
	Number	Per cent		Number	Per cent		Number	Per cent
-1.0 to .9	33	82.5	20.0 to 29.9	2	5.0	20.0 to 29.9	1	2.5
1.0 to 2.9	0	0.0	30.0 to 39.9	8	20.0	30.0 to 39.9	7	17.5
3.0 to 4.9	0	0.0	40.0 to 49.9	12	30.0	40.0 to 49.9	3	7.5
5.0 to 6.9	1	2.5	50.0 to 59.9	9	22.5	50.0 to 59.9	14	35.0
7.0 to 8.9	0	0.0	60.0 to 69.9	5	12.5	60.0 to 69.9	9	22.5
9.0 and over	6	15.0	70.0 to 79.9	4	10.0	70.0 to 79.9	2	5.0
						80.0 to 89.9	4	10.0

^aTotal includes approximately 8 square feet for laundry equipment and hot water heater in 5 of the house plans.

The adjusted open space in the storage-utility room would range from approximately 20.0 to 80.0 square feet if the suggested changes of the homemakers were carried out. Excluding the extremes, the adjusted open space ranged from approximately 30.0 to 70.0 square feet. See Table 22, p. 71.

If 70.0 square feet of floor space were allocated for open space in the storage-utility room the projected needs of 90 per cent of the forty homemakers would be satisfied.

Total Space. The total size of the storage-utility room as suggested by the forty homemakers ranged from approximately 20.0 to 90.0 square feet. Excluding the extremes, the total adjusted space for the storage-utility room ranged from approximately 30.0 to 80.0 square feet. On the basis of these house plans, a storage-utility room of approximately 78.0 square feet would satisfy the majority of homemakers. This space would include no built-in storage, 70.0 square feet for open space and 8.0 square feet for the laundry equipment and hot water heater.

Space Recommendations for a 1,400 Square Foot House

Space recommendations for a house of approximately 1,400 square feet, based on the preferences of the majority of the forty homemakers, are summarized in Table 23. The preferences of the majority for each of the ten rooms or areas were used in order to obtain space recommendations for a 1,400 square foot house. A house of 1,422 square feet resulted.

The largest amount of storage space was desired in: (1) the kitchen, 31.0 square feet; (2) the master bedroom, 25.0 square feet; (3) the second bedroom, 18.0 square feet; (4) the hall, 18.0 square feet; (5) the third bedroom, 15.0 square feet.

TABLE 23

EXISTING AND RECOMMENDED SQUARE FOOTAGES OF FLOOR SPACE FOR TEN ROOMS OR AREAS FOR A 1,400 SQUARE FOOT HOUSE

Room or Area	Ranges in Existing Space			Recommended Space		
	Storage	Open	Total	Storage	Open	Total
Kitchen ^a	15.34 - 33.50	24.72 - 146.07	62.21 - 180.54	31.0	110.0	160.0
Dining-Family	0.00 - 10.40	103.54 - 189.75	112.00 - 189.75	9.0	180.0	189.0
Living	0.00 - 14.38	196.86 - 270.79	196.86 - 281.19	11.0	250.0	261.0
Master Bedroom	12.66 - 24.21	147.84 - 188.69	157.88 - 210.73	25.0	175.0	200.0
Second Bedroom	7.17 - 21.70	109.98 - 156.00	123.56 - 177.70	18.0	145.0	163.0
Third Bedroom	6.40 - 19.53	102.90 - 135.96	109.30 - 149.96	15.0	125.0	140.0
Main Bathroom ^b	0.00 - 4.87	16.96 - 26.54	33.40 - 52.96	5.0	26.0	52.0
Second Bathroom ^c	0.00 - 6.24	13.85 - 24.43	30.28 - 42.49	4.0	22.0	46.0
Hall ^d	2.77 - 27.30	42.10 - 126.77	53.39 - 143.40	18.0	110.0	133.0
Storage-Utility ^e	0.00 - 9.00	31.83 - 75.80	36.82 - 83.80	0.0	70.0	78.0
Total House	66.28 - 108.83	947.01 - 1,182.54	1,100.30 - 1,324.39	136.0	1,213.0	1,422.0

^aTotal includes approximately 19 square feet for kitchen appliances.

^bTotal includes approximately 21 square feet for bathroom fixtures.

^cTotal includes approximately 20 square feet for bathroom fixtures.

^dTotal includes approximately 5 square feet for furnace in 5 of the house plans.

^eTotal includes approximately 8 square feet for laundry equipment and hot water heater in 5 of the house plans.

The total storage space recommended in this study for a house of 1,422 square feet, which would meet the suggested preferences of 80 to 90 per cent of the homemakers, was 136.0 square feet. This constitutes approximately 10 per cent of the housing space.

The largest amount of open space was desired in: (1) the living room, 250.0 square feet; (2) the dining-family room, 180.0 square feet; (3) the master bedroom, 175.0 square feet; (4) the second bedroom, 145.0 square feet; (5) the third bedroom, 125.0 square feet.

The total open space recommended in this study for a house of 1,422 square feet, which would meet the preferences of 80 to 90 per cent of the homemakers, was 1,213.0 square feet. This constitutes approximately 85 per cent of the housing space.

As indicated earlier in the chapter, the homemakers wanted to increase the storage space within their houses. In order to project an increase in the storage, the homemakers had to relinquish open space within the house. It was not that the homemakers preferred less open space but that they preferred additional storage.

The recommended space divisions for a 1,400 square foot house, based on the preferences of the forty homemakers along with Federal Housing Administration minimum requirements, are shown in Table 24. In addition, space recommendations determined by Davis for a 1,100 square foot house based on the preferences of twenty homemakers are listed.

TABLE 24

HOUSING SPACE DIVISIONS RECOMMENDED FOR A 1,400 SQUARE FOOT HOUSE, A 1,100 SQUARE FOOT HOUSE AND THE MINIMUM REQUIREMENTS OF FEDERAL HOUSING ADMINISTRATION

	Present Study: 1,400 Square Foot Houses		Davis Study: 1,100 Square Foot Houses		FHA Minimums for three bedroom house	
	Storage	Total	Storage	Total	Storage	Total
Kitchen	31.0	160.0	24.0	84.0	20.0	70.0
Kitchen-Dining	..	..	6.0	98.0	..	..
Dining	..	..	..	..	..	95.0
Dining-Family	9.0	189.0	..	..	..	..
Living	11.0	261.0	10.0	230.0	..	170.0
Master Bedroom	25.0	200.0	15.0	153.0	6.0	80.0
Second Bedroom	18.0	163.0	14.0	152.0	6.0	80.0
Third Bedroom	15.0	140.0	12.0	142.0	6.0	80.0
Main Bathroom	5.0	52.0	5.0	58.0	1.8	..
Second Bathroom	4.0	46.0	..	..	..	..
Hall	18.0	133.0	4.0	65.0	..	..
Storage-Utility	..	78.0	20.0	65.0	..	..
Total House	136.0	1,422.0	110.0	1,047.0		

.. Space divisions not divided as such, did not exist or FHA did not list a minimum requirement.

CHAPTER V

STATISTICAL ANALYSIS OF DATA

One of the most useful statistical procedures for sensitizing an experiment is the analysis of variance. When used, the experiment is so designed that the total variation can be separated into components that are of experimental interest. In this study, the analysis of variance was used to test the differences in the square feet of storage space suggested by the forty homemakers between the families, between the rooms or areas, and between the plans. The variances were also analyzed to test the differences in the square feet of open space suggested by the forty homemakers between the families, between the rooms or areas, and between the plans. The homemakers' suggested square feet of alterations in storage space and square feet of alterations in open space were analyzed for all three of the above tested differences. In addition, the total square feet of storage space and the total square feet of open space, which would result if the homemakers' suggestions were followed, were analyzed to determine whether variations found were due to differences between families, rooms or areas or plans.

Differences in the Desired Alterations of Storage Space

The analysis of variance for the desired alterations of storage space is presented in Table 25. Three null hypotheses concerning the amount of storage space were to be tested. They are listed below:

1. The first null hypothesis to be tested was that there were no statistically significant differences between the families in the desired amount of alterations of storage space. This hypothesis could not be

TABLE 25

ANALYSIS OF VARIANCE OF THE ALTERATIONS IN SQUARE FEET
OF STORAGE SPACE DESIRED BY THE FORTY HOME-
MAKERS FOR THEIR PRESENT HOUSE PLANS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Families	300	3384.30	11.28
Rooms or Areas	9	363.72	40.41
Plans	9	133.66	14.85
Interaction	81	1566.40	19.33
Total	399	5448.08	

$$\text{Interaction, } F_{81,300} = \frac{19.33}{11.28} = 1.71$$

$$F \text{ at } 5\% = 1.34; \text{ at } 1\% = 1.50$$

$$\text{Rooms or Areas, } F_{9,81} = \frac{40.41}{19.33} = 2.09$$

$$F \text{ at } 5\% = 1.99; \text{ at } 1\% = 2.64$$

$$\text{Plans, } F_{9,81} = \frac{14.85}{19.33} = 0.77$$

$$F \text{ at } 5\% = 1.99; \text{ at } 1\% = 2.64$$

tested directly because the same families did not live in a house of each of the ten different plans. However, whether interaction variances were significantly greater than family variances could be tested. It was found that the interaction variances were significantly greater than the family variances at the one per cent level of significance. Therefore, by inference, the family variances were not statistically significant.

2. The second null hypothesis tested was that there were no statistically significant differences between the rooms or areas in the amount of alterations of storage space desired by the forty homemakers.

This hypothesis was rejected at the five per cent level of significance. The homemakers differentiated between particular rooms or areas within the house in the amount of storage space desired.

3. The third null hypothesis tested was that there were no statistically significant differences between the house plans in the amount of alterations of storage space desired.

This hypothesis was not rejected. In other words, the differences in the plans for the houses did not materially affect the amount of alterations in storage space.

Differences in the Total Storage Space Desired

The analysis of variance for the differences in the total storage space desired is presented in Table 26. Here again three null hypotheses were to be tested. They are listed below:

1. The first null hypothesis to be tested was that there were no statistically significant differences between the families in the total amount of storage space desired. This hypothesis could not be tested

TABLE 26

ANALYSIS OF VARIANCE OF THE TOTAL SQUARE FEET OF STORAGE
SPACE DESIRED BY THE FORTY HOMEMAKERS
IN THEIR PRESENT HOUSE PLANS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Families	300	3,377.38	11.26
Rooms or Areas	9	22,629.68	2,514.40
Plans	9	839.50	93.28
Interaction	81	8,148.85	100.60
Total	399	34,995.41	

$$\text{Interaction, } F_{81,300} = \frac{100.60}{11.26} = 8.93$$

$$F \text{ at } 5\% = 1.34; \text{ at } 1\% = 1.50$$

$$\text{Rooms or Areas, } F_{9,81} = \frac{2,514.40}{100.60} = 24.99$$

$$F \text{ at } 5\% = 1.99; F \text{ at } 1\% = 2.64$$

$$\text{Plans, } F_{9,81} = \frac{93.28}{100.60} = 0.93$$

$$F \text{ at } 5\% = 1.99; \text{ at } 1\% = 2.64$$

directly because the same families did not live in a house of each of the ten different plans. However, whether interaction variances were significantly greater than family variances could be tested. It was found that the interaction variances were significantly greater than the family variances at the one per cent level of significance. Therefore, by inference, the family variances were not statistically significant.

2. The second null hypothesis tested was that there were no statistically significant differences between the rooms or areas in the total storage space desired by the forty homemakers.

This hypothesis was rejected at the one per cent level of significance. The homemakers indicated differences in the total storage space desired in particular rooms or areas within the house.

3. The third null hypothesis tested was that there were no statistically significant differences between the house plans in the total storage space desired by the forty homemakers.

This hypothesis was not rejected. In other words, the differences in the plans for the houses did not materially affect the total amount of storage space desired by the forty homemakers.

Differences in the Desired Alterations of Open Space

The analysis of variance of the differences in the desired alterations of open space is presented in Table 27. Three null hypotheses concerning the amount of open space were tested. They are listed below:

1. The first null hypothesis to be tested was that there were no statistically significant differences between the families in the desired amount of alterations of open space. This hypothesis could not be tested

TABLE 27

ANALYSIS OF VARIANCE OF THE ALTERATIONS IN SQUARE FEET
OF OPEN SPACE DESIRED BY THE FORTY HOMEMAKERS
FOR THEIR PRESENT HOUSE PLANS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Families	300	3,686.04	12.29
Rooms or Areas	9	679.07	75.45
Plans	9	109.67	12.19
Interaction	81	1,412.62	17.44
Total	399	5,887.40	

$$\text{Interaction, } F_{81,300} = \frac{17.44}{12.29} = 1.42$$

$$F \text{ at } 5\% = 1.34; \text{ at } 1\% = 1.50$$

$$\text{Rooms or Areas, } F_{9,81} = \frac{75.45}{17.44} = 4.32$$

$$F \text{ at } 5\% = 1.99; \text{ at } 1\% = 2.64$$

$$\text{Plans, } F_{9,81} = \frac{12.19}{17.44} = 0.70$$

$$F \text{ at } 5\% = 1.99; \text{ at } 1\% = 2.64$$

directly because the same families did not live in houses of the ten different plans. However, whether interaction variances were significantly greater than family variances could be tested. It was found that the interaction variances were significantly greater than the family variances at the five per cent level of significance. Therefore, by inference, the family variances were not statistically significant.

2. The second null hypothesis tested was that there were no statistically significant differences between the rooms or areas in the amount of alterations of open space desired by the forty homemakers.

This hypothesis was rejected at the one per cent level of significance. The homemakers indicated a desire for alterations in the amount of open space in particular rooms or areas within the houses.

3. The third null hypothesis tested was that there were no statistically significant differences between the house plans in the amount of alterations of open space.

This hypothesis was not rejected. In other words, the differences in the plans for the houses had little important affect on the amount of alteration in open space desired.

Differences in the Total Open Space Desired

The analysis of variance of the differences in the total open space desired is presented in Table 28. Here again three null hypotheses were to be tested. They are listed below:

1. The first null hypothesis to be tested was that there were no statistically significant differences between the families in the total amount of open space desired. This hypothesis could not be tested directly because the same families did not live in each of the ten different house plans. However, whether interaction variances were

TABLE 28

ANALYSIS OF VARIANCE OF THE TOTAL SQUARE FEET OF OPEN
SPACE DESIRED BY THE FORTY HOMEMAKERS IN
THEIR PRESENT HOUSE PLANS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Families	300	3,478.41	11.59
Rooms or Areas	9	1,600,727.83	177,858.65
Plans	9	15,643.39	1,738.15
Interaction	81	146,703.19	1,811.15
Total	399	1,766,552.82	

$$\text{Interaction, } F_{81,300} = \frac{1,811.15}{11.59} = 156.27$$

$$F \text{ at } 5\% = 1.34; \text{ at } 1\% = 1.50$$

$$\text{Rooms or Areas, } F_{9,81} = \frac{177,858.65}{1,811.15} = 98.20$$

$$F \text{ at } 5\% = 1.99; \text{ at } 1\% = 2.64$$

$$\text{Plans, } F_{9,81} = \frac{1,738.15}{1,811.15} = 0.96$$

$$F \text{ at } 5\% = 1.99; \text{ at } 1\% = 2.64$$

significantly greater than family variances could be tested. It was found that the interaction variances were significantly greater than the family variances at the one per cent level of significance. Therefore, by inference, the family variances were not statistically significant.

2. The second null hypothesis tested was that there were no statistically significant differences between the rooms or areas in the total amount of open space desired by the forty homemakers.

This hypothesis was rejected at the one per cent level of significance. The homemakers knew in which rooms or areas they preferred larger and smaller amounts of open space.

3. The third null hypothesis tested was that there were no statistically significant differences between the house plans in the total amount of open space desired by the forty homemakers.

This hypothesis was not rejected. In other words, the differences in the plans for the houses did not affect the total amount of open space desired by the forty homemakers to any great degree.

The total amount of open space desired for each of the ten rooms is, obviously, more important than desired alterations from the standpoint of planning houses in the future.

CHAPTER VI

ROOM RELATIONSHIPS

In order to ascertain how the forty homemakers preferred the proximity of rooms, they were asked which three areas they would like near each of the seven rooms or areas within the house. Theoretically, differences in preferences could be due to chance; therefore, the law of probability was employed to test whether the choices were significantly greater than chance. If the number of times an area was chosen to be near another area was great enough for the chance probability to be less than five per cent, it was statistically significant and is listed below:

<u>Room or Area</u>	<u>Level of Significance</u>
Near the Kitchen	
Dining-Family room	1%
Storage-Utility room	1%
Living room	5%
Near the Dining-Family room	
Kitchen	1%
Living room	1%
Near the Living Room	
Dining-Family room	1%
Kitchen	1%
Near the Bedroom Area	
Main Bath	1%
Second Bath	1%
Near the Storage-Utility Room	
Dining-Family room	1%
Kitchen	1%
Near the Main Bath	
Bedroom area	1%
Living room	1%
Near the Second Bath	
Bedroom area	1%
Dining-Family room	1%
Kitchen	5%

Presuming that it might be desirable to have specific rooms near an outside doorway, each of the forty homemakers were given the choice of selecting three rooms out of a total of seven rooms in the house which they preferred near the front door. Rooms selected to be near the front door with greater than chance probability were:

<u>Room</u>	<u>Level of Significance</u>
Near the Front Door	
Dining-Family room	1%
Living room	1%

The homemakers also were asked to indicate their preferences for three rooms out of a total of seven in the house to be near the back door. Rooms selected to be near the back door with greater than chance probability were:

<u>Room</u>	<u>Level of Significance</u>
Near the Back Door	
Dining-Family room	1%
Kitchen	1%
Storage-Utility room	1%

The forty homemakers were asked which room was least objectionable as a passageway. The kitchen was selected enough times for the probability of the choice being due to chance to be less than one per cent. Some felt that the use of the kitchen as a passageway would be least objectionable because it was usually occupied by only one person. They also seemed to feel the flooring would be affected less since the kitchen floor was a hard surface in all the houses under study.

CHAPTER VII

SUMMARY AND CONCLUSIONS

After living in a house, a family often finds that some spaces for living and for storage are inadequate while other spaces could be reduced. The purpose of this study was to determine how homemakers would re-appportion the amount of living space and storage space provided for the different rooms in the house in which they live. An additional purpose was to determine the preferred relationships of rooms to one another and the preferred location of outside doorways.

House plans were chosen on the basis of having similar total outside square footages and the same number of rooms or areas within the plan. The plans chosen for study ranged from 1,293.84 to 1,571.14 square feet. The total inside square footage for the ten house plans ranged from 1,118.57 to 1,322.82. Each plan had ten different rooms or areas.

In order to test whether space preferences were consistent rather than due to individual idiosyncrasies, the study of each of the ten house plans was repeated four times with four different homemakers. A total of forty interviews were made in Charlotte, Greensboro, and Winston-Salem, North Carolina.

Since housing needs may vary with different sizes of families, this study was limited to families having two or three children. The children ranged in age from three months to nineteen years.

The homemakers were not allowed to project an increase in overall dimensions of the house in order to sensitize the suggested alterations in both storage space and in open space.

The recommended storage, open, and total spaces, based on the

preferences of the majority of the forty homemakers interviewed, are listed in Table 29. In order to meet the needs of the majority, the recommended size of the house became slightly larger than 1,400 square feet, as some homemakers preferred more space in one room, some in another.

All of the forty homemakers wanted additional storage space in the house, though all did not suggest additional storage for the same rooms. The homemakers particularly desired a large amount of storage space in the kitchen, the master bedroom, the second bedroom, the hall, and the third bedroom.

Since all of the forty homemakers did not suggest the same changes for each of the ten rooms or areas, the differences in their replies could have been attributed to differences between the family preferences, differences between the rooms or areas, or differences between the house plans. In order to test whether these differences were significant, the variances were analyzed.

The analysis of variance indicated that the homemakers could distinguish in which rooms or areas they felt storage was most important and in which rooms or areas they felt open space was most important.

The differences between the house plans did not materially affect the homemakers' preferences for storage space or for open space.

The differences between the families in preferences for storage space and open space could not be tested directly since the degrees of freedom were larger than the degrees of freedom for the interaction. However, whether interaction variances were significantly greater than family variances could be tested. It was found that interaction variances were significantly greater than family variances. Therefore, by inference, differences between the families did not materially affect the results.

TABLE 29

SPACE ALLOCATIONS THAT MEET THE PROJECTED DESIRES OF THE MAJORITY
OF HOMEMAKERS INTERVIEWED WHO LIVE IN HOUSES
OF APPROXIMATELY 1,400 SQUARE FEET

Room or Area	Suggested Space Allocations		
	Storage	Open	Total
Kitchen ^a	31.0	110.0	160.0
Dining-Family	9.0	180.0	189.0
Living	11.0	250.0	261.0
Master Bedroom	25.0	175.0	200.0
Second Bedroom	18.0	145.0	163.0
Third Bedroom	15.0	125.0	140.0
Main Bathroom ^b	5.0	26.0	52.0
Second Bathroom ^c	4.0	22.0	46.0
Hall ^d	18.0	110.0	133.0
Storage-Utility ^e	0.0	70.0	78.0

^aTotal includes app. 19 sq. ft. for kitchen appliances.

^bTotal includes app. 21 sq. ft. for bathroom fixtures.

^cTotal includes app. 20 sq. ft. for bathroom fixtures.

^dTotal includes app. 5 sq. ft. for furnace in 5 of the house plans.

^eTotal includes app. 8 sq. ft. for laundry equipment and hot water heater in 5 of the house plans.

The preferences of the forty homemakers for the proximity of rooms and outside doorways are listed below: These preferences occurred with greater than chance frequency.

<u>Room or Area</u>	<u>Level of Significance</u>
Near the Kitchen	
Dining-Family	1%
Storage-Utility	1%
Living	5%
Near the Dining-Family	
Kitchen	1%
Living	1%
Near the Living	
Dining-Family	1%
Kitchen	1%
Near the Bedrooms	
Main Bath	1%
Second Bath	1%
Near the Main Bathroom	
Bedrooms	1%
Living	1%
Near the Second Bathroom	
Bedrooms	1%
Dining-Family	1%
Kitchen	5%
Near the Storage-Utility	
Dining-Family	1%
Kitchen	1%
Near the Front Door	
Dining-Family	1%
Living	1%
Near the Back Door	
Dining-Family	1%
Kitchen	1%
Storage-Utility	1%

The forty homemakers were asked which room was least objectionable as a passageway. The kitchen was selected enough times for the probability of the choice being due to chance to be less than one per cent. Some of the homemakers felt that the use of the kitchen as a passageway would be least objectionable because it was usually occupied by only one person. Some of the homemakers indicated the flooring would be affected less since the kitchen floor was a hard surface in all the houses under study.

It is recommended that similar studies of houses of various square footages be undertaken to determine preferences of homemakers for open spaces and for storage spaces. For example, a study of preferences of homemakers living in two-story houses of approximately 1,400 square feet would be of interest. It may be that preferred locations and amounts of storage and open spaces would differ between one and two story houses of approximately the same size.

It is hoped that this study will be of interest to families, housing designers, research personnel, and builders and that it will make a contribution to the housing plans of the future.

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Married Partner _____

Name _____
Address _____

Married's occupation: _____

Married's occupation: Part time _____

Married's occupation: Full time _____

Children in family: _____

Number of boys: _____

Number of girls: _____

Number of years having lived in this house: _____

How do you like most about this house? _____

What do you like least about this house? _____

APPENDIX

If you were buying another house, what type would you buy? Check

the number: _____

Schedule Number _____

Date: _____

Name: _____ Address: _____

Husband's occupation: _____

Wife's occupation: Part time _____

Full time _____

Children in family:

Number of boys _____ Ages _____

Number of girls _____ Ages _____

Number of years having lived in this house: _____

What do you like most about this house? _____

What do you like least about this house? _____

If you were buying another house, what type would you buy? Circle

the answer. Ranch type Split level Two Story

Schedule Number _____

Summary Sheet for Data and for the Homemaker to Rate Preferences

In order of preference, which rooms or areas would you prefer larger and smaller? Please rate both the open space and the storage space.

Larger				Room	Smaller			
Open Space		Storage Space			Open Space		Storage Space	
Sq. Ft.	Rate Pref.	Sq. Ft.	Rate Pref.		Sq. Ft.	Rate Pref.	Sq. Ft.	Rate Pref.
				Kitchen				
				Dining-Family				
				Living				
				BR I				
				BR II				
				BR III				
				Main Bath				
				Second Bath				
				Hall				
				Storage-Utility				
Total:	Total:		Total:		Total:		Total:	

TOTAL: _____

TOTAL: _____

Schedule Number _____

Of the six different remaining rooms or areas, which three do you think should be close to: (They can be equally important.)

1. the Kitchen

Room	Reason
a.	
b.	
c.	

2. the Dining-Family Room

Room	Reason
a.	
b.	
c.	

3. the Living Room

Room	Reason
a.	
b.	
c.	

4. the Bedrooms

Room	Reason
a.	
b.	
c.	

5. the Main Bath

Room	Reason
a.	
b.	
c.	

6. the Second Bath

Room	Reason
a.	
b.	
c.	

7. the Storage-Utility Area

Room	Reason
a.	
b.	
c.	

Which three of the seven areas do you think should be close to:

1. the Front Door

Room	Reason
a.	
b.	
c.	

2. the Back Door

Room	Reason
a.	
b.	
c.	

Almost all plans of houses are laid out so that the people living in them have to go through one room to get to another. Which room would you prefer to use as a passageway?

Room	Reason
a.	