HOUSING SPACE DIVISIONS FOR LIVING AND FOR STORAGE SUGGESTED BY THIRTY-SIX HOMEMAKERS WHO LIVED IN SPLIT-LEVEL HOUSES

by

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APPROVAL SHEET

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This study was planned to determine how homemakers, who lived in split-level houses, preferred to have the existing space in their houses allocated for storage and for living.

Nine house plans, each with the same number and kinds of rooms, were used. Two sizes of house plans were included because a sufficient number of house plans of approximately the same size were not available. Five plans were for smaller split-level houses which ranged from 1515.85 to 1657.08 square feet and four plans were for larger split-level houses which ranged from 1798.89 to 1926.23 square feet.

Thirty-six homemakers were interviewed--four for each of the nine different house plans. When the homemakers suggested changes in living and storage space in their houses, they were not allowed to suggest changes in the overall size of their houses, since the focus of this study was the space allocations in their present houses and not their desires for a larger or smaller house.

The total existing storage in the five smaller split-level houses ranged from fifty-eight to ninety-one square feet. All of the homemakers wanted additional storage. A total of 101 square feet of storage would satisfy a majority of the twenty homemakers living in the smaller houses. The total existing storage in the four larger split-level houses ranged from seventy to one hundred square feet. A total of 128 square feet of storage would satisfy a majority of the

sixteen homemakers living in the larger houses.

In order to determine whether differences in the homemakers' desires for storage and for living space were due to differences between the house plans, differences between the rooms, or differences between the families, twenty-four null hypotheses were tested. The analysis of variance was used to test the hypotheses.

The resulting suggested desires of housing space for living and for storage were not affected to any extent by either differences between the house plans not differences between the homemakers. The homemakers not only wanted more storage space but consistently distinguished between rooms in the amount of storage space needed. They also agreed on which rooms should be larger, which smaller.

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CHAPTER I

INTRODUCTION

In an effort to keep pace with demand over a million new houses have been built each year in the United States since World War II. During the earlier part of this period new houses were easy to sell even though they were small and often poorly planned.(1:103) People bought the houses that were available and it wasn't long before the complaints, lack of space and lack of adequate storage, were heard.(2:128) Because of high building costs it was impossible for many prospective buyers to purchase the more spacious houses they preferred.

Today, houses are larger in comparison to those built immediately following World War II. Families also have more money which they could spend for housing if better housing were available. Some builders realize that people would spend more of their rising incomes for houses if houses were better designed and planned. Two desired features are larger houses and more storage space.(3:121) Well designed houses that are functional and livable are the concern of home economists.

Home economists have conducted research to determine the space requirements for various activities and for the storage of various items in the house. Such research can aid designers and builders to develop plans in ac-

cordance with the space needs of families.

One housing space study, "Adjustments in Open Floor Space And Storage Space Divisions Expressed by Twenty Homemakers Who Live in Speculative Built Houses," in which Davis interviewed homemakers living in small, three-bedroom houses of approximately 1,000 square feet revealed that:

> although all the homemakers did not suggest additional storage in the same room, they all wanted more storage space in the house. More storage space was wanted first, in the kitchen, second, in the bathroom, third, in the bedroom area, and fourth, in the outside storage utility area.(4:81)

Studies similar to the Davis study, in which the living and storage space requirements of families living in other sizes and types of houses such as, larger one-story, two-story, and split-level houses, are needed.

The split-level house gained popularity during the early fifties because it was larger in relation to cost and people wanted more space. In 1952 it was stated by House and Home that:

> For many housewives the split-level is obviously a return to the idea of what a house should be: A kitchen, a dining and living room on one floor with bedrooms separate from the living quarters and upstairs. The utility room with its furnace and laundry room is usually a finished or partly finished room suitable for many purposes: TV, study, guest bedroom, sewing room, workshop, childrens' play area. The split-level seems to have all of the advantages of a real two story house but with only half a dozen short steps to climb between levels.(5:117)

Patterned after the study by Davis, this study was planned to investigate the living and storage space preferences of homemakers living in split-level houses.

It is hoped that designers and builders will find the results of this study useful in planning and building housing spaces in accordance with family

preferences.

I. PURPOSES

To determine how homemakers, who live in split-level houses, prefer to have the existing space in their houses allocated for living and for storage was the aim of this study. A secondary purpose was to determine how the homemakers preferred rooms arranged in relation to each other and to the front and back doorways.

It was possible that differences in plans, families and rooms could influence the results. Therefore, twenty-four null hypotheses were tested. They were that there is no difference in amounts of living and in the amounts of storage space suggested by homemakers living in split-level houses, with the identical number and kinds of rooms: (1) between different families, (2) between different rooms, and (3) between different house plans.

II. DEFINITIONS OF TERMS

Speculative built houses: Houses planned and built for an unknown occupant.

Existing spaces: the square footages as built.

Living space or open space: the floor space which is not used for built-in storage, or equipment, therefore, it is free space for furniture or for activities of individuals.

Storage space: that floor space which is used for built-in storage, such as cabinets, closets and shelves.

Depth of storage space: the dimension perpendicular to a wall.

Width or length of storage space: the dimension parallel to a wall.

Suggested space alterations: square footages of the changes suggested by the homemakers.

Adjusted spaces: combined existing spaces plus or minus suggested space alterations.

CHAPTER II

REVIEW OF LITERATURE

The literature reviewed in this chapter relates recommendations in research for sizes of rooms or areas in the house. These area spaces are further considered according to storage which occupies floor space and clearances needed to perform certain tasks. Since this study is focused on the use of floor space, the writer did not include research on heights or divisions of storage space.

Most of the research included was conducted by Agricultural Experiment Stations. The requirements of the Federal Housing Administration are also given because they are so often used as a guide by builders.

In the remainder of this chapter the recommendations found in the literature are given for each room or area of the house.

Kitchen

Those who think that house plans should be tailor-made for family situations suggest that factors which should influence the size of the kitchen in a new house are: the amount of cooking done, which is related to the size of the family and the kind of entertaining; the number and kind of other activities, such as family eating, laundering, child play, and hobbies; and family preferences. A kitchen designed for meal preparation activities only can be

for storage, and 41 square feet would be open space.(4:82)

The University of Illinois Small Homes Council states in one of its circulars, Kitchen Planning Standards, that "the primary requirement for every kitchen plan is that there be sufficient wall space for installation of appliances and all the necessary cabinets and counters." This publication recommended minimum amounts of wall required for base cabinets and appliances for three levels of kitchens. Kitchens with liberal storage facilities, including appliances, require twenty linear feet; with medium storage facilities, seventeen feet six inches; and with limited storage facilities, fifteen feet.(8:4) Deducting nine feet six inches for appliances and translating the recommended linear measures into area of floor space required, the liberal storage facilities became 21 square feet of floor space, the medium storage facilities became 16 square feet and the limited storage facilities became 11 square feet of floor space. It was also advised by the Small Homes Council that when only minimum storage is allowed for in the budget, the builder should allow enough wall space to increase the amount of storage at a later time.(9:5)

Kitchen appliances and cabinets can be arranged in various ways; one wall, parallel wall, L, U, and broken U. The arrangement is dependent on the shape of the room and location of doors and windows. A Southern Series publication, Planning Guides for Southern Rural Homes, included plans for storage in each type of kitchen arrangement. These plans were based on recent research and included sufficient work and storage space to meet the needs of a majority of southern rural families.(10:9) Recommendations for width of storage units were

given according to the items stored and varied with the type of kitchen arrangement. Base cabinet storage was planned under all counters. The recommendations for counter width requirements and the writer's calculations of related floor space requirements are listed below.

Work Center	Counter Widths		Floor Space	
	Limited	Liberal	Limited	Liberal
	Inches		Square Feet	
Mix				
Straightline	36	42	6.0	7.0
Between turn of counter and sink or range	24	36	4.0	6.0
Between turn of counter and refrigerator	28	36	4.7	6.0
Left of sink (stacking clean dishes)				
Straightline	18	36	3.0	6.0
Between turn of counter and sink	6	18	1.0	3.0
Right of sink (stacking soiled dishes)				
Straightline	24	36	4.0	6.0
Between turn of counter and sink	6	18	1.0	3.0
Range-serve, hot food				
Straightline	12	24	2.0	4.0
Between turn of counter and range	8	8	1.3	1.3
Refrigerator - serve, cold food				
Straightline	15	18	2.5	3.0
Between turn of counter and refrigerator	21	24	3.5	4.0

The total amount of floor space needed for limited storage in a kitchen planned to meet the straightline counter width requirements recommended in this research would be 17.5 square feet. The amount of floor space needed for liberal storage in a straightline arrangement would be 26.0 square feet. The total square feet of floor space needed for the other measurements given in the table were not calculated because there could be overlapping of work centers, depend-

ing on the kitchen arrangement.

Another cooperative study, seeking to establish adequate farmhouse planning guides for the Northeast Region, included research in which recommended space requirements for the kitchen were also given.(11:10, 11) The recommended minimum counter requirements needed for meal preparation along with the writer's calculations of required floor space are listed below.

Center	Minimum Width Inches	Floor Space Square Feet
Refrigerator - at left side	15	2.5
Sink - no dishwasher		
at left side of bowl	32	5.3
at right side of bowl	36	6.0
Mix		
free standing	36	6.0
adjacent to another center	28	4.7
Range	21	3.5

According to Heiner and McCullough, the maximum depth of working surface is 20 inches, but where the conventional depth of 24 inches is provided the additional depth may be used for counter storage of frequently used items.(11:11)

Minimum requirements for storage and work space in relation to work units were suggested in a study by the Homemakers Institute of the Servel Company. In preparing the 84 meals used in the study the absolute minimum length of counter space needed by the workers in each work unit was: refrigerator unit, at least 36 inches; sink unit, at least 18 inches on each side of the sink;

and range unit, at least 18 inches.(12:15) These minimum allowances require 15 square feet of floor space. This is 3 square feet more than that required by the popular Federal Housing Administration's minimum standards and 2 1/2 square feet less than the recommendations of the southern cooperative study.

Storage in the kitchen should at least provide adequate space for food supplies, dishes, utensils, cleaning supplies, and linens. Adequate space should also be provided for working in the kitchen.

Recommended clearances for satisfactory performance of certain kitchen activities are listed below.(13:5)

Activity	Amount of Space Inches
Using kitchen base cabinet, wall oven, or refrigerator	36
Using range oven	38
Minimum space for two people working at cabinets and appliances opposite each other*	54
Liberal space for people working at cabinets and appliances opposite each other*	64
Using a front-opening dish washer (24" wide)	42 x 44

*except a front-opening dishwasher

These recommended space standards resulted from the body measurements of two-hundred-fifty subjects and their activity measurements for the part of each activity requiring the most space.(13:3)

It is stated in Planning Guides for Southern Rural Homes that the minimum floor space recommended between opposite cabinets or appliances is four feet for one worker and four and one-half feet for two workers; the maximum for convenience is six feet. This recommendation indicates that one dimension,

probably the width, of a kitchen with opposite cabinets or appliances should be no less than 8 feet and no more than 10 feet.(10:27)

Dining Room or Area

The space provided in a dining area should at least be sufficient for comfortable seating at the table and preferably there should be enough space to pass behind seated persons. Space should also be allowed for the storage of table linen and tableware, if this storage is not provided for elsewhere in the house.

According to Johnson and Hurley the space per cover at a table should be at least 21 inches long, but 24 to 29 inches would provide more freedom of movement.(14:10) The Southern Cooperative study also recommended 24 to 29 inches as the desirable length of a cover.(10:53) Johnson and Hurley found that a table 42 inches wide met the leg room requirements of 75 per cent of the men and women included in the study.(14:10)

Space is needed around the table for sitting, for getting up from the table, for passing and for serving. Johnson and Hurley recommended a minimum of 24 inches between the edge of a dinner table and a wall or furniture of more than elbow height for a person to seat himself. For serving or passing behind a seated person, 41.5 to 44.5 inches are needed.(11:16)

In Space Standards For Household Activities the clearances recommended around the table were: 32 inches for getting up from the table, 36 inches for edging past a seated person and 44 inches for walking past a seated person.(13:5)

Space requirements for clearances from the table edge to the wall given in Planning Guides for Southern Rural Homes were less than those mentioned in the two preceding studies. In this study the measurements given for getting up from the table were 24 to 30 inches and for serving were 30 to 36 inches.[10:53] A dining room planned to meet the space allowances recommended in this study would be eight and one-half to nine and one-half feet wide (table 42 inches wide with persons seated on each side).

The sizes of dining areas recommended by Johnson and Hurley for a specified number of persons and various serving patterns are given below.[14:11]

Number to be Seated	Size Area with Passage Behind Chairs On			
	All Sides	Three Sides	Two Sides	One Side
4	11'11" x 10'5" (124.1 sq. ft.)	10'6" x 10'5" (109.4 sq. ft.)	10'6" x 9' (94.5 sq. ft.)	10'6" x 7'7" (79.6 sq. ft.)
6	12'11" x 10'5" (134.5 sq. ft.)	11'6" x 10'5" (119.8 sq. ft.)	11'6" x 9' (103.5 sq. ft.)	11'6" x 7'7" (87.2 sq. ft.)
8	14'11" x 10'5" (155.4 sq. ft.)	13'6" x 10'5" (140.3 sq.ft.)	13'6" x 9' (121.5sq. ft.)	13'6" x 7'7" (102.4 sq. ft.)
10	16'11" x 10'5" (176.2 sq. ft.)	15'6" x 10'5" (161.5 sq. ft.)	15'6" x 9' (139.5 sq. ft.)	15'6" x 7'7" (117.5 sq. ft.)
12	17'11" x 10'5" (186.6 sq. ft.)	16'6" x 10'5" (171.9 sq. ft.)	16'6" x 9' (148.5 sq. ft.)	16'6" x 7'7" (125.1 sq. ft.)

*Rectangular dining table 60 inches long and 42 inches wide, table leaves 12 inches wide, chair 19 inches wide and 19 1/2 inches deep, covers 21 inches long and 14 1/2 inches deep, allowance for passage behind chairs 22 inches, allowance between chair and wall where no passage is planned 5 inches.

The preceding recommendations for the sizes of dining areas are for

the table and chairs with passage behind the chairs only. Any space for storage or additional furniture will be in addition to these recommended areas.

Following the principle that items should be stored at or near the place of use, there should be some provision made for storage in the dining area for items to be used in meal service. Campbell recommended that in a separate dining room, which is used for purposes other than for eating, storage should also be provided for the other activities carried on there.(15:82)

Storage walls for meal service equipment were recommended by Johnson and Hurley. The dimensions for the storage walls were determined for three income levels: low-income level, 37 inches wide by 21.5 inches deep; medium income level, 60 inches wide by 25.5 inches deep; high income level, 81.5 inches wide by 23.5 inches deep.(14.47) Translating these dimensions into the floor space required, the low income level recommendations became 5.39 square feet; the medium income level, 10.62 square feet; and the high income level, 13.30 square feet.

All but two of the homemakers interviewed by Davis wanted some storage in the dining area. Davis found that 6 square feet of storage space met the projected needs of these homemakers.(4:82)

Campbell recommended that the dining alcove should be at least 72 square feet or larger.(15:82) It was recommended in the Arizona study that dining areas in the kitchen for seating six should range from 52 square feet to 90 square feet with no one sitting at the ends of the table and from 78 to 134 square feet with a person sitting at each end of the table.(14:16)

Davis found that a dining area in the kitchen of 98 square feet met the projected needs of the twenty families, who were restricted to the floor space of their present homes in making adjustments.(4:82) This was slightly more than the 95 square feet required by the Federal Housing Administration for a separate dining room.(7:32)

Living or Family Room

Little research was found on living space and storage space requirements for living or family rooms. The Federal Housing Administration recommended as a minimum, a living room for a three-bedroom house of 170 square feet. If the living room is combined with a dining area the minimum size recommended was 200 square feet.(7:32) Also recommended by the Federal Housing Administration was a coat closet, reasonably accessible to the living areas, having the same minimum size as the bedroom closet, (2 feet deep and 3 feet wide or 6 square feet).(7:34)

A Georgia study by Bland and Mize suggested 196 square feet for liberal living areas and approximately 144 square feet for limited living areas. Storage was not included in these room sizes but it was recommended. The suggested storage space in a liberal living area was approximately 16 square feet and in a limited living area was approximately 14 square feet.(16:32, 33)

Based on the preferences of the homemakers interviewed, Davis suggested for small three-bedroom houses a living room of 220 square feet of living space and 10 square feet of storage space.(4:82)

It was suggested in research by Johnson that 12 to 13 square feet of play area be provided for children in the living room. Storage space should also be provided and the liberal amount recommended by Johnson for children's play materials was approximately 4 square feet; the minimum storage recommended was less than 2 square feet. Whether this storage will require floor space is dependent on the amount of storage space in the room which might be used or the amount to be provided for children's play materials. (17:183, 184, 185)

Bedrooms

According to one author, "about 100 square feet is the typical minimum size for a fully furnished bedroom. A single bed, a chair and a dresser can be accommodated in less than 100 square feet, but more space is desirable." (18:82)

The Federal Housing Administration requires that in three-bedroom houses a total of 280 square feet is the minimum which can be allotted for the bedrooms. It is also specified that each bedroom shall have at least one closet with a minimum depth of 2 feet and a minimum width of 3 feet (6 square feet). (7:32, 34)

Based on the projected needs of the majority of the homemakers in her study, Davis suggested that a total of 447 square feet be allotted for three bedrooms, of which 41 square feet was for storage. The total square footage was proportioned as shown below. (4:82)

Bedroom	Open Space	Storage Space	Total Space
	Square Feet		
1	138	15	153
2	138	14	152
3	130	12	142
Total	406	41	447

It is stated in research by Philson that in a bedroom used by more than one person it is desirable to have two closets. Also the usefulness and adequacy of a closet depends to a great extent on correct dimensions. The inside depth of a closet should never be less than 24 inches. Depths of 24 to 28 inches are recommended for all clothes closets except coat closets which should be 26 to 30 inches deep.[19:5, 18]

Philson recommended for homes with unassigned bedrooms, rod allowances per person for three levels of ownership: minimum level, 3 to 3.5 feet; medium level, 4 to 4.5 feet; and liberal level, 4.5 to 5.5 feet. When men hang all their shirts and their work pants, the liberal rod length requirement should be increased to about 5.5 to 6.5 feet per person.[19:19] The floor space needed for closets which meet these allowances for the minimum level of ownership would be from 6 to 7 square feet; for the moderate level, from 8 to 9 square feet; and for the liberal level, from 9 to 11 square feet; if the closets are two feet in depth.

In Farmhouse Planning Guides rod lengths required for Northeastern families are given. These recommended lengths were developed by the Clothing and Housing Research Division of the United States Department of Agriculture from a

farm housing survey in the Northeast region. The rod length recommended for closets and the floor space needed for the closets in each bedroom for in-season and out-of-season garments with a separate closet for dress-wear coats is given below for three-bedroom houses.[11:30]

Location of Storage	Limited to Liberal Dimensions	Floor Space Needed For Closets*
	Feet	Square feet
Length of rod in		
Master bedroom		
Wife's closet	3.5 to 4	7 to 8
Husband's closet	4 to 5	8 to 10
Bedroom #2	7.5 to 10	15 to 20
Bedroom #3	6 to 10	12 to 20
Coat Closet	4 to 5.5	8 to 10

*The inside measure for the depth of the coat closet is 30" and for the other closets it is 24".

The rod length requirements given in both the southern and northeastern studies are less than those given in a western study. The limited allowances recommended in the Western Cooperative Series represent the least space that should be provided. The liberal allowances will meet the clothes storage needs of most western farm families. The rod length recommended for each man or boy is from four feet to eight feet six inches; for each woman or girl is five feet four inches to thirteen feet four inches.[20:43] Translated into floor space requirements, closets for each man or boy requires 8 to 17 square feet and for each woman or girl, 10.5 to 26.5 square feet.

The minimum space recommended by McCullough for hanging clothes storage was a closet 2 feet deep and 4 feet wide or 8 square feet.[21:35]

In a bedroom free space is needed in addition to the space used for furnishings. The Farmhouse Planning Guides includes a study by Wells in which the amount of free space needed for sitting on the bed, getting up from the bed and for bed-making were determined.(11:28, 29) Amounts of floor space needed to carry on activities in the bedroom are also given in the publication, Space Standards for Household Activities.(13:12) Clearances for certain activities in the bedroom given in these two studies are listed below.

Activity	Clearance Space
	Inches
Sitting on bed	12 to 14
Getting up from the bed	14 to 19
Making bed	22 (all around)
Cleaning under bed	48
Using dresser	40
Using closet	36 to 42

It is also recommended that sufficient space be provided for child play and storage of play materials in a child's bedroom. Johnson suggested that 15 to 26 square feet of space be provided for play in the bedroom and that from 5 to 9 square feet be provided for storage of play materials.(17:183, 184, 185)

Bathroom

According to Carter and Hinchcliff, "the minimum bathroom size is five feet by seven feet, or thirty-five square feet, for tub, toilet and lavatory. More space is desirable to provide for the storage of towels, supplies, and room for dressing table or counter top cabinet."(18:83)

Monroe made a study in which space requirements for activities at

conventional bathroom fixtures were determined. It was stated in the study that in a bathroom "space is needed not only for comfortable use of the facilities by an individual alone or assisting another person, but also for purposes of cleaning and maintenance. Optimum arrangements of fixtures has not been determined."(11:26)

Amounts of space required at conventional bathroom fixtures recommended by Monroe are listed below.(11:26, 27)

Measurement	Minimum	Adequate
	Inches	
Lavatory in bathroom		
Width: center axis to		
adjacent wall at left	18	--
adjacent wall at right	20	--
Depth: front clearance to		
opposite wall	34	--
opposite tub	24	30
Tub in bathroom		
Width: parallel to side of tub	30	--
Depth: side of tub to opposite wall	30	34
center axis of adjacent toilet	16	18
Toilet in bathroom		
Width: center axis to		
side of 18-inch deep lavatory	--	14
side of 22-inch deep lavatory	14	16
side of tub	14	18
end of tub	14	16
Depth: front of bowl rim to		
opposite tub	--	24
opposite lavatory	24	30
opposite wall	--	30

In the Federal Housing Administration's publication, Minimum Property Standards, it is stated that a bathroom should be "adequate for water-

closet, lavatory and tub or a shower. Arrangement for fixtures shall provide for comfortable use of each fixture and permit at least a 90 degree door swing." (7:32)

Based on the projected needs of the homemakers interviewed, Davis suggested an area of 58 square feet for a bathroom in small three-bedroom houses. This area included 5 square feet for storage, 33 square feet of open space and 20 square feet for equipment.

The only storage in many bathrooms is a medicine cabinet. In a study of twenty-four families Nicholson found that all but one of the homemakers considered her bathroom storage inadequate. Storage for bathroom linens in the bathroom was preferred by 83 per cent of the homemakers. (22:17, 32)

Nicholson recommended deep storage which could be provided as closets, shelves or drawers. The measurements given in this study for deep storage, which required floor space, were for depths of 12 and 16 inches and ranged in length from 27 to 40 inches. Translated into floor space requirements these recommendations would vary from 2.2 to 3.3 square feet for twelve-inch shelves and from 2.9 to 4.3 square feet for sixteen-inch shelves. (22:51, 52)

The Western cooperative series report, Space Standards for Home Planners, contained suggestions for limited and liberal bathroom storage in addition to a medicine cabinet. For limited storage a cabinet, twenty-four inches wide and twenty inches deep, under the lavatory was recommended. Liberal storage included the same size cabinet under the lavatory plus two

cabinets, four drawers each, 20 inches deep and 12 inches wide.[20:1, 2, 3] Translated into floor space requirements these suggestions would become 3.3 square feet for limited storage and 6.6 square feet for liberal storage. Since only one-third of the space under lavatories is being considered storage space in this study, these suggestions become 1.1 square feet for limited storage and 4.4 feet for liberal storage.

A minimum storage unit for bathroom supplies recommended by McCullough was 16 inches deep and 24 inches wide. A storage unit of this size would require 2.66 square feet of floor space.[21:40]

Laundry

The laundry area should have adequate space for the equipment and for a worker to move about comfortably. Storage facilities for supplies and small equipment should be provided in the area. From the standpoint of ease in laundering, soiled clothing and household articles, as well as clean clothing which require further treatment, should be stored in or near the laundry area.[23:32]

In a study conducted by Sinden and Johnson the various processes of laundering, from sorting through ironing, were studied separately in relation to their space requirements.[11:21-24] Their findings along with the writer's calculations of required floor space are listed below.

Process	Length	Width	Area
	Feet And Inches		Square Feet
Sorting - table	5'0"	6'0"	30.0
floor	6'6"	6'6"	42.2
Pretreating - minimum	3'5"	5'0"	17.1
maximum	4'3"	5'0"	21.2
Washing - front opening washer	3'6"	5'1"	17.8
top opening washer	3'2"	4'5"	14.0
Drying - slant opening, drop door	3'8"	4'11"	18.1
front opening, right hinged door	3'11"	5'2"	20.2
Ironing - ironing board	4'7"	6'0"	27.5
ironer	4'6"	7'0"	31.5

Sinden and Johnson also had workers to use eight different arrangements of automatic washers and dryers. The preferred arrangement was with the dryer to the right of the washer and at an angle. The clear floor space needed for working varied with each arrangement.(23:37, 30) The floor area needed for operating automatic washers and dryers is given on page 23.

In a study conducted by the Georgia Experiment Station on laundry areas, different arrangements of laundry equipment, which included washer, dryer, sink, soiled and clean clothes bins and storage cabinets, were used and it was found that,

> overall floor space required for laundry areas ranged from forty-four to seventy-five square feet. The shape of the arrangement resulted in variation of the overall area as well as in the length and width dimensions. Arrangements on two opposite walls required less length for the equipment but more width than did one-wall arrangements. Two-wall and U-shaped arrangements needed less floor space to place equipment but additional space had to be added if ironing was done in the laundry area.(24:30)

The clear floor space recommended by Sinden and Johnson, which was mentioned on the preceding page, for working at eight different arrangements of automatic washers and dryers is listed below.

Arrangement	Length	Width	Work Area	Total Floor Area Needed*
	Feet And Inches		Square Feet	
With top opening washer				
1. Straight-line, dryer to right of washer	5'6"	3'0"	16.50	28.43
2. Right angle, dryer to right of washer	3'11"	3'4"	13.00	33.44
3. Diagonal, dryer to right of washer	4'11"	3'0"	14.75	32.73
4. Opposite dryer	6'10" 31"	1'9" 30"	18.50	29.57
5. Straight-line, dryer to left of washer	6'4"	2'11"	18.50	32.16
With front opening washer				
6. Stacked, dryer on top of washer	3'7"	3'1"	11.00	18.79
7. Straight-line, dryer to right of washer	6'9"	2'10"	19.00	33.75
8. Opposite dryer	7'0" 31"	1'6" 32"	17.50	28.56

*Work area plus space for equipment

The amount of floor space needed for four different laundry arrangements is given below.

Type of Arrangement	Length	Width	Total Area
	Feet And Inches		Square Feet
U-shape	7'7" - 7'9"	7'9" - 8'0"	59-62*
One wall	12'5"	5'6" - 6'0"	68-75
Opposite walls	6'0" - 8'3"	7'6" - 8'0"	45-66
L-shape	10'5" - 10'7"	6'6"	67-69

*It was possible to get the U-shaped arrangement in 44 square feet.

From 3 to 4 feet of free floor space in front of the equipment was adequate in all arrangements.(24:30)

Textile and Household Storage

> From the standpoint of functional storage, each of the four major groups of household textiles -- bath linens, kitchen linens, table linens and bedding -- would be stored at or near the place of use. However, restrictions imposed by such considerations as layout of house, cost, and family preference often dictate storing two or more groups of linens together.(25:1)

Research by Woolrich, White, and Richards indicates space requirements for the storage of household textiles. These researchers recommend that shelving should be at least 16 inches and not more than 50 inches wide. In this research the width dimension is reported in a range. Any specific dimension which falls within the range can be used when planning storage but the widths that fall between the middle and lower limits of the range are recommended.(26:24) The recommendations made in this study for depths and widths

of surfaces for storage of the five classes of linens along with the writer's calculations of required floor space are listed below.

Item	Width of Surface		Depth of Surface	Floor Space
	Limited	Liberal		
	Inches			Square Feet
Bath linen	18 to 34	18 to 36	12, 16	1.5 to 3.9
Bed linen	18 to 38	24 to 36	12, 16	1.5 to 4.2
Bed covers	22 to 38	28 to 50	16, 20, 24, 28	2.4 to 9.7
Kitchen linen	18 to 26	16 to 30	12, 16, 20	1.3 to 4.1
Table linen	20 to 40	22 to 40	16, 20	2.2 to 5.5

A central linen closet for the storage of liberal supplies of all linen recommended in the Western Cooperative Series report consists of two sections, each 16 inches deep and 28 inches wide. The central closet recommended for limited supplies of linen was 20 inches deep and 40 inches wide.(20:41) Translated into square feet of floor space the liberal recommendations became 6.21 square feet of floor space and the limited became 5.56 square feet of floor space.

The Federal Housing Administration requires that a linen closet shall be provided near the bedrooms and that it should have a minimum depth of 14 inches and a minimum width of 18 inches.(7:34) A closet of these dimensions would require 1.76 square feet of floor space.

According to McCullough, "practically all types of articles requiring storage in the house fit into depths of four, eight, twelve, sixteen, twenty or twenty-four inches with economical use of space." An exception is books which in general require a nine-inch depth; and 10 inches is better than either

8 or 12 inches. Cleaning equipment may be stored in a unit 24 by 24 inches (4 square feet) or one that is 16 by 36 inches (3.99 square feet). Linens fit into depths varying from 16 to 24 inches.(21:10)

Potter found that no closet devoted solely to the storage of household cleaning equipment needed to be more than 41 inches wide and 16 to 20 inches deep (4.55 to 5.71 square feet).(27:196)

In a study conducted by the Georgia Experiment Station, 78 per cent of the homemakers participating in the study desired a centrally located cleaning closet. A majority of this group wanted the closet located in or near the kitchen, in a hall, or in a utility room.(28:17)

The minimum area required for storing the limited inventory of equipment and supplies was 16 inches deep by 30 inches wide or 3.32 square feet. The liberal inventory required an area 24 inches deep and 60 inches wide or 10 square feet. If the door was used for storing equipment, the liberal inventory could be stored in an area 20 inches deep and 60 inches wide or 8.35 square feet of floor space. These closets included space for a wheeled cart, 22 inches long and 17.5 inches wide. It was also found that a space 3 feet perpendicular to the front of the unit was adequate for access to all items of equipment.(28:18)

The literature reviewed indicates that there is variation in the suggestions and recommendations of space allowances. This may be due in part to differences in purpose or procedure. Also, the economic level of the participants may have influenced the results in some of the research. The writer was primarily interested in storage spaces and living spaces as they affected

floor space and in some instances it was difficult to interpret the measurements given into square footages of floor space.

The recommendations of the research have been compiled in tabular form for storage space, for open space, and for work space. The minimum standards of the Federal Housing Administration are also included in the tables for storage and for open space. Since the recommendations by Davis meet the projected needs of the majority of the homemakers interviewed and are not considered minimum or liberal, they are given in a separate column in the tables for storage and open space.

TABLE I

RECOMMENDATIONS IN THE LITERATURE FOR BUILT-IN STORAGE WHICH REQUIRES FLOOR SPACE

Area of House And Source of Study	Minimum	Medium	Liberal	FHA Minimum Standards	Davis*
			Square Feet		
Kitchen				12.0	24.0
Small Homes Council	11.0	16.0	21.0		
Southern Cooperative Study	17.5	--	26.0		
Northeastern cooperative Study					
Servel Company	15.0	--	--		
Dining Room				--	6.0
Arizona Study (Johnson & Hurley)	5.39	10.62	13.30		
Living Room				6.0	10.0
Georgia Study (Bland & Mize)	13.7	--	16.0		
Bedrooms				6.0 per bedroom	(1)-15.0 (2)-14.0 (3)-12.0
Alabama Study (Philson)	6.0-7.0	8.0-9.0	9.0-11.0		
Northeastern Cooperative Study	(1)-15.0	--	18.0		
	(2)-15.0	--	20.0		
	(3)-12.0	--	20.0		
Western Cooperative Study	each man- 8.0	--	17.0		
	each woman-10.5	--	26.6		
McCullough	8.0	--	--		
Bathroom					
Nicholson	2.2-2.9	--	3.3-4.3	--	5.0
Western Cooperative	1.1	--	4.4		
McCullough	2.6	--	--		

TABLE I (continued)

Area of House And Source of Study		Minimum	Medium	Liberal	FHA Minimum Standards	Davis*
			Square feet			
Textile & Household						
Woolrich	Linen	1.5 to 5.5			1.76	4.0
Western	Linen	5.6	--	6.2		
McCullough	Cleaning	3.9				
Potter	Cleaning			4.5- 5.7		
Georgia (Hinson)	Cleaning	3.3		8.3-10.0		

*Met projected needs of majority of twenty homemakers interviewed who lived in houses of approximately 1,000 square feet.

TABLE II

RECOMMENDATIONS IN THE LITERATURE FOR SIZES OF ROOMS OR AREAS IN HOUSES

Area of House and Source of Research			FHA Minimum Standards	Davis*
			Square Feet	
Kitchen			70.0	84.0
Dining Space in Dining Room			Dining room	
Arizona Study (Johnson & Hurley)	People seated	Size area	110.0 kitchen-dining combined	92.0
	4	79.6 - 124.1		
	6	87.2 - 134.5		
	8	102.4 - 155.4		
	10	117.5 - 176.2		
	12	125.1 - 186.6		
Dining area in another room				
Campbell		72.0 or more		
Arizona Study (Johnson & Hurley)	For six with no one at ends of table	52.0 - 90.0		
Living Room			170.0	220.0
Georgia Study (Bland & Mize)		144.0 - 196.0		
Bedrooms			298.0 total for three bedrooms	447.0 total for three bedrooms (1)-153.0 (2)-152.0 (3)-142.0
Laundry Area				
Georgia Study		44.0 - 75.0		

*Met projected needs of majority of twenty homemakers interviewed who lived in houses of approximately 1,000 square feet.

TABLE III

RECOMMENDATIONS IN THE LITERATURE FOR SPACE NEEDED TO USE EQUIPMENT OR FURNISHINGS

Area of House and Source of Research	Type of Space	Minimum	Liberal
		Feet and inches	
Kitchen			
Space Standards for Household Activities	Using base cabinet, refrigerator or wall oven	--	36"
	Using range oven	--	38"
	Work space when appliances are opposite	4'6"	5'4"
Southern Cooperative Study	Work space when appliances are opposite	4'0"-4'6"	6'0"
Dining Room or Area			
Arizona Study (Johnson & Hurley)	Seating at table	2'0"	--
Space Standards For Household Activities	Getting up from table	2'8"	--
Southern Cooperative Study		2'6"	3'0"
Arizona Study (Johnson & Hurley)	Serving and Passing behind seated person	3'6"	3'9"
Space Standards For Household Activities		3'0"	3'8"
Southern Cooperative Study		2'6"	3'0"

TABLE III (continued)

Area of House and Source of Research	Type of Space		Minimum	Liberal
			Feet and inches	
Bedrooms				
Northeastern Cooperative Study	Making bed		1'10"	--
	Cleaning under bed		3'8"	4'3"
Space Standards For Household Activities				4'0"
	Using dresser			3'4"
	Using closet		3'0"	3'6"
Laundry area				
Pennsylvania Study	Operate washer	Length	3'2"	3'6"
		Width	4'5"	5'1"
			(14.0 to 17.8 sq. ft.)	
	Operate dryer	Length	3'8"	3'11"
		Width	4'11"	5'2"
			(18.1 to 20.2 sq. ft.)	
	Operate washer-dryer combination	Length	3'7"	7'0"
		Width	2'10"	3'4"
			(13.0 to 19.0 sq. ft.)	
Georgia Study (Mize & Bland)	In front of all equipment		3'0"	4'0"
Cleaning Closet				
Georgia Study (Hinson)	In front of closet		--	3'0"

CHAPTER III

PROCEDURE

Interviews with thirty-six homemakers living in split-level houses supplied the basic data for this study. Before making the interviews, house plans and families which met the qualifications of this study needed to be selected.

To begin, appointments were made with speculative builders in Greensboro and Charlotte to discuss the purpose and plan of this study and to get blue prints of split-level houses. The builders were most cooperative and made available their current split-level house plans.

In order that suggested changes in space planning could be compared and studied statistically, an effort was made to use plans that were of the same overall square footage and that were divided into the same number and kinds of rooms or areas. Whether the location of rooms or areas within a given square footage would influence suggested changes in planning space allocations was to be investigated also. Therefore, plans with interior arrangements as different as possible were selected.

Since the size of house could influence the suggestions of the homemakers, an effort was made to have all the house plans approximately the same square footage. This was not possible because the split-level houses built in

this area varied considerably in size. Even allowing some variance in the overall size, a sufficient number of plans of approximately the same size were not available. It was decided to use two groups of plans and to divide the study into smaller and larger plans. Nine plans were selected. Five were plans for smaller houses ranging from 1519.85 to 1657.08 square feet. Four were plans for larger houses ranging from 1798.89 to 1926.23 square feet.

Each house plan was measured and the sizes of the rooms, in square feet, were recorded. A tabulation of the sizes of the rooms for each of the house plans used is given in Table IV.

When measuring the existing space in the plans, the space for walls was not included because it was not usable floor space. Floor space required for equipment, such as kitchen appliances, washer, dryer, bathroom fixtures, furnace and water heater, was included in the total size of the room where it was installed but it was not considered either living or storage space. Part of the space under some equipment, such as sinks and lavatories, could be used for storage. One-third of the space under the kitchen sink and bathroom lavatories was recorded as available storage space and two-thirds of the space was recorded as equipment space. Therefore, the total existing space in the plans was divided into living space, storage space or equipment space.

Each house plan selected had a different room arrangement. For instance, in some plans the dining area was combined with the kitchen while in other plans the dining area was combined with the living room. This difference was sought in order to find out whether homemakers would suggest changes in

TABLE IV

SIZES OF THE TWELVE AREAS IN THE NINE SPLIT-LEVEL HOUSE PLANS

Rooms	Smaller Plans					Larger Plans			
	A	B	C	D	E	F	G	H	I
	Square feet					Square feet			
Kitchen	116.50	104.39	92.63	100.00	102.78	132.25	115.00	129.46	132.00
Dining	74.47	70.00	65.43	84.16	97.98	85.49	91.70	108.30	126.00
Living	272.60	203.12	191.07	209.88	212.96	235.38	232.85	252.16	219.16
BR I	160.12	149.19	156.91	146.44	175.02	179.51	173.64	160.68	184.25
BR II	159.23	118.97	116.48	148.36	139.13	144.22	151.70	156.25	151.75
BR III	119.58	98.25	100.64	114.60	110.36	115.22	119.41	127.04	133.96
Bath I	50.00	56.44	60.79	58.48	67.80	54.64	68.31	40.27	94.55
Bath II	24.15	37.50	37.50	36.42	33.90	30.23	33.90	38.35	30.85
Family	198.13	320.00	315.80	229.66	230.51	246.60	237.46	395.50	216.00
Utility	22.50	37.13	58.24	32.12	25.54	23.82	39.15	82.75	73.65
Storage	29.91	39.38	57.52	123.72	141.19	148.35	167.89	29.03	155.25
Hall	40.08	28.25	35.24	27.96	15.15	42.45	46.52	31.00	46.65
Stairs	33.35	35.35	31.38	28.84	32.01	27.98	32.90	32.03	32.85
Total	1323.12	1297.97	1319.63	1340.64	1384.33	1466.14	1510.43	1582.82	1596.92

storage and living space in the same rooms or areas regardless of the room arrangement.

To compare the suggestions made for each plan, the plans had to have the same number and kinds of rooms or areas. The twelve rooms or areas included in the house plans used were: kitchen, dining area, living room, three bedrooms, two bathrooms, family room, utility area, storage room, and hall.

After the plans were selected the builders were asked for names and addresses of families living in houses which had been built by their plans. Since the number of people living in a house could easily influence the needs and uses of housing spaces, the size of the families was controlled. Only those families with a mother, father, and two or three children were chosen from the lists of families provided by the builders. To have all the families the same size with children about the same age was preferred but they were not available.

Four families were selected for each plan. By studying more than one family for each plan differences between the families on the changes suggested in living space and storage space could be analyzed.

Since the purpose and plan of this study is similar to the Davis study, "Adjustments In Open Floor Space And Storage Space Divisions Expressed By Twenty Homemakers Who Live In Speculative Built Houses," the questionnaire developed by Davis was used. In addition the blue print of the house in question was referred to while conducting each interview. Any changes in living and storage space suggested by the homemakers were recorded for each room on a summary sheet. Some additional information about the family and the preferred

arrangement of rooms by the homemaker was also recorded. A sample of the questionnaire used can be found in the Appendix, page 119.

During the interviews each room or area of the house was considered separately and the homemakers were asked how they preferred the living and the storage space in their houses to be proportioned--where did they prefer more living or storage space and where were they willing to give up space. When suggesting the changes in living and storage space the homemakers were not allowed to change the overall size of their houses, since the focus of this study was the space allocations in their present houses and not their desire for a larger or smaller house.

The square footage of storage space and open space suggested by the homemakers during the interviews were analyzed statistically. The analysis of variance was the statistical procedure used to test the null hypotheses--there is no difference in amounts of living space nor in storage space suggested by homemakers living in split-level houses with the identical number and kinds of rooms between: (1) different families, (2) different rooms, and (3) different house plans.

CHAPTER IV

DESCRIPTIVE ANALYSIS OF DATA

I. THE FAMILIES

There were thirty-six families who cooperated in this study. Twenty families lived in the smaller split-level houses and sixteen families lived in the larger split-level houses. Each of the families had four or five members--a mother, a father and two or three children. Sixty per cent of the families living in the smaller houses had two children and 40 per cent of the families had three children. Of the sixteen families living in the larger houses, 38 per cent had two children and 62 per cent had three children. The ages of the children living in the smaller houses ranged from six weeks to fifteen years, with an average age of 5.86 years. The ages of the children living in the larger houses ranged from fourteen months to seventeen years, with an average age of 7.53 years.

All of the husbands were employed. Their occupations included salesmen, engineers, draftsmen, chemists, postmen and office workers. Thirty-nine per cent of all the husbands were salesmen. None of the housewives living in the smaller houses were employed outside of the home while only one of the housewives living in the larger houses was employed outside of the home.

Of the twenty families living in the smaller houses 75 per cent had lived in the house less than one year. Twenty-five per cent had lived in the

house one to two years. Of the sixteen families living in the larger houses, 62 per cent had lived in the house less than one year. Thirty-eight per cent had lived in the house from one to two and one-half years.

II. THE HOUSES

The nine different houses studied had twelve rooms or areas--kitchen, dining area, living room, three bedrooms, two bathrooms, hall, family room, utility area and storage room. The overall size of the houses, including the space for the walls, ranged from 1519.85 to 1657.08 square feet for the smaller houses and from 1798.89 to 1926.23 square feet for the larger houses. The average size of the smaller houses was 1570.01 square feet; the average size of the larger houses was 1857.11 square feet. Deducting the space for the walls, the inside space ranged from 1297.97 to 1384.33 square feet for the smaller houses and from 1475.16 to 1598.90 square feet for the larger houses. The average amount of usable space in the smaller houses was 1328.64 square feet and in the larger houses, 1542.23 square feet.

The homemakers were not allowed to suggest a change in the overall size of their houses. Therefore, the overall size of each house remained the same because some floor space in a room or area was given up every time storage space or open space in a room or area was increased. Each homemaker would have been satisfied with less open space and more storage space in her present house.

In the remainder of this chapter the alterations suggested by the

homemakers for storage space and for open space in each room or area will be described for both the smaller and larger houses. Room or area sizes suggested meet the projected needs of the majority (80 per cent) of the homemakers interviewed.

III. SPLIT-LEVEL HOUSES--1500 SQUARE FOOT GROUPING

Kitchens

All but one of the twenty homemakers living in the smaller houses suggested that the amount of floor space used for storage be increased in the kitchen. The additional storage desired by the homemakers ranged from 4 to 9 square feet (Table V).

The total amount of storage space wanted by the homemakers living in the smaller houses ranged from 18 to 30 square feet. The majority of the homemakers would be satisfied with 26 square feet of storage space in the kitchen.

Nineteen homemakers were willing to give up from 4 to 12 square feet of open floor space in the kitchen for storage, either in the kitchen or in some other area of the house. The amount of open space in the kitchen which satisfied the homemakers ranged from 49 to 69 square feet. The majority of the homemakers would be satisfied with 65 square feet of open floor space in the kitchen.

There was a small decrease in the total overall size of the kitchens because some of the open space given up for storage was used in other areas of the house. The total size of the kitchens including storage, appliances and

TABLE V

KITCHEN. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plans	Open Space	Storage Space	Total[a] Space	Open Space	Storage Space	Open Space	Storage Space	Total[a] Space
			Square Feet					
C				- 5.00	0.00	51.85	17.78	87.63
				- 4.00	4.00	52.85	21.78	92.63
				- 6.00	6.00	50.85	23.78	92.63
				- 8.25	8.25	48.60	26.03	92.63
Average	56.85	17.78	92.63	- 5.81	4.56	51.04	22.34	91.38
D				- 4.00	4.00	61.72	20.28	100.00
				- 5.00	5.00	60.72	21.28	100.00
				- 6.00	6.00	59.72	22.28	100.00
				- 6.00	6.00	59.72	22.28	100.00
Average	65.72	16.28	100.00	- 5.25	5.25	60.47	21.53	100.00
E				- 8.75	8.75	60.75	24.03	102.78
				- 6.00	6.00	63.50	21.28	102.78
				- 6.00	6.00	63.50	21.28	102.78
				0.00	6.00	69.50	21.28	108.78
Average	69.50	15.28	102.78	- 5.19	6.69	64.31	21.97	104.28
B				- 6.00	6.00	64.89	21.50	104.39
				- 6.00	6.00	64.89	21.50	104.39
				- 6.00	6.00	64.89	21.50	104.39
				- 8.00	8.00	62.89	23.50	104.39
Average	70.89	15.50	104.39	- 6.50	6.50	64.39	22.00	104.39
A				-12.00	4.00	62.17	28.33	108.50
				-10.00	4.00	64.17	28.33	110.50
				-12.00	6.00	62.17	30.33	110.50
				- 6.00	6.00	68.17	30.33	116.50
Average	74.17	24.33	116.50	-10.00	5.00	64.17	29.33	111.50

[a]Total includes about 18 square feet allowed for kitchen appliances.

open space, ranged from 88 to 116 square feet. A kitchen with 109 square feet of floor space would meet the projected needs of a majority of the homemakers interviewed.

These data suggest that a kitchen with 109 square feet of floor space, which includes 26 square feet for storage, 18 square feet for appliances and 65 square feet for open space, is needed in small split-level houses to satisfy the majority of these homemakers.

Dining Areas

Only one of the five smaller house plans had built-in storage in the existing dining area. This was 3 square feet (Table VI).

The one homemaker who did not suggest additional storage space in the kitchen was the only one to suggest built-in storage in the dining area. She suggested 5 square feet of storage space. The homemakers indicated a preference for using furniture to store linens and other items used at the table, which could not be stored in the kitchen.

Eighteen of the homemakers living in the smaller houses preferred to make no changes in the amount of open floor space in the dining area. One homemaker was willing to give up 5 square feet of floor space in the dining area for built-in storage and one homemaker wanted an additional 10 square feet of open floor space. The amount of open floor space in the dining area which satisfied the homemakers ranged from 65 to 98 square feet.

Only a small amount of storage space was provided in the smaller

TABLE VI

DINING AREA. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plans	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
C				0.00	0.00	65.43	0.00	65.43
				0.00	0.00	65.43	0.00	65.43
				0.00	0.00	65.43	0.00	65.43
				0.00	5.00	65.43	5.00	70.43
Average	65.43	0.00	65.43	0.00	1.25	65.43	1.25	66.68
B				0.00	0.00	70.00	0.00	70.00
				0.00	0.00	70.00	0.00	70.00
				0.00	0.00	70.00	0.00	70.00
				9.92	0.00	79.92	0.00	79.92
Average	70.00	0.00	70.00	2.48	0.00	72.48	0.00	72.48
A				0.00	0.00	71.47	3.00	74.47
				0.00	0.00	71.47	3.00	74.47
				0.00	0.00	71.47	3.00	74.47
				0.00	0.00	71.47	3.00	74.47
Average	71.47	3.00	74.47	0.00	0.00	71.47	3.00	74.47
D				0.00	0.00	84.16	0.00	84.16
				0.00	0.00	84.16	0.00	84.16
				0.00	0.00	84.16	0.00	84.16
				0.00	0.00	84.16	0.00	84.16
Average	84.16	0.00	84.16	0.00	0.00	84.16	0.00	84.16
E				-6.00	0.00	91.98	0.00	91.98
				0.00	0.00	97.98	0.00	97.98
				0.00	0.00	97.98	0.00	97.98
				0.00	0.00	97.98	0.00	97.98
Average	97.98	0.00	97.98	-1.50	0.00	96.48	0.00	96.48

houses and the average amount of additional storage space suggested was also small. These findings suggest that the homemakers were accustomed to doing without storage in the dining area and were unaware of the need for storage space in this area.

These data indicate that a dining area with 84 square feet of floor space is needed in small split-level houses if the projected needs of the majority of these homemakers are to be met.

Living Rooms

Living room storage was provided in all but one of the smaller house plans. The homemakers living in the houses in which no living room storage was provided were the only ones to suggest additional storage in the living room. The amount of storage space suggested by these homemakers ranged from 3 to 7 square feet (Table VII).

The total amount of living room storage wanted by the homemakers ranged from 3 to 12 square feet. The majority of the homemakers would be satisfied with 8 square feet of storage space in the living room.

None of the homemakers suggested additional open space in the living room but a few were willing to give up a small amount of the existing floor space to add to another room or area or for storage in the living room. The total amount of open living room floor space wanted by the homemakers ranged from 185 to 265 square feet. One living room was considerably larger than the other four and the four homemakers who lived in a house with this plan did not suggest

TABLE VII

LIVING ROOM. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plans	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
C				0.00	0.00	191.07	0.00	191.07
				-3.00	3.00	188.07	3.00	191.07
				-6.00	6.00	185.07	6.00	191.07
				0.00	7.00	191.07	7.00	198.07
Average	191.07	0.00	191.07	-2.25	4.00	188.82	4.00	192.82
B				-9.92	0.00	185.50	7.70	193.20
				0.00	0.00	195.42	7.70	203.12
				0.00	0.00	195.42	7.70	203.12
				0.00	0.00	195.42	7.70	203.12
Average	195.42	7.70	203.12	-2.48	0.00	192.94	7.70	200.64
D				0.00	0.00	198.27	11.61	209.88
				0.00	0.00	198.27	11.61	209.88
				0.00	0.00	198.27	11.61	209.88
				0.00	0.00	198.27	11.61	209.88
Average	198.27	11.61	209.88	0.00	0.00	198.27	11.61	209.88
E				0.00	0.00	204.64	8.32	212.96
				0.00	0.00	204.64	8.32	212.96
				0.00	0.00	204.64	8.32	212.96
				0.00	0.00	204.64	8.32	212.96
Average	204.64	8.32	212.96	0.00	0.00	204.64	8.32	212.96
A				0.00	0.00	265.37	7.23	272.60
				0.00	0.00	265.37	7.23	272.60
				0.00	0.00	265.37	7.23	272.60
				0.00	0.00	265.37	7.23	272.60
Average	265.37	7.23	272.60	0.00	0.00	265.37	7.23	272.60

changes in either storage or open space for this large room. However, since it was approximately 60 square feet larger than the other four living rooms, it may have required somewhat more space than a house of this size really needed. Therefore, the second largest living room, which would satisfy the majority of the homemakers interviewed is recommended for a house of this size. The majority of the homemakers living in the smaller houses would be satisfied with 205 square feet of open space in the living room.

These data indicate that the living room in small split-level houses should have 213 square feet of floor space, which includes 8 square feet of storage space, if the projected needs of the majority of these homemakers are to be met.

Bedroom I

Changes in the amount of storage space allocated for bedroom I were suggested by five of the homemakers. Five of the twenty homemakers suggested about 4 square feet of additional storage space for larger closets in bedroom I (Table VIII).

The total amount of closet storage space wanted in bedroom I by the homemakers ranged from 14 to 19 square feet. The projected needs of the majority of the homemakers interviewed would be met if 17 square feet of closet storage were provided in bedroom I.

Only four of the homemakers were willing to give up open floor space in bedroom I for closet storage in this room or to increase the open floor space

changes in either storage or open space for this large room. However, since it was approximately 60 square feet larger than the other four living rooms, it may have required somewhat more space than a house of this size really needed. Therefore, the second largest living room, which would satisfy the majority of the homemakers interviewed is recommended for a house of this size. The majority of the homemakers living in the smaller houses would be satisfied with 205 square feet of open space in the living room.

These data indicate that the living room in small split-level houses should have 213 square feet of floor space, which includes 8 square feet of storage space, if the projected needs of the majority of these homemakers are to be met.

Bedroom I

Changes in the amount of storage space allocated for bedroom I were suggested by five of the homemakers. Five of the twenty homemakers suggested about 4 square feet of additional storage space for larger closets in bedroom I (Table VIII).

The total amount of closet storage space wanted in bedroom I by the homemakers ranged from 14 to 19 square feet. The projected needs of the majority of the homemakers interviewed would be met if 17 square feet of closet storage were provided in bedroom I.

Only four of the homemakers were willing to give up open floor space in bedroom I for closet storage in this room or to increase the open floor space

TABLE VIII

BEDROOM I. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plans	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
B				0.00	0.00	132.85	16.34	149.19
				0.00	0.00	132.85	16.34	149.19
				0.00	0.00	132.85	16.34	149.19
				0.00	0.00	132.85	16.34	149.19
Average	132.85	16.34	149.19	0.00	0.00	132.85	16.34	149.19
D				-4.16	4.16	130.84	15.60	146.44
				0.00	4.00	135.00	15.44	150.44
				0.00	4.16	135.00	15.60	150.60
				0.00	4.16	135.00	15.60	150.60
Average	135.00	11.44	146.44	-1.04	4.12	133.96	15.56	149.52
C				0.00	0.00	143.04	13.87	156.91
				0.00	0.00	143.04	13.87	156.91
				0.00	0.00	143.04	13.87	156.91
				0.00	0.00	143.04	13.87	156.91
Average	143.04	13.87	156.91	0.00	0.00	143.04	13.87	156.91
A				-1.60	0.00	139.20	19.32	158.52
				0.00	0.00	140.80	19.32	160.12
				0.00	0.00	140.80	19.32	160.12
				0.00	0.00	140.80	19.32	160.12
Average	140.80	19.32	160.12	-0.40	0.00	140.40	19.32	159.72
E				-9.83	0.00	151.67	13.52	165.19
				0.00	0.00	161.50	13.52	175.02
				0.00	0.00	161.50	13.52	175.02
				-4.16	4.16	157.34	17.68	175.02
Average	161.50	13.52	175.02	-3.50	1.04	158.00	14.56	172.56

in another room. These four homemakers suggested giving up 2 to 10 square feet of open space.

The homemakers wanted a total of 133 to 161 square feet of open floor space in bedroom I. The majority of the homemakers interviewed would be satisfied with 143 square feet of open floor space in bedroom I.

These data suggest that bedroom I in small split-level houses should have 143 square feet of open floor space. Including 17 square feet of closet storage, bedroom I should have 160 square feet of floor space to meet the suggestions of the majority of these homemakers.

Bedroom II

Only one homemaker wanted more floor space allocated for closet storage space in bedroom II. This homemaker suggested 2 square feet of additional closet storage space in bedroom II (Table IX).

The total amount of closet storage space in bedroom II which satisfied the homemakers ranged from 6 to 18 square feet. The majority of these homemakers would be satisfied with 15 square feet of floor space allocated for closet storage in the second bedroom.

One of the homemakers was willing to give up open floor space in bedroom II for additional closet storage. This homemaker suggested giving up 2 square feet of open space.

The homemakers were satisfied with 109 to 141 square feet of open floor space in bedroom II. The majority of the homemakers interviewed would

TABLE IX

BEDROOM II. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plans	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
C				0.00	0.00	110.48	6.00	116.48
				0.00	0.00	110.48	6.00	116.48
				0.00	0.00	110.48	6.00	116.48
				0.00	0.00	110.48	6.00	116.48
Average	110.48	6.00	116.48	0.00	0.00	110.48	6.00	116.48
B				0.00	0.00	108.57	10.40	118.97
				0.00	0.00	108.57	10.40	118.97
				0.00	0.00	108.57	10.40	118.97
				0.00	0.00	108.57	10.40	118.97
Average	108.57	10.40	118.97	0.00	0.00	108.57	10.40	118.97
E				0.00	0.00	130.64	8.49	139.13
				0.00	0.00	130.64	8.49	139.13
				0.00	0.00	130.64	8.49	139.13
				-2.08	2.08	128.56	10.57	139.13
Average	130.64	8.49	139.13	-0.52	0.52	130.12	9.01	139.13
D				0.00	0.00	133.80	14.56	148.36
				0.00	0.00	133.80	14.56	148.36
				0.00	0.00	133.80	14.56	148.36
				0.00	0.00	133.80	14.56	148.36
Average	133.80	14.56	148.36	0.00	0.00	133.80	14.56	148.36
A				0.00	0.00	141.50	17.73	159.23
				0.00	0.00	141.50	17.73	159.23
				0.00	0.00	141.50	17.73	159.23
				0.00	0.00	141.50	17.73	159.23
Average	141.50	17.73	159.23	0.00	0.00	141.50	17.73	159.23

be satisfied with 134 square feet of open floor space in the second bedroom.

These data suggest that bedroom II in small split-level houses should have 134 square feet of open floor space. Including 15 square feet of closet storage, bedroom II should have 149 square feet of floor space, if the projected needs of the majority of these homemakers are to be met.

Bedroom III

None of the homemakers suggested changes in the amount of closet storage space provided for bedroom III in the smaller houses. The existing storage for bedroom III ranged from 6 to 15 square feet. The majority of the homemakers interviewed would be satisfied with 11 square feet of floor space allocated for closet storage in bedroom III (Table X).

The third bedroom was the smallest of the three bedrooms in the houses. None of the homemakers were willing to give up open floor space in this bedroom for storage or for additional open floor space in another room or area in the house. Two homemakers wanted about 10 square feet more open space in bedroom III. The additional space for this room was given up in the bathroom and bedroom I.

The homemakers wanted from 89 to 109 square feet of open space in the third bedroom. The majority of the homemakers would be satisfied with 109 square feet of open space in bedroom III.

These data imply that the third bedroom in small split-level houses should have 109 square feet of open floor space. Including 11 square feet of

TABLE X

BEDROOM III. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plans	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
B				0.00	0.00	89.25	9.00	98.25
				0.00	0.00	89.25	9.00	98.25
				0.00	0.00	89.25	9.00	98.25
				0.00	0.00	89.25	9.00	98.25
Average	89.25	9.00	98.25	0.00	0.00	89.25	9.00	98.25
C				0.00	0.00	94.64	6.00	100.64
				0.00	0.00	94.64	6.00	100.64
				0.00	0.00	94.64	6.00	100.64
				0.00	0.00	94.64	6.00	100.64
Average	94.64	6.00	100.64	0.00	0.00	94.64	6.00	100.64
D				0.00	0.00	100.04	14.56	114.60
				0.00	0.00	100.04	14.56	114.60
				0.00	0.00	100.04	14.56	114.60
				0.00	0.00	100.04	14.56	114.60
Average	100.04	14.56	114.60	0.00	0.00	100.04	14.56	114.60
E				0.00	0.00	99.09	11.27	110.36
				0.00	0.00	99.09	11.27	110.36
				9.83	0.00	108.92	11.27	120.19
				9.83	0.00	108.92	11.27	120.19
Average	99.09	11.27	110.36	4.92	0.00	104.01	11.27	115.28
A				0.00	0.00	108.73	10.85	119.58
				0.00	0.00	108.73	10.85	119.58
				0.00	0.00	108.73	10.85	119.58
				0.00	0.00	108.73	10.85	119.58
Average	108.73	10.85	119.58	0.00	0.00	108.73	10.85	119.58

closet storage, bedroom III should have at least 120 square feet of floor space to satisfy the majority of the homemakers interviewed.

Bathroom I

Some storage space was provided for the main bathroom in all the smaller house plans studied. Four of the homemakers wanted more floor space allocated for storage space in the bathroom. The amount of additional storage space suggested by four homemakers ranged from 1 to 2 square feet (Table XI).

The adjusted total storage space wanted by the homemakers ranged from 1 to 8 square feet. The majority of these homemakers would be satisfied with 8 square feet of storage in the bathroom.

All of the main bathrooms in the smaller split-level houses included in the study were larger than the minimum bathrooms (35 square feet) found in many houses. The homemakers liked having a large bathroom in the bedroom area but some thought they would be just as satisfied with less open space in the main bathroom. Seven of the homemakers living in the smaller houses were willing to give up open floor space in the main bathroom for additional storage in the bathroom or for more space in another room. The amount of open floor space given up ranged from 1 to 10 square feet.

The amount of open floor space which the homemakers wanted in the main bathroom ranged from 23 to 39 square feet. The majority of the homemakers would be satisfied with 35 square feet of open floor space in the bath-

TABLE XI

BATHROOM I. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total[a] Space	Open Space	Storage Space	Open Space	Storage Space	Total[a] Space
				Square Feet				
A				0.00	0.00	25.00	5.00	50.00
				0.00	0.00	25.00	5.00	50.00
				-1.70	1.70	23.30	6.70	50.00
				-2.00	2.00	23.00	7.00	50.00
Average	25.00	5.00	50.00	-0.92	0.92	24.08	5.92	50.00
D				-6.41	2.25	28.31	6.01	54.32
				-4.16	0.00	30.56	3.76	54.32
				-4.00	0.00	30.72	3.76	54.48
				-1.15	1.15	33.57	4.91	58.48
Average	34.72	3.76	58.48	-3.92	0.85	30.80	4.61	55.41
B				0.00	0.00	35.19	1.25	56.44
				0.00	0.00	35.19	1.25	56.44
				0.00	0.00	35.19	1.25	56.44
				0.00	0.00	35.19	1.25	56.44
Average	35.19	1.25	56.44	0.00	0.00	35.19	1.25	56.44
C				0.00	0.00	33.21	7.58	60.79
				0.00	0.00	33.21	7.58	60.79
				0.00	0.00	33.21	7.58	60.79
				0.00	0.00	33.21	7.58	60.79
Average	33.21	7.58	60.79	0.00	0.00	33.21	7.58	60.79
E				-9.83	0.00	29.59	8.38	57.97
				0.00	0.00	39.42	8.38	67.80
				0.00	0.00	39.42	8.38	67.80
				0.00	0.00	39.42	8.38	67.80
Average	39.42	8.38	67.80	-2.45	0.00	36.97	8.38	65.35

[a]Total includes approximately 20 square feet allowed for bathroom fixtures

room.

These data indicate that homemakers living in small split-level houses would be satisfied with 35 square feet of open floor space in the main bathroom. Including 8 square feet of storage space and 20 square feet for fixtures, the overall size of the main bathroom should be 63 square feet, if the projected needs of the majority of the homemakers interviewed are to be met.

Bathroom II

No storage was provided in bathroom II. Four of the homemakers suggested that 2 to 3 square feet of floor space be used for storage in bathroom II. The majority of the homemakers interviewed would be satisfied with no storage in the second bathroom (Table XII).

Bathroom II was much smaller than the main bathroom. Only two of the homemakers were willing to give up open floor space in bathroom II. The majority of the homemakers would be satisfied with 19 square feet of open floor space in the second bathroom.

These data suggest that the overall size of a second bathroom, including space for fixtures, should be 37 square feet to satisfy the majority of the homemakers interviewed.

Family Rooms

All but two of the homemakers wanted storage in the family room. Ten homemakers suggested from 6 to 18 square feet of additional storage space for the family room (Table XIII).

TABLE XII

BATHROOM II. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total[a] Space	Open Space	Storage Space	Open Space	Storage Space	Total[a] Space
				Square Feet				
A				0.00	0.00	17.15	0.00	24.15
				0.00	0.00	17.15	0.00	24.15
				0.00	0.00	17.15	0.00	24.15
				0.00	0.00	17.15	0.00	24.15
Average	17.15	0.00	24.15	0.00	0.00	17.15	0.00	24.15
E				-3.00	3.00	23.90	3.00	33.90
				0.00	0.00	26.90	0.00	33.90
				0.00	0.00	26.90	0.00	33.90
				0.00	0.00	26.90	0.00	33.90
Average	26.90	0.00	33.90	-0.75	0.75	26.15	0.75	33.90
D				0.00	0.00	29.42	0.00	36.42
				0.00	0.00	29.42	0.00	36.42
				0.00	0.00	29.42	0.00	36.42
				0.00	0.00	29.42	0.00	36.42
Average	29.42	0.00	36.42	0.00	0.00	29.42	0.00	36.42
B				0.00	0.00	17.50	0.00	37.50
				0.00	0.00	17.50	0.00	37.50
				0.00	0.00	17.50	0.00	37.50
				-2.00	2.00	15.50	2.00	37.50
Average	17.50	0.00	37.50	-0.50	0.50	17.00	0.50	37.50
C				0.00	0.00	17.50	0.00	37.50
				0.00	0.00	17.50	0.00	37.50
				0.00	3.00	17.50	3.00	40.50
				0.00	3.00	17.50	3.00	40.50
Average	17.50	0.00	37.50	0.00	1.50	17.50	1.50	39.00

[a]Total includes from 7 to 20 square feet allowed for bathroom fixtures

TABLE XIII

FAMILY ROOM. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
A				0.00	0.00	198.13	0.00	198.13
				0.00	6.00	198.13	6.00	204.13
				0.00	6.00	198.13	6.00	204.13
				0.00	8.00	198.13	8.00	206.13
Average	198.13	0.00	198.13	0.00	5.00	198.13	5.00	203.13
E				0.00	0.00	222.19	8.32	230.51
				0.00	0.00	222.19	8.32	230.51
				0.00	0.00	222.19	8.32	230.51
				-16.87	16.87	205.32	25.19	230.51
Average	222.19	8.32	230.51	- 4.22	4.22	217.97	12.54	230.51
D				0.00	0.00	220.32	9.34	229.66
				0.00	0.00	220.32	9.34	229.66
				39.75	0.00	260.07	9.34	269.41
				40.50	0.00	260.82	9.34	270.16
Average	220.32	9.34	229.66	20.06	0.00	240.38	9.34	249.72
C				-19.00	16.00	296.80	16.00	312.80
				-21.00	18.00	294.80	18.00	312.80
				-12.00	12.00	303.80	12.00	315.80
				- 8.00	8.00	307.80	8.00	315.80
Average	315.80	0.00	315.80	-15.00	13.50	300.80	13.50	314.30
B				-73.12	7.50	246.88	7.50	254.38
				0.00	0.00	320.00	0.00	320.00
				- 6.00	6.00	314.00	6.00	320.00
				- 8.00	8.00	312.00	8.00	320.00
Average	320.00	0.00	320.00	-21.78	5.37	298.22	5.37	303.59

The adjusted total amount of storage space wanted by the homemakers for the family room ranged from 6 to 25 square feet. The majority of the homemakers would be satisfied with 12 square feet of storage space in the family room.

Half of the homemakers made changes in the open floor space in the family room. The majority of these were willing to give up open space for storage or for more open space in another room or area of the house. The amount of open space these homemakers suggested giving up ranged from 8 to 73 square feet. Two of the homemakers wanted to increase the size of the family room. The amount of increased space suggested was about 40 square feet.

The adjusted total amount of open space wanted by the homemakers for the family room ranged from 198 to 320 square feet. Excluding the smallest family room, the second smallest had 220 square feet of open space. The majority of the homemakers would be satisfied with 304 square feet of open floor space in the family room.

These data suggest that the majority of the homemakers living in the smaller split-level houses would be satisfied with 304 square feet of open space in the family room. Including 12 square feet of storage space the overall size of the family room in the smaller split-level houses should be 316 square feet, if the projected needs of the majority of these homemakers are to be met.

Utility Area

Storage was not provided in any of the utility areas but less than half of the homemakers suggested additional storage. Three square feet was the amount suggested for storage in the utility area by the homemakers suggesting changes (Table XIV).

None of the homemakers were willing to give up floor space in another area of the house to increase the open space in the utility area but several of the homemakers were willing to give up some of the open space in the utility area for storage. Therefore, there was a slight decrease in the open space in the utility area. The majority of the homemakers would be satisfied with 27 square feet of open space in the utility area.

These data suggest that a utility area of 37 square feet, which includes space for laundry equipment, would satisfy the majority of the homemakers interviewed.

Storage Rooms

All of the houses had a room or area designated for storage. No built-in storage was provided in the plans for this room. Since none of the homemakers wanted any shelves or cabinets which would require floor space, all of this space was considered open space (Table XV).

One of the homemakers who had a small storage room wanted to increase the amount of open space in the storage room. Two homemakers who had a large storage room wanted to give up some of the open space in the storage

TABLE XIV

UTILITY AREA. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total[a] Space	Open Space	Storage Space	Open Space	Storage Space	Total[a] Space
				Square Feet				
A				0.00	0.00	12.50	0.00	22.50
				0.00	0.00	12.50	0.00	22.50
				0.00	0.00	12.50	0.00	22.50
				0.00	0.00	12.50	0.00	22.50
Average	12.50	0.00	22.50	0.00	0.00	12.50	0.00	22.50
E				0.00	0.00	20.54	0.00	25.54
				0.00	0.00	20.54	0.00	25.54
				0.00	0.00	20.54	0.00	25.54
				0.00	0.00	20.54	0.00	25.54
Average	20.54	0.00	25.54	0.00	0.00	20.54	0.00	25.54
D				0.00	0.00	16.12	0.00	32.12
				0.00	0.00	16.12	0.00	32.12
				0.00	0.00	16.12	0.00	32.12
				0.00	2.60	16.12	2.60	34.72
Average	16.12	0.00	32.12	0.00	0.65	16.12	0.65	32.77
B				0.00	0.00	27.13	0.00	37.13
				0.00	0.00	27.13	0.00	37.13
				0.00	0.00	27.13	0.00	37.13
				0.00	0.00	27.13	0.00	37.13
Average	27.13	0.00	37.13	0.00	0.00	27.13	0.00	37.13
C				-3.00	3.00	46.24	3.00	58.24
				-3.00	3.00	46.24	3.00	58.24
				0.00	0.00	49.24	0.00	58.24
				0.00	0.00	49.24	0.00	58.24
Average	49.24	0.00	58.24	-1.50	1.50	47.74	1.50	58.24

[a]Total includes approximately 10 square feet allowed for laundry equipment.

TABLE XV

STORAGE ROOM. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
A				0.00	0.00	25.91	0.00	25.91
				0.00	0.00	25.91	0.00	25.91
				0.00	0.00	25.91	0.00	25.91
				0.00	0.00	25.91	0.00	25.91
Average	25.91	0.00	25.91	0.00	0.00	25.91	0.00	25.91
B				0.00	0.00	39.38	0.00	39.38
				0.00	0.00	39.38	0.00	39.38
				0.00	0.00	39.38	0.00	39.38
				65.62	0.00	105.00	0.00	105.00
Average	39.38	0.00	39.38	16.40	0.00	55.78	0.00	55.78
C				0.00	0.00	57.52	0.00	57.52
				0.00	0.00	57.52	0.00	57.52
				0.00	0.00	57.52	0.00	57.52
				0.00	0.00	57.52	0.00	57.52
Average	57.52	0.00	57.52	0.00	0.00	57.52	0.00	57.52
D				-42.35	0.00	81.37	0.00	81.37
				-40.50	0.00	83.22	0.00	83.22
				0.00	0.00	123.72	0.00	123.72
				0.00	0.00	123.72	0.00	123.72
Average	123.72	0.00	123.72	-20.71	0.00	103.01	0.00	103.01
E				0.00	0.00	130.19	0.00	141.19
				0.00	0.00	130.19	0.00	141.19
				0.00	0.00	130.19	0.00	141.19
				0.00	0.00	130.19	0.00	141.19
Average	130.19	0.00	141.19	0.00	0.00	130.19	0.00	141.19

room to increase the open space in the family room. The majority of these homemakers would be satisfied with a storage room of 124 square feet. The homemakers who had large storage rooms thought that sometime they would make a fourth bedroom or work area out of this room.

These data indicate that a storage room with 124 square feet of open space and no built-in storage would satisfy the majority of the homemakers interviewed.

Halls

Only one of the twenty homemakers wanted to increase the amount of storage space in the hall. This homemaker suggested that one and one-half square feet additional storage space. Another homemaker was willing to give up all the closet storage in the hall for storage in another room. Thus, there was a slight decrease in the hall storage space for the five smaller houses studied. The majority of the homemakers would be satisfied with 4 square feet of closet storage in the hall (Table XVI).

The amount of open space allocated for halls was small in the split-level houses but none of the homemakers suggested any changes. The amount of open hall floor space which satisfied the majority of the homemakers was 28 square feet.

Including the 4 square feet for storage, 32 square feet of floor space for halls would satisfy the majority of the homemakers living in the smaller split-level houses.

TABLE XVI

HALL. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY TWENTY HOMEMAKERS LIVING IN FIVE SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
E				0.00	0.00	15.15	0.00	15.15
				0.00	0.00	15.15	0.00	15.15
				0.00	0.00	15.15	0.00	15.15
				0.00	0.00	15.15	0.00	15.15
Average	15.15	0.00	15.15	0.00	0.00	15.15	0.00	15.15
D				0.00	0.00	27.96	0.00	27.96
				0.00	0.00	27.96	0.00	27.96
				0.00	0.00	27.96	0.00	27.96
				0.00	0.00	27.96	0.00	27.96
Average	27.96	0.00	27.96	0.00	0.00	27.96	0.00	27.96
B				0.00	0.00	25.41	2.84	28.25
				0.00	0.00	25.41	2.84	28.25
				0.00	0.00	25.41	2.84	28.25
				0.00	0.00	25.41	2.84	28.25
Average	25.41	2.84	28.25	0.00	0.00	25.41	2.84	28.25
C				0.00	-7.00	28.24	0.00	28.24
				0.00	0.00	28.24	7.00	35.24
				0.00	0.00	28.24	7.00	35.24
				0.00	0.00	28.24	7.00	35.24
Average	28.24	7.00	35.24	0.00	-1.75	28.24	5.25	33.49
A				0.00	0.00	36.46	3.62	40.08
				0.00	0.00	36.46	3.62	40.08
				0.00	0.00	36.46	3.62	40.08
				0.00	1.60	36.46	5.22	41.68
Average	36.46	3.62	40.08	0.00	0.40	36.46	4.02	40.48

IV. SPLIT-LEVEL HOUSES--1800 SQUARE FOOT GROUPING

Kitchens

In one of the larger split-level houses studied, 29 square feet of storage space was provided for the kitchen. The homemakers living in the houses of this plan suggested no additional storage for the kitchen. Seven of the twelve homemakers living in houses of the other three plans suggested from 4 to 11 square feet of additional storage for the kitchen (Table XVII).

The total amount of floor space the homemakers living in the four larger houses allocated for storage in the kitchen ranged from 17 to 31 square feet. The majority of the homemakers interviewed would be satisfied with 29 square feet of storage space in the kitchen.

Homemakers living in three of the four larger houses were willing to give up open floor space in the kitchen for storage, either in the kitchen or in some other area of the house, or to make the dining area larger. The homemakers were willing to give up from 4 to 18 square feet of open space in the kitchen. Thus, the open space in the kitchen which satisfied the homemakers ranged from 69 to 93 square feet. The majority of the homemakers interviewed would be satisfied with 82 square feet of open floor space in the kitchen.

On the average there was a decrease in the overall size of the kitchen in the larger houses because some of the open space given up in the kitchen was added to other rooms in the house. The total size of the kitchen including storage, appliances, and open space ranged from 114 to 132 square feet. A

TABLE XVII

KITCHEN. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total[a] Space	Open Space	Storage Space	Open Space	Storage Space	Total[a] Space
				Square Feet				
G				0.00	0.00	79.72	17.28	115.00
				- 6.00	6.00	73.72	23.28	115.00
				-10.84	10.84	68.88	28.12	115.00
				0.00	6.00	79.72	23.28	121.00
Average	79.72	17.28	115.00	- 4.21	5.71	75.51	22.99	116.50
I				-18.00	0.00	75.22	20.78	114.00
				-12.00	0.00	81.22	20.78	120.00
				- 4.00	4.00	89.22	24.78	132.00
				0.00	0.00	93.22	20.78	132.00
Average	93.22	20.78	132.00	- 8.50	1.00	84.72	21.78	124.50
F				-18.58	8.00	72.39	31.28	121.67
				- 6.00	0.00	84.97	23.28	126.25
				- 4.00	4.00	86.97	27.28	132.25
				- 8.00	8.00	82.97	31.28	132.25
Average	90.97	23.28	132.25	- 9.14	5.00	81.82	28.28	128.10
H				0.00	0.00	82.46	29.00	129.46
				0.00	0.00	82.46	29.00	129.46
				0.00	0.00	82.46	29.00	129.46
				0.00	0.00	82.46	29.00	129.46
Average	82.46	29.00	129.46	0.00	0.00	82.46	29.00	129.46

[a]Total includes about 18 square feet allowed for kitchen appliances

kitchen with 132 square feet of floor space would satisfy the majority of these homemakers.

These data indicate that kitchens with 132 square feet of floor space, which includes 29 square feet for storage space, 18 square feet for appliances and 82 square feet of open space would satisfy the majority of the homemakers living in the larger split-level houses.

Dining Areas

No storage space was provided for the dining area in the larger houses. Three of the homemakers wanted some storage in the dining area. The amount of storage space wanted by these homemakers ranged from 5 to 7 square feet (Table XVIII).

There was an increase in the square footage of open space in the dining area for the four larger houses studied. The additional open space wanted by the homemakers ranged from 6 to 18 square feet. One homemaker was willing to give up 7 square feet of open floor space for storage. The amount of open floor space in the dining area which satisfied the homemakers ranged from 84 to 144 square feet. The majority of these homemakers would be satisfied with 126 square feet of open space in the dining area.

No storage space was provided in the dining area of the larger houses and only a few of the homemakers suggested storage in the dining area. These findings suggest to the writer that these homemakers were unaccustomed to the convenience of built-in storage in the dining area.

TABLE XVIII

DINING AREA. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
F				0.00	6.00	85.49	6.00	91.49
				0.00	0.00	85.49	0.00	85.49
				0.00	0.00	85.49	0.00	85.49
				5.78	4.80	91.27	4.80	96.07
Average	85.49	0.00	85.49	1.44	2.70	86.93	2.70	79.63
G				0.00	0.00	91.70	0.00	91.70
				0.00	0.00	91.70	0.00	91.70
				-7.50	7.50	84.20	7.50	91.70
				10.00	0.00	101.70	0.00	101.70
Average	91.70	0.00	91.70	0.62	1.87	92.32	1.87	94.19
H				0.00	0.00	108.30	0.00	108.30
				0.00	0.00	108.30	0.00	108.30
				0.00	0.00	108.30	0.00	108.30
				0.00	0.00	108.30	0.00	108.30
Average	108.30	0.00	108.30	0.00	0.00	108.30	0.00	108.30
I				0.00	0.00	126.00	0.00	126.00
				0.00	0.00	126.00	0.00	126.00
				12.00	0.00	138.00	0.00	138.00
				18.00	0.00	144.00	0.00	144.00
Average	126.00	0.00	126.00	7.50	0.00	133.50	0.00	133.50

These data indicate that a dining area of 126 square feet is needed in split-level houses of the sizes studied to satisfy the majority of these homemakers.

Living Rooms

The homemakers were satisfied with the storage space provided in the living room, for none of the homemakers wanted additional storage in the living room. The amount of floor space allocated for storage in the house plans ranged from 6 to 11 square feet. The majority of the homemakers interviewed would be satisfied with 11 square feet of storage in the living room (Table XIX).

Two of the homemakers were willing to give up from 6 to 10 square feet of open space in the living room to add to another room or area in the house. The amount of open floor space the homemakers wanted in the living room ranged from 212 to 246 square feet. The majority of these homemakers would be satisfied with 246 square feet of open floor space in the living room.

These data indicate that a living room with 257 square feet of floor space which includes 11 square feet of storage space would satisfy the majority of these homemakers.

Bedroom I

Twelve of the homemakers wanted additional storage in bedroom I. The homemakers suggested from 4 to 7 square feet of additional floor space to be used for closet storage in bedroom I (Table XX).

The total amount of closet storage space wanted in Bedroom I by the

TABLE XIX

LIVING ROOM. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
I				0.00	0.00	213.00	6.16	219.16
				0.00	0.00	213.00	6.16	219.16
				0.00	0.00	213.00	6.16	219.16
				0.00	0.00	213.00	6.16	219.16
Average	213.00	6.16	219.16	0.00	0.00	213.00	6.16	219.16
G				-10.00	0.00	212.00	10.85	222.85
				- 6.00	0.00	216.00	10.85	226.85
				0.00	0.00	222.00	10.85	232.85
				0.00	0.00	222.00	10.85	232.85
Average	222.00	10.85	232.85	- 4.00	0.00	218.00	10.85	228.85
F				0.00	0.00	228.04	7.34	235.38
				0.00	0.00	228.04	7.34	235.38
				0.00	0.00	228.04	7.34	235.38
				0.00	0.00	228.04	7.34	235.38
Average	228.04	7.34	235.38	0.00	0.00	228.04	7.34	235.38
H				0.00	0.00	246.60	5.56	252.16
				0.00	0.00	246.60	5.56	252.16
				0.00	0.00	246.60	5.56	252.16
				0.00	0.00	246.60	5.56	252.16
Average	246.60	5.56	252.16	0.00	0.00	246.60	5.56	252.16

TABLE XX

BEDROOM I. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
H								
				0.00	6.00	147.00	19.68	166.68
				0.00	6.84	147.00	20.52	167.52
				0.00	6.84	147.00	20.52	167.52
				0.00	6.84	147.00	20.52	167.52
Average	147.00	13.68	160.68	0.00	6.63	147.00	20.31	167.31
G				-3.42	0.00	156.46	13.76	170.22
				-2.17	0.00	157.71	13.76	171.47
				0.00	0.00	159.88	13.76	173.64
				0.00	0.00	159.88	13.76	173.64
Average	159.88	13.76	173.64	-1.40	0.00	158.48	13.76	172.24
F				-8.18	4.34	159.57	16.10	175.67
				-5.76	5.76	161.99	17.52	179.51
				-4.34	4.34	163.41	16.10	179.51
				-4.34	4.34	163.41	16.10	179.51
Average	167.75	11.76	179.51	-5.65	4.69	162.10	16.45	178.55
I				0.00	5.00	168.00	21.25	189.25
				0.00	5.00	168.00	21.25	189.25
				0.00	5.00	168.00	21.25	189.25
				0.00	5.00	168.00	21.25	189.25
Average	168.00	16.25	184.25	0.00	5.00	168.00	21.25	189.25

homemakers ranged from 14 to 21 square feet. The projected needs of the majority of the homemakers interviewed would be met if 21 square feet of closet storage were provided in bedroom I.

Six of the sixteen homemakers were willing to give up open floor space in bedroom I for storage, either in the bedroom or another room in the house. These homemakers were willing to give up from 2 to 8 square feet of open space in bedroom I.

The homemakers wanted a total of 147 to 168 square feet of open floor space in bedroom I. The majority of these homemakers would be satisfied with 168 square feet of open floor space in bedroom I.

These data suggest that bedroom I in split-level houses of the sizes studied should have 168 square feet of open floor space. Including 21 square feet of closet storage, bedroom I should have 189 square feet of floor space to meet the suggestions of the majority of these homemakers.

Bedroom II

Over half the homemakers wanted more floor space allocated for closet storage space in bedroom II. The homemakers suggested from 2 to 7 square feet of additional storage space in bedroom II (Table XXI).

The total amount of closet storage space in bedroom II which satisfied the homemakers ranged from 10 to 17 square feet. The majority of the homemakers would be satisfied with 17 square feet of floor space allocated for closet storage in the second bedroom.

TABLE XXI

BEDROOM II. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
F				-2.00	2.00	133.00	11.22	144.22
				-3.25	3.25	131.75	12.47	144.22
				-4.32	4.32	130.68	13.54	144.22
				0.00	2.17	135.00	11.39	146.39
Average	135.00	9.22	144.22	-2.39	2.93	132.61	12.15	144.76
G				0.00	0.00	134.89	16.81	151.70
				0.00	0.00	134.89	16.81	151.70
				0.00	0.00	134.89	16.81	151.70
				0.00	0.00	134.89	16.81	151.70
Average	134.89	16.81	151.70	0.00	0.00	134.89	16.81	151.70
I				-4.00	2.00	137.75	12.00	149.75
				-4.16	4.16	137.59	14.16	151.75
				0.00	0.00	141.75	10.00	151.75
				0.00	0.00	141.75	10.00	151.75
Average	141.75	10.00	151.75	-2.04	1.54	139.71	11.54	151.25
H				0.00	4.00	149.38	10.87	160.75
				0.00	4.50	149.38	11.37	160.75
				0.00	4.50	149.38	11.37	160.75
				0.00	6.84	149.38	13.71	163.09
Average	149.38	6.87	156.25	0.00	4.96	149.38	11.83	161.21

Five of the homemakers were willing to give up from 2 to 4 square feet of open floor space for storage in bedroom II. The homemakers were satisfied with 131 to 149 square feet of open floor space in bedroom II. The majority of these homemakers would be satisfied with 149 square feet of open floor space in the second bedroom.

These data suggest that bedroom II in split-level houses of the sizes studied should have 149 square feet of open floor space. Including 17 square feet of closet storage, bedroom II should have 166 square feet of floor space, if the projected needs of the majority of the homemakers interviewed are to be met.

Bedroom III

Four of the homemakers suggested changes in the amount of closet storage space provided for bedroom III in the larger houses. The homemakers suggested from 2 to 4 square feet of additional closet storage in bedroom III (Table XXII).

The total amount of closet storage space in bedroom III which satisfied the homemakers ranged from 10 to 15 square feet. The majority of the homemakers would be satisfied with 12 square feet of floor space allocated for storage in the third bedroom.

Even though the third bedroom was the smallest bedroom in the house, none of the homemakers were willing to give up floor space somewhere else to make this room larger. One homemaker was willing to give up 4 square feet

TABLE XXII

BEDROOM III. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
F				0.00	0.00	104.20	11.02	115.22
				0.00	0.00	104.20	11.02	115.22
				0.00	0.00	104.20	11.02	115.22
				0.00	0.00	104.20	11.02	115.22
Average	104.20	11.02	115.22	0.00	0.00	104.20	11.02	115.22
G				0.00	0.00	107.11	12.30	119.41
				0.00	0.00	107.11	12.30	119.41
				0.00	0.00	107.11	12.30	119.41
				0.00	0.00	107.11	12.30	119.41
Average	107.11	12.30	119.41	0.00	0.00	107.11	12.30	119.41
H				0.00	0.00	116.38	10.66	127.04
				0.00	0.00	116.38	10.66	127.04
				0.00	2.00	116.38	12.66	129.04
				0.00	4.50	116.38	15.16	131.54
Average	116.38	10.66	127.04	0.00	1.62	116.38	12.28	128.66
I				0.00	0.00	123.96	10.00	133.96
				0.00	0.00	123.96	10.00	133.96
				-4.16	4.16	119.80	14.16	133.96
				0.00	2.00	123.96	12.00	135.96
Average	123.96	10.00	133.96	-1.04	1.54	122.92	11.54	134.46

of open floor space for storage space.

The homemakers were satisfied with from 104 to 124 square feet of open floor space in bedroom III. The majority of the homemakers would be satisfied with 120 square feet of open floor space in the third bedroom.

These data imply that the third bedroom in split-level houses of the sizes studied should have 120 square feet of open floor space. Including 12 square feet of closet storage, bedroom III should have at least 132 square feet of floor space to satisfy the majority of these homemakers.

Bathroom I

Storage was provided for the bathroom in two of the four larger houses studied. The homemakers living in the houses which had storage provided in the main bathroom did not suggest additional storage but all the homemakers living in the houses without storage in the main bathroom suggested storage. Eight homemakers suggested from 2 to 5 square feet of storage for the main bathroom (Table XXIII).

The adjusted total storage space wanted by the homemakers ranged from 2 to 6 square feet. The majority of the homemakers would be satisfied with 6 square feet of storage in the main bathroom.

Changes in open space were suggested for the main bathroom by twelve of the homemakers living in the four larger houses. Eight of the homemakers were willing to give up from 2 to 5 square feet of open floor space for storage in the bathroom or in a bedroom.

TABLE XXIII

BATHROOM I. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total[a] Space	Open Space	Storage Space	Open Space	Storage Space	Total[a] Space
				Square Feet				
F				0.00	0.00	25.64	6.00	54.61
				0.00	0.00	25.64	6.00	54.61
				0.00	0.00	25.64	6.00	54.61
				0.00	0.00	25.64	6.00	54.61
Average	25.64	6.00	54.64	0.00	0.00	25.64	6.00	54.61
H				4.37	4.80	24.64	4.80	56.44
				13.01	3.00	33.28	3.00	63.28
				17.05	2.96	37.32	2.96	67.28
				18.85	2.50	39.12	2.50	68.62
Average	20.27	0.00	40.27	13.32	3.31	33.59	3.31	63.90
G				-4.00	4.00	44.31	4.00	68.31
				-3.00	3.00	45.31	3.00	68.31
				-2.47	2.47	45.84	2.47	68.31
				-2.25	2.25	46.06	2.25	68.31
Average	48.31	0.00	68.31	-2.93	2.93	45.38	2.93	68.31
I				-5.00	0.00	57.05	5.50	89.55
				-5.00	0.00	57.05	5.50	89.55
				-5.00	0.00	57.05	5.50	89.55
				-5.00	0.00	57.05	5.50	89.55
Average	62.05	5.50	94.55	-5.00	0.00	57.05	5.50	89.55

[a]Total includes approximately 20 square feet allowed for bathroom fixtures

In one of the house plans both bathrooms were upstairs but the homemakers preferred to have a larger, compartmented bathroom in the bedroom area and a smaller bathroom downstairs near the family room. Therefore, the four homemakers living in these houses wanted the open space in the main bathroom increased by about 13 square feet.

The amount of open floor space which the homemakers wanted in the main bathroom ranged from 26 to 57 square feet. The majority of the homemakers would be satisfied with 57 square feet of open floor space in the main bathroom.

These data indicate that homemakers living in split-level houses of the sizes studied would be satisfied with 57 square feet of open floor space in the main bathroom. Including 6 square feet for storage and approximately 20 square feet for fixtures, the overall size of the main bathroom should be 90 square feet, if the projected needs of the majority of these homemakers are to be met.

The main bathroom in the larger split-level houses was unusually large because the length of the bathroom was the same as the dimension of the bedroom next to it. Sometimes it was a compartmented bath and a half. Apparently the homemakers either liked the large bathroom or were unable to visualize having a smaller bath so there could be more floor space in another room.

Bathroom II

Storage was provided in the second bathroom of two of the four larger

houses studied. Four of the homemakers suggested 2 to 3 square feet of additional storage space in bathroom II(Table XXIV).

The adjusted total storage space wanted by the homemakers ranged from 2 to 4 square feet. The majority of the homemakers interviewed would be satisfied with 3 square feet of storage in the second bathroom.

There was a small increase in the open space wanted by the homemakers for bathroom II. Five of the homemakers suggested from 1 to 6 square feet of additional floor space in the second bathroom. The majority of the homemakers would be satisfied with 22 square feet of open floor space in the second bathroom.

These data suggest that the overall size of a second bathroom, including space for fixtures, should be 37 square feet to satisfy the majority of these homemakers.

Family Rooms

Twelve of the homemakers wanted storage in the family room. The homemakers suggested from 4 to 11 square feet of additional storage space for the family room (Table XXV).

The adjusted total amount of storage space wanted by the homemakers for the family room ranged from 6 to 18 square feet. The majority of the homemakers would be satisfied with 9 square feet of storage space in the family room.

Changes in the open floor space for the family room were suggested by seven of the homemakers living in the larger houses. In three of the four houses

TABLE XXIV

BATHROOM II. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total[a] Space	Open Space	Storage Space	Open Space	Storage Space	Total[a] Space
				Square Feet				
I				0.00	0.00	21.76	2.09	30.85
				0.00	0.00	21.76	2.09	30.85
				0.00	0.00	21.76	2.09	30.85
				0.00	0.00	21.76	2.09	30.85
Average	21.76	2.09	30.85	0.00	0.00	21.76	2.09	30.85
H				0.00	0.00	18.35	0.00	38.35
				0.50	0.00	18.85	0.00	25.85
				2.40	2.25	20.75	2.25	30.00
				6.55	2.00	24.90	2.00	33.90
Average	18.35	0.00	38.35	2.36	1.06	20.71	1.06	31.52
F				0.00	0.00	12.23	0.00	30.23
				0.00	0.00	12.23	0.00	30.23
				2.00	0.00	14.23	0.00	32.23
				5.34	3.00	17.57	3.00	38.57
Average	12.23	0.00	30.23	1.83	0.75	14.06	0.75	32.81
G				0.00	0.00	14.90	2.63	36.53
				0.00	0.00	14.90	2.63	36.53
				0.00	0.00	14.90	2.63	36.53
				0.00	1.50	14.90	4.13	38.03
Average	14.90	2.63	37.53	0.00	0.37	14.90	3.00	37.90

[a]Total includes from 7 to 20 square feet for bathroom fixtures

TABLE XXV

FAMILY ROOM. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
I				0.00	0.00	216.00	0.00	216.00
				0.00	6.00	216.00	6.00	222.00
				0.00	11.05	216.00	11.05	227.05
				36.00	0.00	252.00	0.00	252.00
Average	216.00	0.00	216.00	9.00	4.26	225.00	4.26	229.26
G				0.00	0.00	229.46	8.00	237.46
				0.00	0.00	229.46	8.00	237.46
				0.00	0.00	229.46	8.00	237.46
				- 4.00	4.00	225.46	12.00	237.46
Average	229.46	8.00	237.46	- 1.00	1.00	228.46	9.00	237.46
F				0.00	0.00	246.60	9.02	255.62
				0.00	0.00	246.60	9.02	255.62
				0.00	0.00	246.60	9.02	255.62
				- 9.00	9.00	237.60	18.02	255.62
Average	246.60	9.02	255.62	- 2.25	2.25	244.35	11.27	255.62
H				-65.69	0.00	329.81	0.00	329.81
				-39.90	6.00	355.60	6.00	361.60
				-38.00	8.00	357.50	8.00	365.50
				-25.85	0.00	369.65	0.00	369.65
Average	395.50	0.00	395.50	-40.61	3.50	354.89	3.50	358.39

the homemakers suggesting changes were willing to give up from 4 to 66 square feet of open floor space for additional storage or to make another room larger. All of the homemakers living in the house with the largest family room (385.50 square feet) were willing to give up enough open space for a second bathroom downstairs. One homemaker who lived in the house with the smallest family room (216.00 square feet) wanted 36 additional square feet in the family room.

The adjusted total amount of open space wanted by the homemakers for the family room ranged from 216 to 369 square feet. The majority of the homemakers interviewed would be satisfied with 329 square feet of open floor space in the family room.

These data suggest that a majority of the homemakers living in the larger split-level houses would be satisfied with 329 square feet of open space in the family room. Including nine square feet of storage space the overall size of the family room in the larger split-level houses should be 338 square feet, if the projected needs of the majority of these homemakers are to be met.

Utility Areas

Storage was not provided in any of the utility areas. Six of the homemakers living in the larger houses suggested from 2 to 3 square feet of storage space in the utility room. Apparently the other homemakers were not aware of the need for storage in the utility rooms (Table XXVI).

Five of the homemakers wanted additional open space in the utility area while none of the homemakers were willing to give up open space in the utility

TABLE XXVI

UTILITY AREA. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total[a] Space	Open Space	Storage Space	Open Space	Storage Space	Total[a] Space
				Square Feet				
F				0.00	0.00	13.82	0.00	23.82
				0.00	2.00	13.82	2.00	25.82
				0.00	3.00	13.82	3.00	26.82
				10.74	2.25	24.56	2.25	36.81
Average	13.82	0.00	23.82	2.68	1.81	16.50	1.81	28.31
G				3.00	0.00	32.15	0.00	42.15
				4.20	3.00	33.35	3.00	46.35
				4.75	3.00	33.90	3.00	46.90
				5.80	3.00	34.95	3.00	47.95
Average	29.15	0.00	39.15	4.44	2.25	33.59	2.25	45.84
I				0.00	0.00	57.65	0.00	73.65
				0.00	0.00	57.65	0.00	73.65
				0.00	0.00	57.65	0.00	73.65
				0.00	0.00	57.65	0.00	73.65
Average	57.65	0.00	73.65	0.00	0.00	57.65	0.00	73.65
H				0.00	0.00	61.75	0.00	82.75
				0.00	0.00	61.75	0.00	82.75
				0.00	0.00	61.75	0.00	82.75
				0.00	0.00	61.75	0.00	82.75
Average	61.75	0.00	82.75	0.00	0.00	61.75	0.00	82.75

[a]Total includes approximately 10 square feet for laundry equipment and in some rooms 7 square feet for furnace and 4 square feet for water heater.

area. The majority of the homemakers would be satisfied with 58 square feet of open space in the utility area.

These data suggest that a utility area of 82 square feet, which includes space for laundry equipment, would satisfy the majority of these homemakers.

The utility area in each house included space for laundry equipment and sometimes the furnace and water heater were also in this area. The size of the utility area in some of the houses seemed to be determined by the space left over from the other rooms on the lower level of the house.

Storage Rooms

All of the houses had a room or area designated for storage. Two of the four house plans provided built-in storage in this room. None of the sixteen homemakers suggested additional built-in storage in this room. Based on those who had storage in this room, the majority of the homemakers would be satisfied with 14 square feet of built-in storage (Table XXVII).

One of the larger house plans had a small storage room while the other three house plans provided larger storage rooms. One of the homemakers living in the house with the small storage room wanted to increase the open space by 27 square feet. Eleven of the homemakers living in the houses with the large storage rooms were willing to give up from 3 to 36 square feet of open space for storage or additional open space in the utility area, bathroom II or family room. The majority of the homemakers would be satisfied with 139 square feet of open floor space in the storage room.

TABLE XXVII

STORAGE ROOM. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
H				0.00	0.00	29.03	0.00	29.03
				0.00	0.00	29.03	0.00	29.03
				0.00	0.00	29.03	0.00	29.03
				27.34	0.00	56.37	0.00	56.47
Average	29.03	0.00	29.03	6.83	0.00	35.86	0.00	35.86
F				-12.99	0.00	119.97	11.39	135.36
				- 8.34	0.00	124.62	11.39	140.01
				- 4.00	0.00	128.96	11.39	144.35
				- 3.00	0.00	129.96	11.39	145.35
Average	132.96	11.39	148.35	- 7.08	0.00	125.88	11.39	141.27
I				-36.00	0.00	119.25	0.00	119.25
				-11.05	0.00	144.20	0.00	144.20
				- 6.00	0.00	149.25	0.00	149.25
				0.00	0.00	155.25	0.00	155.25
Average	155.25	0.00	155.25	-13.25	0.00	141.99	0.00	141.99
G				- 8.70	0.00	133.79	14.30	159.09
				- 8.80	0.00	133.89	14.30	159.19
				- 7.75	0.00	134.84	14.30	160.14
				- 3.00	0.00	139.59	14.30	164.89
Average	142.59	14.30	167.89	- 7.06	0.00	135.53	14.30	160.83

These data indicate that a storage room with 153 square feet of floor space which includes 14 square feet for storage would satisfy the majority of these homemakers.

Halls

Five of the sixteen homemakers living in the larger houses wanted to increase the amount of storage space in the hall. These five homemakers suggested from 2 to 4 square feet additional storage. The majority of the homemakers would be satisfied with 6 square feet of storage space in the hall (Table XXVIII).

No changes were suggested in the amount of open space used for halls. The open space for halls in the larger houses ranged from 27 to 43 square feet. The majority of the homemakers would be satisfied with 43 square feet of open floor space in the hall.

Including 6 square feet for storage, 49 square feet of floor space for halls would satisfy the majority of the homemakers living in the larger split-level houses.

V. RECOMMENDED SPACE DIVISION FOR SPLIT-LEVEL HOUSES

The data indicate that split-level houses of approximately 1500 square feet need to include 101 square feet for storage and 1277 square feet for open space to satisfy the majority of the twenty homemakers interviewed. The amounts of storage and of open space recommended in accordance with the

TABLE XXVIII

HALL. CHANGES AND RESULTING ADJUSTMENTS IN FLOOR SPACE SUGGESTED BY SIXTEEN HOMEMAKERS LIVING IN FOUR SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

	Existing Space			Suggested Space Alterations		Adjusted Space		
House Plan	Open Space	Storage Space	Total Space	Open Space	Storage Space	Open Space	Storage Space	Total Space
				Square Feet				
H				0.00	0.00	27.00	4.00	31.00
				0.00	0.00	27.00	4.00	31.00
				0.00	2.00	27.00	6.00	33.00
				0.00	4.00	27.00	8.00	35.00
Average	27.00	4.00	31.00	0.00	1.50	27.00	5.50	32.50
F				0.00	0.00	38.83	3.62	42.45
				0.00	0.00	38.83	3.62	42.45
				0.00	0.00	38.83	3.62	42.45
				0.00	1.67	38.83	5.29	44.12
Average	38.83	3.62	42.45	0.00	0.42	38.83	4.04	42.87
I				0.00	0.00	41.76	4.87	46.63
				0.00	0.00	41.76	4.87	46.63
				0.00	0.00	41.76	4.87	46.63
				0.00	0.00	41.76	4.87	46.63
Average	41.76	4.87	46.63	0.00	0.00	41.76	4.87	46.63
G				0.00	0.00	42.71	3.81	46.52
				0.00	0.00	42.71	3.81	46.52
				0.00	2.17	42.71	5.98	48.69
				0.00	3.42	42.71	7.23	49.94
Average	42.71	3.81	46.52	0.00	1.39	42.71	5.20	47.91

desires of the homemakers for each of the twelve rooms in the smaller house plans are given in Table XXIX.

All of the homemakers living in the smaller houses suggested an increase in the total square footage of storage space in their houses. The existing storage in the smaller houses ranged from 58 to 91 square feet. This was from 10 to 43 square feet less than the total amount of storage which would satisfy a majority of the homemakers living in the smaller houses. These homemakers suggested that the largest amounts of storage be in the kitchen, the bedrooms and the family room.

Split-level houses of approximately 1800 square feet need to include 128 square feet for storage and 1542 square feet for open space to satisfy the majority of the sixteen homemakers interviewed. The amounts of storage and open space recommended in accordance with the desires of the sixteen homemakers for each of the twelve rooms in the larger house plans studied are given in Table XXX.

These homemakers also suggested an increase in the total square footage of storage space in their houses. The existing storage in the larger houses ranged from 70 to 100 square feet. This was from 28 to 58 square feet less than the total amount of storage which would satisfy a majority of the homemakers living in the larger houses. These homemakers suggested the largest amounts of storage for the kitchen, the bedrooms, the storage room and the living room.

In Table XXXI the amounts of storage space recommended to meet the

TABLE XXIX

ADJUSTMENTS IN FLOOR SPACE FOR TWELVE ROOMS OR AREAS WHICH MEET THE PROJECTED NEEDS OF THE MAJORITY OF THE HOMEMAKERS LIVING IN SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

Room or Area	Recommended Space		
	Open Space	Storage Space	Total Space
	Square Feet		
Kitchen[a]	65.0	26.0	109.0
Dining Area	84.0	0.0	84.0
Living Room	205.0	8.0	213.0
Bedroom I	143.0	17.0	160.0
Bedroom II	134.0	15.0	149.0
Bedroom III	109.0	11.0	120.0
Bathroom I[b]	35.0	8.0	63.0
Bathroom II[b]	19.0	0.0	37.0
Family Room	304.0	12.0	316.0
Utility Area[c]	27.0	0.0	37.0
Storage Room	124.0	0.0	124.0
Halls	28.0	4.0	32.0
Total	1277.0	101.0	1444.0

[a]Total includes 18 square feet allowed for kitchen appliances

[b]Total includes approximately 20 square feet allowed for bathroom fixtures

[c]Total includes approximately 14 square feet allowed for laundry equipment and water heater

TABLE XXX

ADJUSTMENTS IN FLOOR SPACE FOR TWELVE ROOMS OR AREAS WHICH MEET THE PROJECTED NEEDS OF THE MAJORITY OF THE HOMEMAKERS LIVING IN SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

Room or Area	Recommended Space		
	Open Space	Storage Space	Total Space
	Square Feet		
Kitchen[a]	82.0	29.0	129.0
Dining Area	126.0	0.0	126.0
Living Room	246.0	11.0	257.0
Bedroom I	168.0	21.0	189.0
Bedroom II	149.0	17.0	166.0
Bedroom III	120.0	12.0	132.0
Bathroom I[b]	57.0	6.0	90.0
Bathroom II[b]	22.0	3.0	37.0
Family Room	329.0	9.0	338.0
Utility Area[c]	61.0	0.0	71.0
Storage Room	139.0	14.0	153.0
Hall	43.0	6.0	49.0
Total	1542.0	128.0	1737.0

[a]Total includes 18 square feet allowed for kitchen appliances

[b]Total includes approximately 20 square feet allowed for bathroom fixtures

[c]Total includes approximately 14 square feet allowed for laundry equipment and water heater

projected needs of the majority of the thirty-six homemakers interviewed are given along with the minimum storage requirements of the Federal Housing Administration, with the amount of storage recommended by Davis for houses of approximately 1000 square feet, and with a range of recommendations from the literature reviewed in Chapter Two.

TABLE XXXI

STORAGE RECOMMENDED IN THIS STUDY, STORAGE REQUIRED BY THE FEDERAL HOUSING ADMINISTRATION, STORAGE RECOMMENDED BY DAVIS AND OTHER RESEARCH STUDIES

Area of House	Size of House				Literature Reviewed
	This Study		Davis	F H A	
	1500 Sq. Ft.	1800 Sq. Ft.	1000 Sq. Ft.	Three Bedroom	
	Square Feet				
Kitchen	29.0	26.0	24.0	12.0	11.0 to 26.0
Dining Area	0.0	0.0	6.0	--	5.9 to 13.3
Living Room	11.0	8.0	10.0	6.0	13.7 to 16.0
Family Room	9.0	12.0	--	--	----
Bedrooms	(1) 21.0 (2) 17.0 (3) 12.0	(1) 17.0 (2) 15.0 (3) 11.0	(1) 15.0 (2) 14.0 (3) 12.0	6.0 each	6.0 to 26.0
Bathrooms	(1) 6.0 (2) 3.0	(1) 8.0 (2) 0.0	5.0	--	1.1 to 4.4
Hall (textile)	6.0	4.0	4.0	1.8	1.5 to 6.2
Utility-Storage	14.0	0.0	20.0	--	----

The majority of the homemakers living in the 1500 square foot houses wanted kitchen storage (26.0 square feet) equal to the largest amount recommended in the literature (26.0 square feet) while the majority of the homemakers living in the 1800 square foot houses wanted even more (29.0 square feet).

No storage was recommended for the dining area in either of the split-level houses nor was required by the Federal Housing Administration. However, such storage was recommended by some research workers (6.0 to 13.3 square feet).

The amount of storage recommended for the living room in the smaller split-level house (8.0 square feet) was less than the amount recommended by other researchers (13.6 to 16.0 square feet) but more than the minimum required by the Federal Housing Administration (6.0 square feet). In the larger split-level houses the amount of storage recommended for the living room (11.0 square feet) was more than that recommended by Davis (10.0 square feet) but it was also less than the amount recommended by other researchers.

The literature made no recommendations for storage for the family room and the Federal Housing Administration has no minimum requirements for storage in this area. On the basis of this study 12 square feet of storage space was recommended for the smaller split-level houses and 9 square feet of storage space was recommended for the larger houses. This difference may be due to the increased storage desired in the living room by homemakers living in the larger split-level houses.

The closet storage recommended for the three bedrooms for both smaller houses (43.0 square feet) and larger split-level houses (50.0 square feet) was more than double the minimum required by the Federal Housing Administration (18.0 square feet) and was also more than the amount recommended by Davis (41.0 square feet) for houses of 1000 square feet.

Storage space recommended for the bathrooms in the smaller split-level houses (8.0 square feet) and in the larger split-level houses (9.0 square feet) was more than the amount recommended in other research (1.1 to 5.0 square feet).

Storage space recommended for the halls, which could be used for linens, in the larger split-level houses (6.0 square feet) was as much as the liberal amount recommended by some researchers. Less storage was recommended for the halls in the smaller split-level houses (4.0 square feet).

Built-in storage recommended for a storage-utility area was not found in either the literature reviewed or in the minimum requirements of the Federal Housing Administration. Storage was not recommended for the utility area in either of the split-level houses.

In the storage room of the larger split-level house, 14 square feet of storage was recommended. No built-in storage was recommended in the storage of the smaller split-level houses.

Since the houses used in this study were larger than houses which would meet the minimum requirements of the Federal Housing Administration, all the rooms and areas recommended were larger than FHA minimum standards.

The room sizes for the 1800 square-foot split-level houses studied were always larger than for the 1500 square-foot split-level houses, except for the second bathroom. The second bathroom was the same for both size houses. Although the houses in this study were larger than the houses studied by Davis, the recommendations for the size of each room in the houses were not always larger than the room size recommended by Davis. The dining area, the living room, the second and third bedrooms recommended by Davis were larger than these rooms recommended for the 1500 square-foot houses. The third bedroom recommended by Davis was larger than the one recommended for the 1800 square-foot house.

CHAPTER V

STATISTICAL ANALYSIS OF DATA

Since it was possible that differences in the sizes of rooms and in the amount of storage space desired by the homemakers might be influenced by differences in the house plans, differences in the rooms, and differences in the families, twelve hypotheses were tested statistically. The analysis of variance was the statistical procedure used to test the following twelve null hypotheses:

For the amount of change desired by the homemakers in storage space,

1. there is no difference between the house plans.
2. there is no difference between the rooms.
3. there is no difference between the families.

For the amount of change desired by the homemakers in the open space,

4. there is no difference between the house plans.
5. there is no difference between the rooms.
6. there is no difference between the families.

In the total or adjusted storage space desired by the homemakers,

7. there is no difference between the house plans.
8. there is no difference between the rooms.
9. there is no difference between the families.

In the total or adjusted open space desired by the homemakers,

10. there is no difference between the house plans.

11. there is no difference between the rooms.

12. there is no difference between the families.

These twelve hypotheses were tested for both sizes of houses studied, that is, the smaller (approximately 1500 square feet) split-level houses and the larger (approximately 1800 square feet) split-level houses. Hence, a total of twenty-four hypotheses were tested with the analysis of variance.

I. CHANGES IN STORAGE SPACE SUGGESTED BY THE HOMEMAKERS

Split-Level Houses -- 1500 Square-Foot Classification

The analysis of variance for changes in square footage of storage space suggested by the twenty homemakers living in the smaller houses is shown in Table XXXII.

The null hypothesis, that there is no difference between house plans in the amount of storage space the homemakers wanted to change, was not rejected.

Between the twelve rooms or areas in each house the F ratio of 7.80 was significant at the 1 per cent level. This significant value indicated that the twenty homemakers living in the smaller split-level houses wanted to change the storage space more in some rooms than in others. This finding led to the rejection of the null hypothesis, that there is no difference between the rooms in the amount of storage space the homemakers wanted to change.

TABLE XXXII

ANALYSIS OF VARIANCE FOR CHANGES IN STORAGE SUGGESTED BY THE TWENTY HOMEMAKERS LIVING IN SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

Source of Variation	Degrees Freedom	Sum of Squares	Mean Square	F Ratio	Level of Significance
Plans	4	43.56	10.89	0.98	n.s.
Rooms	11	958.90	87.17	7.80	1%
Families	180	544.80	3.03		
Interaction	44	491.42	11.17	3.36	1%
Total	239	2038.68			

It was not possible to test the significance of the differences between the families directly because there were more degrees of freedom for families than for plan-area interaction. Therefore, whether or not the variances between plan-area interaction were significantly greater than the variances between the families was tested.

The F ratio for plan-area interaction over families was significant. This significant value of F indicated that variances for the interaction between the plans, areas, and families were greater than the variances between the families. Therefore, this test implies that even though there were differences between families, these differences apparently did not affect greatly the amount of change suggested for storage space by the homemakers.

Split-Level Houses -- 1800 Square-Foot Classification

The analysis of variance for changes in square footage of storage space suggested by the sixteen homemakers living in the larger houses is shown in Table XXXIII.

The null hypothesis, that there is no difference between house plans in the amount of storage space the homemakers wanted to change was not rejected.

Between the twelve rooms or areas in each house the F ratio of 2.42 was significant at the 5 per cent level. This significant value indicated that the twenty homemakers living in the smaller split-level houses wanted to change the storage more in some rooms than in others. This finding led to the rejection of the null hypothesis, that there is no difference between the rooms in the amount of storage space the homemakers wanted to change.

It was not possible to test the significance of the differences between the families directly because there were more degrees of freedom for families than for plan-area interaction. Therefore, whether or not the variances between plan-area interaction were significantly greater than the variances between the families was tested.

The F ratio for plan-area interaction over families was significant. This significant value of F indicated that variances for the interaction between the plans, areas, and families was greater than the variances between the families. Therefore, this test implies that even though there were differences between families, these differences apparently did not affect greatly the amount of change suggested for storage space by the homemakers.

TABLE XXXIII

ANALYSIS OF VARIANCE FOR CHANGES IN STORAGE SUGGESTED BY THE SIXTEEN HOMEMAKERS LIVING IN SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

Source of Variation	Degrees Freedom	Sum of Squares	Mean Square	F Ratio	Level of Significance
Plans	3	18.46	6.15	0.57	n. s.
Rooms	11	283.76	25.80	2.42	5%
Families	144	495.32	3.44		
Interaction	33	351.87	10.66	3.09	1%
Total	191	1149.41			

II. CHANGES IN OPEN SPACE SUGGESTED BY THE HOMEMAKERS

Split-Level Houses -- 1500 Square-Foot Classification

The analysis of variance for changes in square footage of open space suggested by the twenty homemakers living in the smaller houses is shown in Table XXXIV.

The null hypothesis, that there is no difference between house plans in the amount of open space the homemakers wanted to change, was not rejected.

It was not possible to test the significance of the differences between the families directly because there were more degrees of freedom for families

than for plan-area interaction. Therefore, whether or not the variances between plan-area interaction were significantly greater than the variances between the families was tested.

TABLE XXXIV

ANALYSIS OF VARIANCE FOR CHANGES IN OPEN SPACE SUGGESTED BY THE TWENTY HOMEMAKERS LIVING IN SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

Source of Variation	Degrees Freedom	Sum of Squares	Mean Square	F Ratio	Level of Significance
Plans	4	43.56	10.89	0.07	n. s.
Rooms	11	978.11	88.92	0.55	n. s.
Families	180	11,007.31	61.15		
Interaction	44	7,154.26	162.60	2.66	1%
Total	239	19,183.24			

The F ratio for plan-area interaction over families was significant. This significant value of F indicated that variances for the interaction between plans, areas and families was greater than the variances between families. Therefore, this test implies that even though there were differences between families, these differences apparently did not affect greatly the amount of changes suggested for open space by the homemakers.

Split-Level Houses -- 1800 Square-Foot Classification

The analysis of variance for changes in square footage of open space suggested by the sixteen homemakers living in the larger houses is shown in Table XXXV.

TABLE XXXV

ANALYSIS OF VARIANCE FOR CHANGES IN OPEN SPACE SUGGESTED BY THE SIXTEEN HOMEMAKERS LIVING IN SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

Source of Variation	Degrees Freedom	Sum of Squares	Mean Square	F Ratio	Level of Significance
Plans	3	11.94	3.98	0.02	n. s.
Rooms	11	2,116.60	192.42	0.75	n. s.
Families	144	4,505.39	31.28		
Interaction	33	8,448.15	256.00	8.18	1%
Total	191	15,082.08			

The null hypothesis, that there is no difference between house plans in the amount of open space the homemakers wanted to change, was not rejected.

The null hypothesis, that there is no difference between the rooms in the amount of open space the homemakers wanted to change, was not rejected.

It was not possible to test the significance of the differences between the families directly because there were more degrees of freedom for families than for plan-area interaction. Therefore, whether or not the variances between

plan-area interaction were significantly greater than the variances between the families was tested.

The F ratio for plan-area interaction over families was significant. The significant value of F indicated that variances for the interaction between plans, areas and families was greater than the variances between families. Therefore, this test implies that even though there were differences between families, these differences apparently did not affect greatly the amount of change suggested for open space by the homemakers.

III. TOTAL STORAGE SPACE WANTED BY THE HOMEMAKERS

Split-Level Houses -- 1500 Square-Foot Classification

The analysis of variance for the total storage space wanted by the twenty homemakers living in the smaller houses is shown in Table XXXVI.

The null hypothesis, that there is no difference between house plans in the total amount of storage space the homemakers wanted, was not rejected.

Between the twelve rooms or areas in each house the F ratio of 69.85 was significant at the 1 per cent level. This significant value indicated that the twenty homemakers living in the smaller split-level houses wanted more storage space in some rooms than in others. This finding led to the rejection of the null hypothesis, that there is no difference between the rooms in the total amount of storage space the homemakers wanted.

It was not possible to test the significance of the differences between the families directly because there were more degrees of freedom for families

than for plan-area interaction. Therefore, whether or not the variances between plan-area interaction were significantly greater than the variances between the families was tested.

TABLE XXXVI

ANALYSIS OF VARIANCE FOR THE TOTAL STORAGE SPACE WANTED BY THE TWENTY HOMEMAKERS LIVING IN SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

Source of Variation	Degrees Freedom	Sum of Squares	Mean Square	F Ratio	Level of Significance
Plans	4	138.08	34.52	2.28	n. s.
Rooms	11	11,602.54	1054.78	69.85	1%
Families	180	1,113.89	6.19		
Interaction	44	664.47	15.10	2.44	1%
Total	239	13,518.98			

The F ratio for plan-area interaction over families was significant. This significant value of F indicated that variances for the interaction between the plans, areas and families was greater than the variances between the families. Therefore, this test implies that even though there were differences between families, these differences apparently did not affect greatly the total amount of storage space wanted by the homemakers.

Split-Level Houses -- 1800 Square-Foot Classification

The analysis of variance for the total storage space wanted by the sixteen homemakers living in the larger houses is shown in Table XXXVII.

TABLE XXXVII

ANALYSIS OF VARIANCE FOR THE TOTAL STORAGE SPACE WANTED BY THE SIXTEEN HOMEMAKERS LIVING IN SPLIT-LEVEL OF APPROXIMATELY 1800 SQUARE FEET

Source of Variation	Degrees Freedom	Sum of Squares	Mean Square	F Ratio	Level of Significance
Plans	3	187.73	62.58	1.73	n. s.
Rooms	11	9,655.06	877.73	24.25	1%
Families	144	495.32	3.44		
Interaction	33	1,194.27	36.19	10.52	1%
Total	191	11,532.38			

The null hypothesis, that there is no difference between house plans in the total amount of storage space the homemakers wanted, was not rejected.

Between the twelve rooms or areas in each house the F ratio of 24.25 was significant at the 1 per cent level. This significant value indicated that the sixteen homemakers living in the larger split-level houses wanted more storage space in some rooms than in others. This finding led to the rejection of the null hypothesis, that there is no difference between the rooms in the amount of storage space the homemakers wanted.

It was not possible to test the significance of the differences between the families directly because there were more degrees of freedom for families than for plan-area interaction. Therefore, whether or not the variances between plan-area interaction were significantly greater than the variances between the families was tested.

The F ratio for plan-area interaction over families was significant. This significant value of F indicated that variances for the interaction between the plans, areas and families was greater than the variances between the families. Therefore, this test implies that even though there were differences between families, these differences apparently did not affect greatly the total amount of storage space wanted by the homemakers.

IV. TOTAL OPEN SPACE WANTED BY THE HOMEMAKERS

Split-Level Houses -- 1500 Square-Foot Classification

The analysis of variance for the total open space wanted by the twenty homemakers living in the smaller houses is shown in Table XXXVIII.

The null hypothesis, that there is no difference between house plans in the total square footage of open space the homemakers wanted, was not rejected.

Between the twelve rooms or areas in each house the F ratio of 54.51 was significant at the 1 per cent level. This significant value indicated that the twenty homemakers living in the smaller split-level houses wanted more open space in some rooms than in others. This finding led to the rejection of the null hypothesis, that there is no difference between the rooms in the amount of open

space the homemakers wanted.

TABLE XXXVIII

ANALYSIS OF VARIANCE FOR THE TOTAL OPEN SPACE WANTED BY THE TWENTY HOMEMAKERS LIVING IN SPLIT-LEVEL HOUSES OF APPROXIMATELY 1500 SQUARE FEET

Source of Variation	Degrees Freedom	Sum of Squares	Mean Square	F Ratio	Level of Significance
Plans	4	1,987.85	496.96	0.25	n. s.
Rooms	11	1,230,624.72	111,874.97	54.51	1%
Families	180	10,998.40	61.10		
Interaction	44	90,298.52	2,052.24	33.58	1%
Total	239	1,333,909.49			

It was not possible to test the significance of the differences between the families directly because there were more degrees of freedom for families than for plan-area interaction. Therefore, whether or not the variances between plan-area interaction were significantly greater than the variances between the families was tested.

The F ratio for plan-area interaction over families was significant. This significant value of F indicated that variances for the interaction between the plans, areas and families was greater than the variances between the families. Therefore, this test implies that even though there were differences

between families, these differences apparently did not affect greatly the total amount of open space wanted by the homemakers.

Split-Level Houses -- 1800 Square-Foot Classification

The analysis of variance for the total open space wanted by the sixteen homemakers living in the larger houses is shown in Table XXXIX.

TABLE XXXIX

ANALYSIS OF VARIANCE FOR THE TOTAL OPEN SPACE WANTED BY THE SIXTEEN HOMEMAKERS LIVING IN SPLIT-LEVEL HOUSES OF APPROXIMATELY 1800 SQUARE FEET

Source of Variation	Degrees Freedom	Sum of Squares	Mean Square	F Ratio	Level of Significance
Plans	3	5,070.54	1,690.18	0.61	n. s.
Rooms	11	1,025,686.06	93,244.19	33.89	1%
Families	144	2,106.17	14.63		
Interaction	33	90,774.34	2,750.74	188.02	1%
Total	191	1,123,637.11			

The null hypothesis, that there is no difference between house plans in the total amount of open space the homemakers wanted, was not rejected.

Between the twelve rooms or areas in each house the F ratio of 33.89 was significant at the 1 per cent level. This significant value indicated that the sixteen homemakers living in the larger split-level houses wanted more open

space in some rooms than in others. This finding led to the rejection of the null hypothesis, that there is no difference between the rooms in the amount of open space the homemakers wanted.

It was not possible to test the significance of the differences between the families directly because there were more degrees of freedom for families than for plan-area interaction. Therefore, whether or not the variances between plan-area interaction were significantly greater than the variances between the families was tested.

The F ratio for plan-area interaction over families was significant. This significant value of F indicated that variances for the interaction between the plans, areas and families was greater than the variances between the families. Therefore, this test implies that even though there were differences between families, these differences apparently did not affect greatly the total amount of open space wanted by the homemakers.

CHAPTER VI

ROOM RELATIONSHIPS

A house may be more convenient if certain rooms are closer to others. For instance, if the dining area is near the kitchen related activities may be carried on in these two areas.

The thirty-six homemakers were asked which three of seven areas they preferred near each of the eight areas in their houses. A homemaker could "just happen" to select a room or area to be near another room. Therefore, whether the number of times a room was chosen to be near another was greater than chance was calculated. The law of probability was used for this calculation.

If the number of times a room was chosen to be near another room was large enough for there to be little probability of that number of choices being due to chance, that room relationship is listed below:

	Level of Significance
Near the Kitchen	
Dining Room	1%
Living Room	1%
Family Room	1%
Near the Dining Area	
Kitchen	1%
Family Room	1%

	Level of Significance
Near the Living Room	
Kitchen	1%
Dining Area	1%
Bathroom	1%
Near the Bedrooms	
Bathroom	1%
Near the Main Bathroom	
Bedroom Area	1%
Living Room	1%
Near the Second Bathroom	
Family Room	1%
Utility Area	1%
Kitchen	1%
Near the Family Room	
Bathroom	1%
Kitchen	1%
Utility Area	1%
Near the Utility Area	
Family Room	1%
Kitchen	1%
Bathroom	1%

Some rooms may be more convenient near entrances than others. The homemakers were asked to choose three of the eight areas to be near the front door and three areas to be near the back door. If the number of times a room was chosen to be near an entrance was large enough for there to be little probability of that number of choices being due to chance, the room is listed below:

	Level of Significance
Near the Front Door	
Living Room	1%
Kitchen	1%
Dining Area	1%

	Level of Significance
Near the Back Door	
Kitchen	1%
Family Room	1%
Utility Area	1%

In most houses it is necessary that areas, other than the hall, be used as passageways from one part of the house to another. The homemakers were asked to select one of the eight rooms in the house which they preferred to be used as a passageway. The family room and the kitchen were chosen to be used as the passageway a large enough number of times for there to be little probability that these choices were due to chance.

CHAPTER VII

SUMMARY AND CONCLUSIONS

This study was planned to determine how homemakers, who live in split-level houses, prefer to have the existing space in their houses allocated for storage and for living. That is, whether women want more open space in some rooms than in others and whether they want more storage space in some rooms than in other rooms. Whether the preferences indicated by the homemakers for allocation of storage space and open space in their houses were related to differences between house plans, to differences between rooms, or to differences between the homemakers was the main purpose of this study. The homemakers' preferences for the arrangement of rooms and doorways and which preferences were greater than chance was included.

In order that suggested changes in space planning could be compared and studied statistically, house plans of approximately the same size with the same number and kinds of rooms were needed for this study. Since a sufficient number of house plans of approximately the same size were not available, two groups of plans were used. Five plans for smaller houses and four plans for larger houses, each with twelve rooms or areas, were selected. The five plans for smaller split-level houses ranged from 1515.85 to 1657.08 square feet. The four plans for the larger split-level houses ranged from 1798.89 to 1926.23

square feet.

Since the number of people living in a house could easily influence the needs and uses of housing spaces, this study was limited to families with four or five members, a mother, a father and two or three children. Thirty-six families were included in this study--four families for each of the nine different house plans.

The thirty-six homemakers of these families were interviewed. During the interviews when the homemakers suggested changes in living and storage space in their houses, they were not allowed to suggest a change in the overall size of their houses, since the focus of this study was the space allocations in their present houses and not their desires for a larger or smaller house.

Rooms with amounts of storage and open space that would satisfy the majority of the homemakers interviewed who lived in split-level houses of approximately 1500 square feet are listed below:

Room or Area	Open Space	Storage Space	Total Space
		Square Feet	
Kitchen[a]	65.0	26.0	109.0
Dining Area	84.0	0.0	84.0
Living Room	205.0	8.0	213.0
Bedroom I	143.0	17.0	160.0
Bedroom II	134.0	15.0	149.0
Bedroom III	109.0	11.0	120.0
Bathroom I[b]	35.0	8.0	63.0
Bathroom II[b]	19.0	0.0	37.0
Family Room	304.0	12.0	316.0
Utility Area[c]	27.0	0.0	37.0
Storage Room	125.0	0.0	125.0
Hall	28.0	4.0	32.0

[a]Total includes 18 square feet allowed for kitchen appliances
[b]Total includes approximately 20 square feet allowed for bathroom fixtures
[c]Total includes approximately 14 square feet allowed for laundry equipment and water heater

Rooms with amounts of storage and living space that would satisfy the majority of the homemakers living in split-level houses of approximately 1800 square feet are listed below:

Room or Area	Open Space	Storage Space	Total Space
		Square Feet	
Kitchen[a]	82.0	29.0	129.0
Dining Area	126.0	0.0	126.0
Living Room	246.0	11.0	257.0
Bedroom I	168.0	21.0	189.0
Bedroom II	149.0	17.0	166.0
Bedroom III	120.0	12.0	132.0
Bathroom I[b]	57.0	6.0	90.0
Bathroom II[b]	22.0	3.0	37.0
Family Room	329.0	9.0	338.0
Utility Area[c]	61.0	0.0	71.0
Storage Room	139.0	14.0	153.0
Hall	43.0	6.0	49.0

[a]Total includes 18 square feet allowed for kitchen appliances
[b]Total includes approximately 20 square feet allowed for bathroom fixtures
[c]Total includes approximately 14 square feet allowed for laundry equipment and water heater

These recommendations for both the smaller and larger split-level houses met the projected need of eighty per cent of the homemakers interviewed.

All of the homemakers wanted additional storage in their houses. The total existing storage in the five smaller split-level houses ranged from 58 to 91 square feet. This was from 10 to 43 square feet less than the total amount of storage (101 square feet) which would satisfy a majority of the twenty homemakers living in the smaller houses. The total existing storage in the four larger split-level houses ranged from 70 to 100 square feet. This was from 28 to 58 square feet less than the total amount of storage (128 square feet) which would satisfy a majority of the sixteen homemakers living in the larger houses.

All of the homemakers did not suggest the same amount of storage

space for the same rooms or the same amount of open space for the same rooms. In order to determine whether these differences in their desires for storage and living space allocations were due to differences between the house plans, differences between the rooms, or differences between the families, twenty-four null hypotheses were tested. The analysis of variance was the procedure used to test the hypotheses. The hypotheses were tested according to total amounts of storage and open space wanted and according to changes in storage and open space desired. The hypotheses tested for each size house and whether they were rejected or accepted are listed below:

Hypotheses	Accepted or Rejected	
	1500 Sq. Ft. Houses	1800 Sq. Ft. Houses
For the amount of change desired by the homemakers in storage space, there is no difference		
1. between the house plans	Accepted	Accepted
2. between the rooms	Rejected	Rejected
3. between the families	Accepted (by inference)	Accepted (by inference)
For the amount of change desired by the homemakers in the open space, there is no difference		
1. between the house plans	Accepted	Accepted
2. between the rooms	Accepted	Accepted
3. between the families	Accepted (by inference)	Accepted (by inference)

Hypotheses	Accepted or Rejected	
	1500 Sq. Ft. Houses	1800 Sq. Ft. Houses
In the total or adjusted storage space desired by the homemakers, there is no difference		
1. between the house plans	Accepted	Accepted
2. between the rooms	Rejected	Rejected
3. between the families	Accepted (by inference)	Accepted (by inference)
In the total or adjusted open space desired by the homemakers, there is no difference		
1. between the house plans	Accepted	Accepted
2. between the rooms	Rejected	Rejected
3. between the families	Accepted (by inference)	Accepted (by inference)

These statistical tests indicate that:

1. differences in the house plans did not affect greatly the changes suggested by the homemakers for living and storage space or the total living and storage space desired.

2. differences in changes suggested in storage space and differences in the total storage space desired were due to rooms and areas. That is, the homemakers wanted more storage space in some rooms than in others.

3. the homemakers wanted some rooms larger than others. Differences were undoubtedly already present in the sizes of the rooms they had since they did not suggest significant changes in living space.

4. although there were differences in the individual homemakers' preferences, these differences were not large enough to affect the resulting suggested sizes for rooms or for storage spaces.

The following expressed preferences of homemakers for rooms to be near each other, or near entrances, were statistically significant at the 1 per cent level. No such preferences at the 5 per cent level of significance were found.

Near the Kitchen
Dining Area, Living Room, Family Room

Near the Dining Area
Kitchen, Family Room

Near the Living Room
Kitchen, Dining Area, Bathroom

Near the Bedrooms
Bathroom

Near the Main Bathroom
Bedroom Area, Living Room

Near the Second Bathroom
Family Room, Kitchen, Utility Area

Near the Family Room
Bathroom, Kitchen, Utility Area

Near the Utility Area
Family Room, Kitchen, Bathroom

Near the Front Door
Living Room, Kitchen, Dining Area

Near the Back Door
Kitchen, Family Room, Utility Area

The family room and the kitchen were chosen to be used as the passageway enough times that there was little probability that their choices were due to chance.

Further study of the differences in family preferences for housing

space divisions is recommended. Such research could be conducted in a housing development where families live in identical houses or apartments. The preferences of the families could be analyzed for different sizes of families with children at different age levels.

The homemakers interviewed in this study commented on things they disliked about their houses. Some of these, such as--poorly planned kitchens, poorly planned laundry areas, windows and doors poorly spaced for furniture arrangement, and lack of privacy from the front entrance for other rooms, might be the basis of further study.

It is hoped that builders, research personnel and others interested in house planning will find this study helpful for planning housing spaces in accordance with family preference.

APPENDIX

Schedule number_____

Date_____

Name_____Address_____

Husband's occupation_____

Part Time_____

Wife's Occupation_____Full Time.

Children in family:

No. boys_____ Ages_____

No. girls_____ Ages_____

Number of years living 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 kind would you buy? Circle the answer.

Ranch type split-level two-story

Used for Each Room or Area

Schedule Number_____

How much more storage space would you like? Or, would you give up any? How much? Would you prefer built-in or furniture storage?

Additional Built-in Storage (by builder)	Width	Length	Sq. Ft. of Floor Space
Closet			
Cabinets Base			
Wall			

Total Sq. Ft._____

Considering that any additional furniture will probably take up some space, would you like to add or subtract any pieces of furniture in here? List any changes.

Add Pieces	Subtract Pieces

Do you and your family have enough room to do what you want to do in here? Would you like for this room to be larger? How much?

Additional Space (other than built-in storage) for:	Width	Length	Sq. Ft. of Floor Space
Furniture and/or Furniture storage			
Wall shelves (open)			
Living Space			

Total Sq. Ft._____

Overall Total Sq. Ft._____

Which room or rooms would you make smaller to have this one larger for:

Built-in Storage		Living Space	
Room	Sq. Ft.	Room	Sq. Ft.

Schedule Number_____

Summary Sheet for Data and for the Homemaker to Rate Preferences

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

Larger				Room	Smaller			
Living Space		Built-in Storage Space			Living Space		Built-in Storage Space	
Sq. ft. of Floor Sp.	Rate Pref.	Sq. ft. of Floor sp.	Rate Pref.		Sq. ft. of Floor Sp.	Rate Pref.	Sq. ft. of Floor Sp.	Rate Pref.
				Kitchen				
				Dining Area				
				Living Room				
				Bedroom I				
				Bedroom II				
				Bedroom III				
				Bath I				
				Hall				
				Bath II				
				Family Room				
				Utility Area				
				Storage Room				
Total:		Total:			Total:		Total:	

TOTAL:_____SQ. FT.

TOTAL:_____SQ. FT.

Schedule No. _____

Room Relationship

Of the seven 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 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 Family Room

Room	Reason
a.	
b.	
c.	

6. the Utility Area

Room	Reason
a.	
b.	
c.	

7. the Main Bath

Room	Reason
a.	
b.	
c.	

8. the Second Bath

Room	Reason
a.	
b.	
c.	

Which three of these eight 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.	

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