HOUSEHOLD STORAGE STUDY

Developed under
The Technical Studies Program
of the
Federal Housing Administration

by
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This report is a product of the University of Illinois and does not necessarily represent nor coincide with the standards or policy of the Federal Housing Administration.

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I. OBJECTIVE OF THE STUDY

The major objective of this study was to review and recommend improvements in the requirements for storage facilities needed in residences of one or two living units as specified in the Minimum Property Standards of the Federal Housing Administration. The recommendations for storage standards incorporated as part of this report are based upon a review of published and unpublished literature available, and upon the experience and opinion of a committee of experts assembled by the contractor, the Small Homes Council-Building Research Council of the University of Illinois, Urbana, Illinois. This report is the product of the University of Illinois and does not necessarily represent nor coincide with the standards or policy of the Federal Housing Administration.

A second objective of the study was to make recommendations as to the kind and type of additional studies which might be advisable or necessary to further the first objective in those areas in which information is presently inadequate.

II. PROCEDURE

The procedure used in the study involved the following steps:

a. The review of pertinent literature.

b. The convening of a committee of specialists to discuss the problems and the literature pertaining thereto, and to make recommendations with respect to the storage requirements in the Minimum Property Standards of the Federal Housing Administration.

c. The preparation of the preliminary draft of the report including the recommendations.

d. The review of the draft by committee members.

e. The preparation of this document, the final report.
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III. LITERATURE REVIEW

The basis for the literature review was the comprehensive Primary Report on Study of Storage Requirements for Homes, written by Clarence W. Farrier, Engineering Consultant, for the Standards and Studies Section of the Federal Housing Administration, along with the appended "Bibliography of Publications Reviewed for Primary Report of Technical Studies of Storage Space Requirements for Homes".

A significant portion of the Farrier report is the tabulated information obtained from six inventory surveys of the possessions of a total of 4771 families. The two earliest of these surveys were studies of urban families made 18 years ago; the other four were studies of farm families made 10 to 13 years ago. Following tabulation of the data, the Farrier report shows computations of space required to store the inventoried items.

Committee members knew of more recent studies conducted on a more limited basis. Comments on certain of these studies are included later in this report and the reports are listed in Appendix A.

Other items in the literature detail the amount of space required for various items to be stored. There appears to be adequate information of this type.
IV. PURPOSE OF FHA STANDARDS

FHA standards serve a dual purpose. The prime purpose is concerned with protection of the investment in the house. A second purpose is to improve the quality of housing in the United States, and to make good housing available to the maximum number of people.

FHA standards are designed to establish long-range market value in houses financed under the FHA insurance program. It is believed that most persons buying these homes are young families who are making their first home purchase and that their accumulation of household items is in the earlier stage.* Generally, their storage requirements are less than older families. Older families are likely to demand greater storage facilities and, therefore, houses that have limited storage may be excluded from this particular part of the housing market. Hence, to assure a reasonable continuation of value, minimum storage standards should at least meet the needs of families married five to ten years. Nevertheless, minimum space standards should not be raised without a full understanding of the possible effects on the cost of houses and the consumers ability to pay greater costs. Every effort should be made to avoid penalizing low-income families by increases which raise costs.

*Data reported in "Quarterly Reports on FHA Trends" beginning with the first quarter of 1959 and continuing through the third quarter of 1962 indicate that between 36% and 44% of the mortgagors (of FHA insured loans) of proposed construction are under 30 years old and from 59% to 65% are under 35 years of age. The respective percentages for mortgagors of existing properties are 33% to 40% and 55% to 59%.
V. APPROACH TO THE PROBLEM

1. General Premises

Based on the previous comments, the Committee approached the study of recommendations with the following premises:

A. Information on storage needs as evidenced through possession surveys is out of date and incomplete, particularly with respect to typical families living in suburban areas and purchasing homes through the FHA mortgage insurance program. Due to this lack of adequate knowledge on storage needs, the problem should be approached from the point of view that changes should be recommended only in those instances where inequities clearly exist.

B. Accumulation will always expand to fill the space available; therefore, surveys of stored materials should be examined carefully.

C. In general, FHA Minimum Property Standards should be consistent with the goal of providing suitable housing for the lower income groups. Storage requirements should not be so high as to price the house out of the market.

D. Sufficient storage space should be provided so as to reduce the possibility of resale as little as possible.

E. The evaluation of storage requirements must consider the total needs. Limited space in storage of one type, such as kitchen cabinets, can be offset by extra storage space and closets of another type, such as general storage. The key to better minimum standards lies in the identification of critical types of storage which surveys and case studies show to be undersized frequently.
F. The six case studies (Appendix B) indicate that available storage space is often not utilized to the best advantage. In the case studies, the amount of general storage cubage actually used varied from 52% to 78% of the available cubage. For example, the space above wheeled vehicles, garden equipment, etc. stored in a garage is frequently unused, thereby reducing the effectiveness of area occupied by 40% to 50%. An arrangement of shelving would make this space more useful, but the homeowner seldom goes to the effort of making this provision. Such inefficient use of storage often results in reports of inadequate storage. Additional storage to overcome this type of inadequacy should not be required.

2. **Accessibility and Usability**

Throughout the study the importance of and definition of "accessibility" and "usability" was considered.

The suitability of storage varies with:

- a. width of unit
- b. depth of unit
- c. height of unit
- d. minimum access opening
- e. width of access opening related to the unit dimensions, particularly the unit width
- f. clearances in the unit
- g. facilities appropriate to the items stored.

Different dimensions are suitable for different types of storage. Generally, these dimensions have been established by the FHA with one exception: the relation of the access opening to the width and depth of the closet.
Obviously, a 2-foot-wide door on a 8-foot-wide closet does not make it possible to use the entire area of the closet. Some reduction factor must be applied to the area in order to make a proper allowance for the reduced usability of the space. Throughout the study the committee and/or the contractor has established certain recommendations for determining the usability of the space as related to its accessibility.
VI. SHC-BRC RECOMMENDED STANDARDS

On the following pages are the recommended standards as suggested by the Small Homes Council-Building Research Council following the meeting of the Committee of Specialists. These SHC-BRC recommendations are shown as modifications of the current Minimum Property Standards. Certain recommended additions to the MPS are indicated by the notation "new page"; other changes are indicated by being enclosed in a box.

The recommended standards are followed by an explanation of the recommendations.
602-4 CLOSETS

602-4.1 Bedroom Closet
Each bedroom shall have at least one closet having a minimum:

a. Accessible rod length for master bedroom, 6 feet (may be in two closets); accessible rod length for each other bedroom, 3 feet. Accessible rod length is defined in accordance with details (10a) and (10b).

b. Depth, 2 feet clear, for required rod length.

c. Height: adequate to permit 5 feet clear hanging space for at least the required rod length.

d. One shelf for required rod length with at least 8 inches clear space over shelf.

e. At least one-half the closet floor depth shall be flat.

f. See Detail 10 for examples.

602-4.2 Coat Closet
A coat closet shall be provided reasonably accessible to the living areas, having the same minimum size and equipment as bedroom closets.

602-4.3 Linen Closet

a. A linen closet shall be provided near bedrooms having a minimum:

(1) Depth, 14 inches.

(2) Width, 18 inches.

(3) Spacing of shelving, approximately 12 inches o.c.

(4) Shelf area:

<table>
<thead>
<tr>
<th>Living Unit of</th>
<th>Shelving (sq. ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2 bedrooms</td>
<td>9</td>
</tr>
<tr>
<td>3 and 4 bedrooms</td>
<td>12</td>
</tr>
</tbody>
</table>

b. Maximum depth of shelving which may be included in required area, 24 inches.

c. Volume of drawers may be substituted for a maximum of 50 percent of required shelf volume.
S.H.C. RECOMMENDED STANDARDS

(NeW PAGE)

accessible rod length

accessible rod length

5'-3' min

12" min

12" min

12" min

12" min

clearance

1'-6" min

1'-6" min

1'-6" min

1'-6" min

door

2'-0" min

door

2'-0" min

accessible rod length

602-4.1a (10b)

(type 3)

edge-in

(type 4)

walk-in
1. **SHC-BRC Recommended Standards for Clothes Closets - Explanation**

A. Accessible Rod Length

The Committee felt that a definition of the clothes closet requirements in terms of "accessible rod length" rather than size would be more useful in achieving the desired end. For this reason the term "accessible rod length" is suggested.

As long as the closets used in houses are limited to the minimum width of 3 feet with a 2-foot-wide door, accessibility is not a problem, but when the minimum closet is doubled, accessibility is paramount. In reality, a closet 2 feet deep and 6 feet wide is not fully accessible if only a 2-foot-wide door is used.

After considerable discussion, the Committee agreed that in a clothes closet of minimum depth (2'-0'') any portion of the rod beyond 6 inches from the edge of the door jamb should not be considered accessible. (See detail 10a, type 1).

Providing a space 6 inches deep in front of the clothes (minimum closet depth = 2'-6'') permits additional access to the clothes to the extent that 12 inches beyond the edge of each door jamb may be allowed as accessible. (See detail 10a, type 2).

In some instances, it is possible to "edge-in" in front of a rack of clothes on hangers. Previously published recommendations (Reference 3) show the clearance in front of clothes for edging-in should not be less than 1'-6". (See detail 10b, type 3).

The same published standards show the minimum necessary clearance to "walk-in" between two ranks of clothes to be 1'-8". "Walk-in" closets are
considered more desirable than "edge-in" closets. In addition, "walk-in" closets are more efficient in that fewer square feet of space are required to give 6 feet of accessible rod length.

B. Clothes Clearance

One member of the Committee wished to increase the requirements for the minimum depth (front-to-back) of wardrobe-type closets on the basis that certain types of clothing require a space deeper than 24 inches in order to prevent wear on sleeves, etc., which extend beyond the 24 inches and rub against the wall if stored in a closet of this dimension.* However, it was pointed out that the 24-inch standard had been in use for a number of years and was recommended by various references,** and that, desirable as it might be, any increase in the depth requirement would not fit within the framework of a "minimum requirement". The Committee did agree, however, that in wardrobe-type closets the rod should be centered in a 2-foot-deep closet. In other closets it should be located at least 12 inches from the back wall of the closet. This requirement was added to Figure (10) in the recommended MPS suggested by SHC-BRC. The Committee also felt that in those instances in which the depth of the closet exceeded 24 inches, the rod should be placed at least 13 inches from the back wall, provided this did not reduce other necessary clearances.

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*Philson (Reference 29, page 7) shows that certain garments hung on rods in the open without the confining effects of walls actually occupy space deeper than 24 inches.

**McCullough (Reference 1, page 35) found that types of clothing are sufficiently uniform in their space requirements to establish depth required for closets. "Garments on hangers, even heavy coats, hung at right angles to the closet opening can be taken care of in a closet 24 inches deep." Thus the 2-foot depth, now required by Section 602-4.1a of the Minimum Property Standards, is an acceptable minimum for "storage units in which the rod for the hangers runs parallel with the opening." See also Reference (3).
C. Bedroom Closets

At the present time, the Minimum Property Standards requires a closet at least 3 feet wide in each bedroom. All members of the committee were in agreement that there was sufficient evidence of inadequate closet space in the master bedroom to justify an increase in this amount. Since the master bedroom is almost invariably occupied by two persons, storage space should be provided for each person. The Farrier report (Reference 2) gives an analysis of seven surveys which shows clothes rod requirements for a total of 4799 families. A listing of these surveys is shown below.

<table>
<thead>
<tr>
<th>Studies</th>
<th>Number of Families</th>
<th>Average Rod Requirements in inches</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pierce Study of Houses (1944)</td>
<td>39</td>
<td>Male 31 Female 49</td>
<td>80</td>
</tr>
<tr>
<td>Pierce Study of Apartments (1944)</td>
<td>65</td>
<td>Male 24 Female 54</td>
<td>78</td>
</tr>
<tr>
<td>War Housing (1944)</td>
<td>1062</td>
<td>Male 30 Female 40</td>
<td>70</td>
</tr>
<tr>
<td>North East Farm Study (1949)</td>
<td>607</td>
<td>Male 40 Female 35</td>
<td>75</td>
</tr>
<tr>
<td>North Central Farm Study (1951)</td>
<td>884</td>
<td>Male 68 Female 89</td>
<td>157</td>
</tr>
<tr>
<td>Western Farm Study (1952)</td>
<td>607</td>
<td>Male 78 Female 72</td>
<td>150</td>
</tr>
<tr>
<td>Southern Farm Study (1951)</td>
<td>1507</td>
<td>Male 18 Female 42</td>
<td>60</td>
</tr>
<tr>
<td>Weighted average</td>
<td></td>
<td></td>
<td>94</td>
</tr>
</tbody>
</table>

A weighted average for the entire group shows an average requirement for the men and women combined to be 94 inches. What appears more significant is the fact that only the Southern Farm survey, as reported by Farrier, shows a
need below 70 inches, and this requirement is 60 inches, considerably above the present FHA requirement of 36 inches. On the basis of this evidence and upon general observation, the Committee agreed to recommend as a reasonable minimum standard that, as a minimum reasonable recommendation, the master bedroom should have a clothes closet or closets which would provide a usable rod length of 72 inches.

Some argument can be made for the need for larger closets in other bedrooms, especially those that may be occupied by two persons, particularly teen-agers. However, since the majority of families buying new property insured by FHA are likely to have younger children whose needs are not so great, the Committee did not feel it could justify changing the closet requirement in bedrooms other than the master bedroom.

D. Coat Closet

A 3-foot-wide coat closet is now specified in Section 602-4.2 of the Minimum Property Standards. This width may not always be needed for outer garments. However, experience indicates the total specified clothes closet space is frequently too small and this extra space serves as overflow space for clothing which cannot be accommodated in bedroom closets or other storage. This is especially true of families with four or more people who are teen-agers or older.

It was, therefore, not considered wise to recommend a change in the coat closet rod length until a thorough study of the total required rod length throughout the entire house had been made.
2. Linen Closet Recommendations - Explanation

The net volume of linen storage space is indirectly specified by three of the current requirements in Section 602-4.3:

a. Minimum shelf 9 square feet for one or two bedrooms and 12 square feet for three or four bedrooms.

b. Space of shelves vertically, approximately 12 inches.

c. Shelving over 74 inches high shall not be included in the required shelf area.

Accordingly, the minimum volume required is 9 cubic feet for two-bedroom houses and 12 cubic feet for three-bedroom houses.

Based on the inventories of the six surveys he reviewed, Farrier (Reference 2) suggests certain areas as being adequate for linen and bedding storage. In the table below the areas are converted to volumes by multiplying the usable height of the closet by 7 feet, as it appears that Farrier assumed the closets would be full height.

<table>
<thead>
<tr>
<th>Storage of Bath Linens, Bed Linens and Bedding</th>
<th>Area in square feet</th>
<th>Volume in cubic feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>War Housing Projects, 2'-6&quot; x 2'-0&quot;</td>
<td>5.0</td>
<td>35.0</td>
</tr>
<tr>
<td>Farm Surveys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeastern, 2'-0&quot; x 2'-0&quot;</td>
<td>4.0</td>
<td>28.0</td>
</tr>
<tr>
<td>North Central, 2'-6&quot; x 2'-0&quot;</td>
<td>5.0</td>
<td>35.0</td>
</tr>
<tr>
<td>Western states, 2'-6&quot; x 2'-0&quot;</td>
<td>5.0</td>
<td>35.0</td>
</tr>
<tr>
<td>Southern states (not given)</td>
<td>5.0</td>
<td>35.0</td>
</tr>
</tbody>
</table>

Kitchen and dining room linens are excluded from this tabulation.

Wilson (Reference 3) recommends a 2' x 3' linen closet as a "good average size". McCullough (Reference 1, page 38) shows a 2' x 2' x 7' high unit for "bedding". Of this, only two drawers totaling 18 inches in height are allotted to sheets and pillowcases. These 6 cubic feet will hold 24 sheets and 36 pillowcases.
In McCullough's study (Reference 1, page 40) bathroom linens are included in a bathroom supply cabinet. This cabinet is 16 inches deep (front-to-back) and 24 inches wide. Four shelves totaling 28 inches in height accommodate the washcloths, hand towels, and bath towels. The gross volume of the space is 6.22 cubic feet. By examining the picture of the unit it can be determined that approximately 8 large bath towels, 12 medium size towels, 18 hand towels, and 24 washcloths or small hand towels are stored in this space.

Accordingly, the McCullough study provides a total of 12.22 cubic feet for bed linens and bath linens. This is comparable to the present requirement in the MPS of FHA. Also, the quantity of items stored is comparable to Farrier's listing of possessions stored in farm houses in 1952 in the Western States, the largest listing in the surveys included in his study.

The Committee recognized that the linen closet specified in the MPS is too small to accommodate any bulky bedding items such as pillows, blankets, comforters, etc., and agreed that people are often forced to store these items elsewhere in the house, either in a general storage area, or on a top shelf in a closet. The Committee agreed that no change should be made with respect to the linen closet specified in the MPS, particularly because of the lack of up-to-date knowledge of the number and type of possessions of this class held by homeowners.

*In the bathroom supply cabinet, the top two shelves are shown as storing bath mats, toilet tissue, and cleansing tissue. This addition increases the cabinet to a height of 42 inches and a total volume of 9.33 cubic feet.

**The Committee members wish to point out clearly that there is no intent of recommending storage of bedding on clothing closet shelves; rather, they recognize that this is one storage space employed when specific space is not available.
At the same time the Committee was dissatisfied with this disposition of bedding items and strongly recommended further research into the number of possessions of this class as well as research on the usual and desirable means of storing them.
S. H. C. RECOMMENDED STANDARDS

602-5 KITCHEN STORAGE

602-5.1 Each kitchen shall have accessible storage space for food and utensils, and space for such activities and equipment needed to perform the intended functions. Shelf space in a broom closet shall be classified as general storage.

602-5.2 Minimum Shelf and Counter Top Area*

a. Total shelving in wall and base cabinets, 50 square feet with not less than 20 square feet in either wall or base cabinets.
b. Minimum counter top area, 11 square feet.
c. Minimum drawer area, 11 square feet.
d. Area occupied by sink basin and by cooking units shall not be included in minimum counter top area.
e. Usable storage space in cooking ranges, when provided in the form of drawers or shelving may be included in the minimum shelf area.
f. In determining the required area of revolving base shelves (lazy susan) the area of each shelf may be considered to be the area of a square whose dimensions are equal to the diameter of the revolving shelf.

(Example: The diameter of the revolving shelf is 18 inches. The area of the shelf may be considered to be 1.5 feet x 1.5 feet, which is 2.25 square feet.)
g. Drawer area may be substituted for not more than 25 percent of required base shelf area.
h. If a range at least 39 inches in width or a 40-inch space for a range is provided, the following may be counted toward required areas:
   (1) Base cabinet shelving, 4 square feet.
   (2) Counter top, 2 square feet.*
i. If range is not provided, provide at least a 40-inch space for range.

602-5.3 Height of Shelving and Counter Top*

a. Shelving and counter top space above the following heights shall not be included in required area:
   (1) Wall shelving, 74 inches.
   (2) Counter top, 38 inches.
b. Counter top space below 30 inches above floor shall not be included in required area.

c. Height between counter top and wall cabinets shall be at least the following:
   (1) Over range and sink cabinets, 24 inches.
   (2) Over other base cabinets, 15 inches.
   (3) Wall shelving closer than the above dimension may be permitted, except over ranges, provided such shelving does not interfere with the use of the counter top. As a guide, wall shelving which does not project beyond a line drawn from the front edge of the wall cabinet at a 60 degree angle to the bottom of the wall cabinet, may be considered as not interfering with the use of the counter top. If shelving projects beyond such a line, the counter top shall not be included in the required area.

602-5.4 Depth of Shelving and Counter Top

That portion of shelving and counter top space less than or exceeding the following dimensions shall not be included in the required area:

<table>
<thead>
<tr>
<th>Minimum (inches)</th>
<th>Maximum (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Shelving</td>
<td>4</td>
</tr>
<tr>
<td>Base Shelving</td>
<td>12</td>
</tr>
<tr>
<td>Counter Top</td>
<td>15</td>
</tr>
</tbody>
</table>

602-5.5 Spacing of Shelving*

Clearance between shelving shall comply with the following to be included in required area.

<table>
<thead>
<tr>
<th>Depth of shelf (inches)</th>
<th>Minimum spacing (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 to 6</td>
<td>5</td>
</tr>
<tr>
<td>6 to 10</td>
<td>6</td>
</tr>
<tr>
<td>10 to 15</td>
<td>7</td>
</tr>
<tr>
<td>15 to 24</td>
<td>10</td>
</tr>
</tbody>
</table>

602-5.6 See Details 11 and 12 for examples of kitchen cabinet measurements.
3. Recommended Standards for Kitchen Storage - Explanation

A. Accessibility

The Minimum Property Standards require that "each kitchen shall have accessible storage space". Certain dimensions are given which limit the amount of shelving that can be used in accordance with depth, height, etc. Detail 11 of the present standards shows that the amount of shelf storage in cabinet corners that can be credited is determined by the access to the corner. Full credit is allowed if door access is from both sides; half credit if door access is from one side only.

In view of the fact that the accessibility of the back corner is limited even if access from both sides is available, it is recommended that only one-half of the corner area of each shelf be credited in the shelf area count. Detail 11* has been modified to show this recommendation.

B. Shelf Area and Drawer Area

The Minimum Property Standards (Paragraph 602-5.2a and c) requires 50 square feet of shelf space, with at least 20 square feet in wall cabinets and at least 20 square feet in base cabinets.

None of the surveys analyzed in the Farrier report provide any overall tabulation of kitchen storage needs, although requirements for dish storage were mentioned. A 1959 study by the Small Homes Council (Reference 5) suggests the storage space required for a limited list and a liberal list of kitchen supplies. The study also gives recommendations for minimum as well as ample space for these supplies. The space required for the storage of dishes needed by 4, 6, 8, or 10 people is also given in terms of minimum space and ample space.

*See page 26.
All of these recommendations are expressed in terms of lineal feet of frontage of storage cabinet, and, therefore, no credit is given for storage in the corners of kitchen cabinets.

Assuming that a limited list of supplies and dinnerware for 8 persons is to be stored in a minimum space, the Small Homes Council requirements translate to the following equivalent number of square feet:

<table>
<thead>
<tr>
<th></th>
<th>Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wall Cabinet</strong></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>10.5</td>
</tr>
<tr>
<td>Dishes</td>
<td>10.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21.0</strong></td>
</tr>
<tr>
<td><strong>Base Cabinet</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Cabinet Space</strong></td>
<td><strong>51.0</strong></td>
</tr>
<tr>
<td><strong>Drawer Space</strong></td>
<td>13.0</td>
</tr>
</tbody>
</table>

It is clear that the FHA standards are comparable to the SHC recommendations. Without more current information on kitchen requirements, the Committee was willing to let these standards continue. At the same time, it was recognized that the SHC study is based on a list of supplies and equipment that is now outdated, and that new investigations are needed in this field, particularly with reference to the increased number of packaged foods and small appliances now available and in use.

C. Revolving Shelves

Section 602-5.2f of the present Minimum Property Standards states that "shelf area of revolving base shelves (lazy-susan) may be considered as twice its actual area in determining required shelf area".

There does not seem to be any justification for doubling the amount of credit for the actual area of these shelves although this provision
may stem from an attempt to evaluate the extra accessibility of these shelves over normal corner shelves; however, a careful examination of this provision indicates that it is inequitable.

If it is assumed that the diameter of the rotating shelf is 18 inches to 24 inches, then it must be implied that shelving that is within 9 inches to 12 inches of the front of the cabinet is twice as valuable as more remote shelving. Accordingly, it would be consistent to double the credit for the first 9 inches to 12 inches of regular cabinet shelving. In effect this would reduce the actual amount of required base cabinet shelving required by one-third. It should also be pointed out that less-accessible shelving in the corner of regular cabinets will probably be used for dead storage, and that there is no similar compensating space in cabinets with rotating shelves.

A more logical solution to this problem would be to allow full credit for rotating shelves and reduced credit for corner storage as recommended above. A recommended change in Section 605-5.2f of the MPS is included in these recommendations. To simplify the calculation of the area of the shelf, it is proposed that the area of the shelf be considered to be the area of the enclosing square. Thus the area of the shelf may be calculated as the square of the diameter of the rotating shelf. This allows a bonus of about 27% over actual space provided.

*At least one member of the Committee commented that no bonus should be given and pointed out that this method of calculation gave a larger bonus to rotating shelves that were only three-fourths of a circle.
D. Minimum Counter-Top Area

The Committee did not originally discuss the counter-top requirements of the Minimum Property Standards (602-5.2b), which calls for a minimum of 11 square feet, as it was not originally interpreted as a part of the storage requirements. Subsequent examination of this standard indicated that 11 square feet is indeed a minimum, especially when it is realized that the actual amount required can be reduced by 2 square feet when a credit for range top is used. The Small Homes Council has published the following recommendations: (Reference 11).

<table>
<thead>
<tr>
<th>Location</th>
<th>Size</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frontage to left of sink</td>
<td>30 in</td>
<td>5 sq ft</td>
</tr>
<tr>
<td>to right of sink</td>
<td>36 in</td>
<td>6 sq ft</td>
</tr>
<tr>
<td>near range</td>
<td>24 in</td>
<td>4 sq ft</td>
</tr>
<tr>
<td>near refrigerator</td>
<td>15 in</td>
<td>2.5 sq ft</td>
</tr>
<tr>
<td>for mixing, etc.</td>
<td>36 in</td>
<td>6 sq ft</td>
</tr>
</tbody>
</table>

Small Homes Council Circular C5.32, Kitchen Planning Standards, further states:

"In a continuous assembly, some counter may be counted for more than one of the above functions; however, this multiple use should never reduce the amount of counter to such a point that recommended base cabinet requirements are cut."

This minimum would be equivalent to 15 square feet of counter space.

It is interesting to note that the MPS standard of 11 square feet provides only the amount of counter space on either side of the sink, as recommended by the Small Homes Council.

Later publications (Reference 13) place a more severe requirement on counter top. Kapple (Reference 12) proposes the minimum counter frontage should be 10 feet or an area of 20 square feet.
The Committee considered the 1-foot-wide space that might occur on some 39-inch ranges to be of doubtful value as a working counter and felt that the 11-square-foot counter requirement was an irreducible minimum.

Accordingly, a majority of the Committee agreed that counter-top credit of 2 square feet for 39-inch and larger ranges should be omitted and, therefore, item 602-5.2h(2) of the present MPS has been omitted in the recommendations.
605 ACCESS

605-1 OBJECTIVE

To provide openings adequate in size to admit furniture and equipment to all spaces and to permit inspection for repair and maintenance.

605-2 EXTERIOR DOORS

605-2.1 Minimum Sizes*  
<table>
<thead>
<tr>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main entrance doors</td>
<td>3' 0''</td>
</tr>
<tr>
<td>Service doors</td>
<td>2' 6''</td>
</tr>
<tr>
<td>Garage doors, 1 car</td>
<td>8' 0''</td>
</tr>
<tr>
<td>Garage doors, 2 car</td>
<td>15' 0''</td>
</tr>
</tbody>
</table>

* If double entrance doors are used, minimum width of each door, 2'6'.

605-2.2 See 909-4 for construction and installation of exterior doors.

605-3 INTERIOR DOORS

605-3.1 Provide a door for each opening to a bedroom, bathroom, and toilet compartment. Doors to bathrooms and toilet compartments shall be of a conventional type, hinged or sliding, and shall have locks.

605-3.2 Minimum Size

a. Habitable rooms, 2 feet 6 inches wide.

b. Bathrooms, toilet compartments and closets other than linen, general storage and broom closets, 2 feet wide.

c. General storage and basement and service stair doors, 2 feet 6 inches wide.

d. Height, 6 feet 6 inches except that height of sliding or folding doors for wardrobe closets may be 6 feet provided depth of closet does not exceed 30 inches.*

e. When other than conventional hinged doors are provided, including folding and sliding doors, minimum clear opening shall be 2 feet 3 inches under (a) and 1 foot 9 inches under (b).*

605-3.3 See 909-5 for construction and installation of interior doors.

605-4 ATTIC SPACE

605-4.1 Access to attics shall be provided by means of conveniently located scuttles, disappearing or permanently installed stairways; minimum opening 14 x 22 inches.

605-4.2 If mechanical equipment such as an attic furnace is installed in attic space, access opening shall be of sufficient size to permit removal and replacement of equipment.

605-5 BASEMENTLESS SPACES

605-5.1 An access opening, at least 18 x 24 inches shall be provided.

605-5.2 If mechanical equipment is installed in basementless space, access opening shall be of sufficient size to permit removal and replacement of equipment.

605-5.3 If sill of access opening is below grade, provide areaway. See 609-4.*

606 PRIVACY

606-1 OBJECTIVE

To provide a degree of privacy, commensurate with desirable living conditions, by means of the proper location of exterior openings in relation to exterior conditions and the interior arrangements of rooms, particularly with reference to access to bathrooms from bedrooms.

606-2 ROOM ARRANGEMENTS

606-2.1 The room arrangements shown in table 6-1 are not acceptable.

606-2.2 An exception to (e) below may be permitted in specific cases when market acceptance of this type of planning is assured.

<table>
<thead>
<tr>
<th>Only Access From</th>
<th>To</th>
<th>Thru</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Habitable room</td>
<td>Bathroom</td>
<td>Bedroom</td>
</tr>
<tr>
<td>b. Habitable room</td>
<td>Habitable room</td>
<td>Bedroom</td>
</tr>
<tr>
<td>c. Habitable room</td>
<td>Habitable room</td>
<td>Bathroom</td>
</tr>
<tr>
<td>d. Bedroom</td>
<td>Bathroom</td>
<td>Another bedroom</td>
</tr>
<tr>
<td>e. Bedroom</td>
<td></td>
<td>Habitable room</td>
</tr>
</tbody>
</table>
602-6 GENERAL STORAGE*

602-6.1 Usable general storage space shall be provided for the storage of items and equipment essential to the use of the occupants. This storage shall be in addition to required closets and kitchen storage.

Usable general storage space shall be calculated in accordance with the guide shown in illustrations (12a) and (12b).

602-6.2 Minimum total volume (interior and exterior storage) 150 cubic feet plus 75 cubic feet per bedroom.

602-6.3 Interior Storage

a. At least 25 percent of the required total volume shall be located within the dwelling and shall be suitable for storage of items customarily stored inside. This space may be separate storage closets, utility rooms, attic space, suitable basement space, or similar spaces.

b. Conveniently accessible excess space in required bedroom or coat closets may be included as part of required interior storage volume provided at least one separate full height storage closet having a minimum depth of 18 inches and a minimum width of 36 inches or other equivalent storage area is provided.

Excess space in required closets shall not be included in the required interior storage volume unless it is conveniently accessible as defined by illustrations (12c) and (12d).

c. Required storage space in attics shall be accessible by means of a permanent or disappearing stairway.

602-6.4 Exterior Storage

a. At least 50 percent of the required total volume shall be located for convenient storage of items and equipment used outdoors. This space may be located in garage, storage lockers or within dwelling if readily accessible to the exterior.

b. Storage space in excess of 4 feet in depth or less than 1 foot in width or depth shall not be included in required volume.

602-6.5 Dimensions (Interior and Exterior)

a. Storage space less than 4 feet in height or greater than 8 feet in height shall not be included in required volume.

b. Storage space in excess of 4 feet in depth or less than 1 foot in width or depth shall not be included in required volume.

c. At least 60 percent of required exterior storage space shall have a minimum depth of 2 feet 6 inches.

d. Space occupied by or necessary for the use and access of permanent equipment shall not be included in required volume.

---

*Revised by S.H.C. - Recommended Standards*
S. H. C. RECOMMENDED STANDARDS

(type 5
reach-in
(not over 4’ deep)

H = height

(type 6
walk-in
(efficient when width
W is greater than 76”)

H = height

usable general storage space  602-6.1  (12a)
S. H. C. RECOMMENDED STANDARDS

(type 7)
walk-in

H = height

usable general storage space 602-6.1

measurement of conveniently accessible excess space in closets 602-6.3
S.H.C. RECOMMENDED STANDARDS

(type 9)
edge-in

(type 10)
walk-in

(type 11)
walk-in

measurement of conveniently accessible excess space in closets 602-6.3

H = height

(2d)
4. General Storage Recommendations - Explanation

A. Access

Section 605-3.2b and e of the current FHA Minimum Property Standards allow doors to general storage as narrow as 2 feet (less with sliding or folding doors). In basementless houses the large items are usually stored in the general storage area. For this reason it is equally important to require a 2'-6" wide access to the general storage as it is to basements (Section 605-3.2c). Accordingly, modifications of section 605-3.2b and 605-3.2e have been recommended. (See page 25).

The usable space within a general storage closet may be seriously limited if the door is only 2'-6" wide. Full access doors with openings equal to at least two-thirds of the closet width permit access to virtually all of the closet. For this reason, the entire area of a closet having a depth of 4 feet or less and having a wide opening can be considered to be usable. If the openings are narrower than the two-thirds requirement, it is usually necessary to step inside of the closet to reach stored items. In this case the usable space should be determined by allowing a walk-in access space 2'-6" wide by a minimum of 1 foot deep. This allows some space to maneuver items in and out of the storage area. These recommendations are shown in details (12a) and (12b).

*Expressed in a different way, the creditable width of the closet may not extend beyond either jamb more than one-fourth the width of the opening.
B. Usability

In closets with narrower openings the space in the corners is not readily accessible, and some reduction in credit is indicated. Following the procedure established in the analysis of the kitchen storage, only half of the space in the corners is considered usable. See details (12b) and (12d).

C. Excess Space in Closets

Section 602-6.3b of the Minimum Property Standards states, in part:

"Conveniently accessible excess space in required bedroom or coat closets may be included as part of required interior storage volume provided at least one separate full height storage closet having a minimum depth of 18 inches and a minimum width of 36 inches or other equivalent storage area is provided."

Recommendations for the definition of "conveniently accessible" excess space in this case are shown in details (12c) and (12d). In general these follow the principles developed previously.

D. Volume Requirements

Knowledge of the total volume of storage requirements for families is needed in order to evaluate their general storage needs. The only overall studies of the volume of storage needs and usage have been based upon assumed quantities or upon case studies of less than a significant number of families. Such a study for six families was made for this research project.* All six of the families surveyed lived in basementless houses with 3 bedrooms; one family had a garage, another family had a

*See Appendix B
carport. The net space used for general storage by the families married 4 or 5 years varied from a minimum of 121 cubic feet to a maximum of 366 cubic feet. The family married 23 years was using a net cubage of 967 cubic feet. The amounts mentioned are net storage cubage occupied; in several instances objects are stored on the floor and no use is made of the space above them. For example, in one garage 566 cubic feet of storage occupied 100 square feet of area.

The Committee agreed that these general storage standards are minimal for houses without basement, garage, or attic. However, since the overall general storage needs cannot be conclusively established, the Committee felt that it was important to avoid any increase in the standards which would increase the cost of houses built under these standards. Therefore, they agreed that, pending further research, the recommended increase in the master bedroom closets space should be offset by an equal reduction in the general storage space. The 3 feet of additional rod, recommended for the closet in the master bedroom, will require a closet addition 3 feet wide, 2 feet deep, and 8 feet high, or 48 cubic feet. Hence, they recommend a corresponding 50-foot reduction in the general storage space requirement. This means that the general storage requirement for a three-bedroom house will become 375 cubic feet.

This change has the effect of requiring a lesser amount of exterior storage. Under the suggested regulations, a minimum of 187.5 cubic feet is required for a three-bedroom house, contrasted with 212.5 cubic feet under the current standards. The Committee agreed that this slight change in favor of interior storage was not undesirable especially since additional general
storage for "exterior" items, such as garden tools, bicycles, etc. can be added at a later date more readily than can storage in bedrooms, linen closets, and other "interior" storage. For this reason interior storage may be considered more critical than exterior storage.

E. Interior General Storage

In evaluating interior general storage requirements, an unpublished paper concerning general storage needs in small houses was examined. (Reference 14). The study lists the following items that are owned by half or more of the 103 families.* Half of those who own the items use them frequently.

- Cleaning supplies
- Cleaning equipment
- Supplies for care of clothing
- Supplies for care of shoes
- Sewing supplies
- Card table
- Folding chairs
- Books
- Small electrical appliances
- Ironing board
- Clothes basket
- Small tools
- Stepladder

If it is assumed that these items are stored inside, some rough allotment of space for their storage can be made by using Bulletin 557 (Reference 1) as a guide.

Cleaning equipment, including space for a folding ironing board, can be accommodated in a space 2' x 2' x 7'. (Reference 1, page 52). If shallow shelving is built on the back of the door of this cabinet, cleaning supplies and small tools may be stored in the same space.

Card tables and folding chairs will require a space 3' (wide) x 2' x 3' (high).

The space above the card tables will be adequate for the most common sewing supplies and other supplies used in the care of clothing, exclusive
of laundry supplies. This space includes room for a portable sewing machine, but does not include space for a dress form, a folding sewing table, a folding cutting table, nor does it include space for hanging unfinished sewing work.

A space one-foot wide will accommodate a stepladder and the space above the stepladder should be sufficient for shoe cleaning supplies.

This allotment accounts for all of the items in the above list excepting books and small electrical appliances. Books will undoubtedly be cared for in book cases rather than in general storage space. It must be assumed that small electrical appliances will be stored near the point of use.

The total gross space required for this storage is $2' \times 6' \times 8'$ or 96 cubic feet, as shown in Figure A.

Under the recommendations in this report, the minimum acceptable interior storage space for a three-bedroom house is 25% of 375 cubic feet or 94 cubic feet. This figure is comparable to the space allotted in the above exercise.

![Figure A. Interior General Storage Allotment 96 cubic feet](image)

*no articles assigned to top 1-foot space.*
F. Exterior General Storage

The previously mentioned study (Reference 14) lists the following items owned by half or more of the families, and half of those who own them use them seasonally:

- Lawn mower
- Hoe
- Rake
- Lawn broom
- Lawn clippers
- Garden hose
- Lawn chairs
- Grill
- Large thermos
- Picnic equipment
- Recreation equipment
- Electric fan
- Paint and removers
- Storm windows
- Storm doors
- Screen doors
- Window screens
- Christmas decorations

In estimating the amount of space required for these items, the following allotments may be made:

<table>
<thead>
<tr>
<th>Item</th>
<th>Size</th>
<th>Cubic Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screens, etc.</td>
<td>2 1/2' x 3'  x 8'</td>
<td>60</td>
</tr>
<tr>
<td>Garden tools, garden hose</td>
<td>6' x 1 1/2' x 8'</td>
<td>24</td>
</tr>
<tr>
<td>Lawn mower</td>
<td>2' x 3' x 4'</td>
<td>24</td>
</tr>
<tr>
<td>Grill</td>
<td>2' x 2' x 4'</td>
<td>16</td>
</tr>
<tr>
<td>Christmas decorations</td>
<td>2' x 2' x 2'</td>
<td>8</td>
</tr>
<tr>
<td>Picnic equipment</td>
<td>2' x 3' x 2'</td>
<td>12</td>
</tr>
<tr>
<td>Thermos bottle</td>
<td>1' x 1' x 1'</td>
<td>1</td>
</tr>
<tr>
<td>Electric fan</td>
<td>1' x 1' x 1'</td>
<td>1</td>
</tr>
<tr>
<td>Paint, etc.</td>
<td>2' x 3' x 1'</td>
<td>6</td>
</tr>
<tr>
<td>Recreation equipment</td>
<td>2' x 3' x 1'</td>
<td>6</td>
</tr>
</tbody>
</table>

The total gross storage space required for this storage is 6'-6" (wide) x 3'-6" x 8'-0" (high), or 182 cubic feet, an amount less than the minimum required exterior storage for a three-bedroom house which is 50% of 375 cubic feet or 187.5 cubic feet.

---

* See Figure B, following page.
Figure B.

Exterior General Storage Allotment
182 cubic feet

*No articles assigned to top 1-foot space.*
The new recommended total general storage (including both interior and exterior) requirement for a three-bedroom house is 375 cubic feet of which 278 cubic feet have been allocated in the above exercises.

The remaining 97 cubic feet are available to accommodate one or more of the less frequently owned items, such as a bicycle, tricycle, stroller, garden cart, etc. In addition, any extra items not accounted for in the interior storage listing will probably have to be accommodated in this small remaining cubage.

Obviously the storage is tight, and for a two-bedroom house (minimum, 300 cubic feet) would be even tighter. Nevertheless, these figures do indicate these requirements can be considered a reasonable minimum until such time as more adequate information concerning the possessions of average families is available.

The study (Reference 14) reports:

"When groups of items were rated, more than half of the families felt their storage for out-of-season clothing, blankets and other covers, toys, and hobby and recreation items was inadequate. Forty per cent or more considered storage inadequate for in-season clothing, cleaning supplies and equipment, and garden and lawn equipment. Storage for kitchen utensils, dishes, and linens was rated more adequate, yet more than one-fourth of the families felt their storage for any of these groups of items was inadequate.

"Adequacy of storage for individual items was not rated as low as for groups of items. It may have been that individual items were not so troublesome as the required combination to fit into available storage. Even so, one-fourth or more of the families rated their storage inadequate for almost every item about which they were asked. Some of the items for which storage was most critical were those connected with children such as bicycles, tricycles, strollers, and wagons."
Since the Committee did not recommend increasing the storage volume required in the MPS, some persons may infer that the storage as specified is adequate. On the contrary, there are a number of indications that storage space is inadequate in some parts of the house, but the Committee did not feel that the information available was sufficient to justify an increase in total storage requirements, especially since, whenever possible, it was desirable to avoid increasing the cost of the small home. Information on the possessions and storage arrangements of families living in "FHA type" housing is badly needed.

As the work proceeded, it became apparent that the Committee's efforts were focusing on better distribution and accessibility of storage.

The requirements for increased accessibility, either through greater opening width or access clearances, may cause some increase in price, but, in recent years, several new and less costly large-size doors have become available. In some instances it is likely that the added costs of these doors will be offset by the savings in framing and wall finish material.

For those instances in which wall space in the room is of prime importance, acceptable arrangements for walk-in and edge-in closets have been shown. These closet types allow the use of smaller door sizes. Walk-in closets are to be preferred over edge-in closets.

Several times members of the Committee pointed out the desirability of storage designed and/or equipped in such a manner that it could be used more efficiently. These remarks included comments on sliding shelves, special racks and the like. Comments were also made on the effectiveness of adjustable shelving.
arranged in such a manner as to permit the accommodation of various sized articles with resulting convenience and efficiency. Along these same lines it was also pointed out that some of the specified spacings of shelving, etc. led to poor storage. For example, cups are not stored efficiently on shelves spaced 12 inches apart. At the same time the committee recognized that it was impossible to write regulations which would achieve the end desired.

The Committee also became very much aware of the fact that people seem to talk a lot about storage, but do little about it. The six local case studies provided examples of storage space that could be used much more efficiently if the householder would spend a day's work and a small amount of money in improving it with shelving, racks, and the like. However, since this appears to be done infrequently, we must assume that storage has a low priority on the consumers time and money.

When a complete and current survey of stored items and the storage space needed is available, better standards can be written.
There is a need for a comprehensive study of the storage space usage and the possessions stored by families living in homes which are representative of those covered by the FHA mortgage insurance program.

Such a research program would entail the following activities:

1. **Preparation of survey guides** by the research agency. These guides would be designed to give information on these aspects of storage:
   a. Articles stored
   b. Dimensions and volume of storage space used
   c. Dimensions and volume of storage available
   d. Location of storage
   e. Unstored articles
   f. Access to storage

   The following information would also be obtained if feasible:
   a. Length of married life
   b. Family composition
   c. Family income
   d. Occupational group
   e. Time in present house
   f. Previous housing

2. **Selection of survey sample** with reference to:
   a. Representative FHA housing
   b. Location in the United States
   c. Urban, suburban
   d. Statistical accuracy

3. **Survey conducted with the assistance of the Home Economics departments of the land grant educational institutions in the U. S. or by local memberships of the Home Economists in Homemaking sections or the Consumers Interest Committee of the American Home Economics Association.**

4. **Data processing conducted by the central research agency.**

5. **Report embodying:**
   a. Summary of information accumulated
   b. Interpretation of data
   c. Recommendations

It is suggested that the basic program would be financed by the Federal Housing Administration, but it is hoped that the individual surveys can be undertaken by the Home Economics departments of land grant institutions through the support they receive from U.S.D.A. funds.

*(A pilot survey would be employed to test the structuring of the interview-survey guide.)*
IX. GUIDE FOR APPRAISAL

The difficulty with any minimum standard is that it is applied to all cases including houses that are definitely not in the minimum category. In order to maintain marketability, better houses should have higher standards. One way of achieving this objective is to set up an appraisal guide which will credit housing facilities in accordance with the general quality of the house being appraised.

The following guide is suggested for purposes of discussion:

<table>
<thead>
<tr>
<th>Guide for Appraisal*</th>
<th>Suggested Minimum Standards for Category**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>602-4.1 Bedroom Closets</td>
<td></td>
</tr>
<tr>
<td>Rod length (feet)</td>
<td></td>
</tr>
<tr>
<td>Master Bedroom and any two person bedroom</td>
<td>6</td>
</tr>
<tr>
<td>Secondary, one person bedroom</td>
<td>3</td>
</tr>
<tr>
<td>602-4.3 Linen Closet</td>
<td></td>
</tr>
<tr>
<td>Shelving (square feet)</td>
<td></td>
</tr>
<tr>
<td>1 and 2 bedroom</td>
<td>9</td>
</tr>
<tr>
<td>3 and 4 bedroom</td>
<td>12</td>
</tr>
<tr>
<td>602-5 Kitchen Storage</td>
<td></td>
</tr>
<tr>
<td>602-5.2 area (square feet)</td>
<td></td>
</tr>
<tr>
<td>Wall Cabinet Shelf</td>
<td>20</td>
</tr>
<tr>
<td>Base Cabinet Shelf or Pull out Storage</td>
<td>20</td>
</tr>
<tr>
<td>Both Wall and Base Cabinet</td>
<td>50</td>
</tr>
<tr>
<td>Drawer or pull out tray</td>
<td>11</td>
</tr>
<tr>
<td>Counter</td>
<td>11</td>
</tr>
<tr>
<td>602-6 General Storage</td>
<td></td>
</tr>
<tr>
<td>602-6.2 Total Volume (cubic feet)</td>
<td></td>
</tr>
<tr>
<td>LU 1 BR</td>
<td>225</td>
</tr>
<tr>
<td>LU 2 BR</td>
<td>300</td>
</tr>
<tr>
<td>LU 3 BR</td>
<td>375</td>
</tr>
<tr>
<td>LU 4 BR</td>
<td>450</td>
</tr>
</tbody>
</table>

*Suggested by W. H. Kapple, SHC-BRC

**Category A = Minimum, 800 - 1200 square feet in house (if three bedroom).
Category B = Normal, 1200 - 1600 square feet in house (if three bedroom) costing 100% more than Category A.
Category C = Optimum, over 1600 square feet in house (if three bedroom) costing 200% more than Category A.
APPENDIX A

BIBLIOGRAPHY


6) Peart, Mary; and King, Virginia, "General Storage Needs in Small Houses as Related to Family Characteristics," a thesis submitted to the faculty of Purdue University, June 1960.


10) Hawes, Mary H., "Quantity and Cost Budgets for Two Income Levels--Prices for the San Francisco Bay Area," Heller Committee for Research in Social Economics of the University of California, September 1961.


14) Peart, Virginia; McConnell, Janet; Pifer, Glenda; Risk, Fidelia; and Johnson, Kathleen, General Storage Needs in Small Houses - a Pilot Study, 1962.


23) McCullough, Helen E.; and Farnham, Mary B., Space and Design Requirements for Wheelchair Kitchens, University of Illinois, Agricultural Experiment Station, Bulletin 661, 1960.


28) McCullough, Helen E., Household Storage Units, University of Illinois, Small Homes Council, Circular C5.1, 1953.

29) Philson, Kathryn, Rod Closets for Southern Farm Homes, Auburn University Agricultural Experiment Station, Bulletin 325, March 1960.

30) McCullough, Helen E.; Philson, Kathryn; Smith, Ruth H.; Wood, Anna L.; and Woolrich, Avis, Space Standards for Household Activities, University of Illinois Agricultural Experiment Station (with others), Bulletin 686, May 1962.

Plus other items listed in the bibliography attached to the Farrier report.
**APPENDIX B**

**CASE STUDIES**

**CASE STUDY—GENERAL STORAGE**

During September, 1962, five brief case studies were made in Champaign-Urbana to evaluate the adequacy of general storage in basementless houses.

**GENERAL STORAGE**
(in cubic feet)

<table>
<thead>
<tr>
<th></th>
<th>Family #1</th>
<th>Family #2</th>
<th>Family #3</th>
<th>Family #4</th>
<th>Family #5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross</td>
<td>410</td>
<td>n.o.</td>
<td>375</td>
<td>407</td>
<td>355</td>
</tr>
<tr>
<td>Available</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used</td>
<td>366</td>
<td>970</td>
<td>217</td>
<td>268</td>
<td>121</td>
</tr>
<tr>
<td>Inside</td>
<td>83</td>
<td>69</td>
<td>40</td>
<td>73</td>
<td>18</td>
</tr>
<tr>
<td>Outside</td>
<td>114</td>
<td>566</td>
<td>130</td>
<td>70</td>
<td>62</td>
</tr>
<tr>
<td>Attic</td>
<td>122</td>
<td>252</td>
<td>0</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Inside</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unstored</td>
<td>20</td>
<td>10</td>
<td>n.o.</td>
<td>n.o.</td>
<td>21</td>
</tr>
<tr>
<td>Outside</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unstored</td>
<td>27</td>
<td>73</td>
<td>47</td>
<td>45</td>
<td>20</td>
</tr>
</tbody>
</table>

n.o.** not observed

Following are the conclusions of this study which was made to serve as background for use at the meeting of specialists.

a. The net general storage space used by families of a four or five-year marriage was far less than that used by the family of a twenty-year marriage. (i.e. 121 to 366 cubic ft. vs. 970 cubic ft.)

b. The needs for general storage are most critical in houses without basement, garage, or accessible attic.

c. None of the families used all of the cubage available, presumably due to inadequate shelving, etc., and all but family #2 (married 23 years) used less storage than the 425 cubic feet required by the MPS. Nevertheless, all families left some articles outdoors for lack of proper storage space.

d. Even though the attic access was difficult and there was no attic floor, three of these families stored over 80 cu. ft. of items in the attic. All families with minimum general storage and 20" x 22" trap door wanted better attic access.

*made by William H. Kapple, SHC-BRC
e. The 23-year family lived in a house with two car garage but no basement. They used 200 sq. ft. of garage floor for general storage (566 net cubage) and 217 sq. ft. of storage space in the attic with disappearing stair. (i.e. approximately 2280 cu. ft. of gross general storage space allowing 8'0" high space in garage and 3'2" for the average height of the space in attic.)

f. Only 40% of the shallow general outdoor storage was used by the family living in a house with a carport. (Depth front to back only 8" and 12"). This five-year family reported that the lack of space to store lawn mower, bicycle and other large items was not yet critical. It would, however, become critical when the children grow older and they purchase instead of rent their dwelling.
Developed under
The Technical Studies Program
of the
Federal Housing Administration

by
Rudard A. Jones
Director
Small Homes Council–Building Research Council
University of Illinois

July, 1963

This report is a product of the University of Illinois and does not necessarily represent nor coincide with the standards or policy of the Federal Housing Administration.
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I. OBJECTIVE OF THE STUDY

The major objective of this study was to review and recommend improvements in the requirements for storage facilities needed in residences of one or two living units as specified in the Minimum Property Standards of the Federal Housing Administration. The recommendations for storage standards incorporated as part of this report are based upon a review of published and unpublished literature available, and upon the experience and opinion of a committee of experts assembled by the contractor, the Small Homes Council—Building Research Council of the University of Illinois, Urbana, Illinois. This report is the product of the University of Illinois and does not necessarily represent nor coincide with the standards or policy of the Federal Housing Administration.

A second objective of the study was to make recommendations as to the kind and type of additional studies which might be advisable or necessary to further the first objective in those areas in which information is presently inadequate.

II. PROCEDURE

The procedure used in the study involved the following steps:

a. The review of pertinent literature.

b. The convening of a committee of specialists to discuss the problems and the literature pertaining thereto, and to make recommendations with respect to the storage requirements in the Minimum Property Standards of the Federal Housing Administration.

c. The preparation of the preliminary draft of the report including the recommendations.

d. The review of the draft by committee members.

e. The preparation of this document, the final report.
COMMITTEE OF SPECIALISTS ON STORAGE REQUIREMENTS OF FHA MINIMUM PROPERTY STANDARDS
(Meeting held October 2-3, 1962, Urbana, Illinois)

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Observer:

Scott Heider
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The basis for the literature review was the comprehensive Primary Report on Study of Storage Requirements for Homes, written by Clarence W. Farrier, Engineering Consultant, for the Standards and Studies Section of the Federal Housing Administration, along with the appended "Bibliography of Publications Reviewed for Primary Report of Technical Studies of Storage Space Requirements for Homes".

A significant portion of the Farrier report is the tabulated information obtained from six inventory surveys of the possessions of a total of 4771 families. The two earliest of these surveys were studies of urban families made 18 years ago; the other four were studies of farm families made 10 to 13 years ago. Following tabulation of the data, the Farrier report shows computations of space required to store the inventoried items.

Committee members knew of more recent studies conducted on a more limited basis. Comments on certain of these studies are included later in this report and the reports are listed in Appendix A.

Other items in the literature detail the amount of space required for various items to be stored. There appears to be adequate information of this type.
IV. PURPOSE OF FHA STANDARDS

FHA standards serve a dual purpose. The prime purpose is concerned with protection of the investment in the house. A second purpose is to improve the quality of housing in the United States, and to make good housing available to the maximum number of people.

FHA standards are designed to establish long-range market value in houses financed under the FHA insurance program. It is believed that most persons buying these homes are young families who are making their first home purchase and that their accumulation of household items is in the earlier stage.* Generally, their storage requirements are less than older families. Older families are likely to demand greater storage facilities and, therefore, houses that have limited storage may be excluded from this particular part of the housing market. Hence, to assure a reasonable continuation of value, minimum storage standards should at least meet the needs of families married five to ten years. Nevertheless, minimum space standards should not be raised without a full understanding of the possible effects on the cost of houses and the consumers ability to pay greater costs. Every effort should be made to avoid penalizing low-income families by increases which raise costs.

*Data reported in "Quarterly Reports on FHA Trends" beginning with the first quarter of 1959 and continuing through the third quarter of 1962 indicate that between 36% and 44% of the mortgagors (of FHA insured loans) of proposed construction are under 30 years old and from 59% to 65% are under 35 years of age. The respective percentages for mortgagors of existing properties are 33% to 40% and 55% to 59%.
V. APPROACH TO THE PROBLEM

1. General Premises

Based on the previous comments, the Committee approached the study of recommendations with the following premises:

A. Information on storage needs as evidenced through possession surveys is out of date and incomplete, particularly with respect to typical families living in suburban areas and purchasing homes through the FHA mortgage insurance program. Due to this lack of adequate knowledge on storage needs, the problem should be approached from the point of view that changes should be recommended only in those instances where inequities clearly exist.

B. Accumulation will always expand to fill the space available; therefore, surveys of stored materials should be examined carefully.

C. In general, FHA Minimum Property Standards should be consistent with the goal of providing suitable housing for the lower income groups. Storage requirements should not be so high as to price the house out of the market.

D. Sufficient storage space should be provided so as to reduce the possibility of resale as little as possible.

E. The evaluation of storage requirements must consider the total needs. Limited space in storage of one type, such as kitchen cabinets, can be offset by extra storage space and closets of another type, such as general storage. The key to better minimum standards lies in the identification of critical types of storage which surveys and case studies show to be undersized frequently.
F. The six case studies (Appendix B) indicate that available storage space is often not utilized to the best advantage. In the case studies, the amount of general storage cubage actually used varied from 52% to 78% of the available cubage. For example, the space above wheeled vehicles, garden equipment, etc. stored in a garage is frequently unused, thereby reducing the effectiveness of area occupied by 40% to 50%. An arrangement of shelving would make this space more useful, but the homeowner seldom goes to the effort of making this provision. Such inefficient use of storage often results in reports of inadequate storage. Additional storage to overcome this type of inadequacy should not be required.

2. Accessibility and Usability

Throughout the study the importance of and definition of "accessibility" and "usability" was considered.

The suitability of storage varies with:

a. width of unit
b. depth of unit
c. height of unit
d. minimum access opening
e. width of access opening related to the unit dimensions, particularly the unit width
f. clearances in the unit
g. facilities appropriate to the items stored.

Different dimensions are suitable for different types of storage. Generally, these dimensions have been established by the FHA with one exception: the relation of the access opening to the width and depth of the closet.
Obviously, a 2-foot-wide door on a 8-foot-wide closet does not make it possible to use the entire area of the closet. Some reduction factor must be applied to the area in order to make a proper allowance for the reduced usability of the space. Throughout the study the committee and/or the contractor has established certain recommendations for determining the usability of the space as related to its accessibility.
VI. SHC-BRC RECOMMENDED STANDARDS

On the following pages are the recommended standards as suggested by the Small Homes Council-Building Research Council following the meeting of the Committee of Specialists. These SHC-BRC recommendations are shown as modifications of the current Minimum Property Standards. Certain recommended additions to the MPS are indicated by the notation "new page"; other changes are indicated by being enclosed in a box.

The recommended standards are followed by an explanation of the recommendations.
S. H. C. RECOMMENDED STANDARDS

602-4 CLOSETS

602-4.1 Bedroom Closet

Each bedroom shall have at least one closet having a minimum:

   a. Accessible rod length for master bedroom, 6 feet (may be in two closets); accessible rod length for each other bedroom, 3 feet. Accessible rod length is defined in accordance with details (lOa) and (lO.b).

   b. Depth, 2 feet clear, for required rod length.

   c. Height: adequate to permit 5 feet clear hanging space for at least the required rod length.

   d. One shelf for required rod length with at least 8 inches clear space over shelf.

   e. At least one-half the closet floor depth shall be flat.

   f. See Detail 10 for examples.

602-4.2 Coat Closet

A coat closet shall be provided reasonably accessible to the living areas, having the same minimum size and equipment as bedroom closets.

602-4.3 Linen Closet

a. A linen closet shall be provided near bedrooms having a minimum:

   (1) Depth, 14 inches.

   (2) Width, 18 inches.

   (3) Spacing of shelving, approximately 12 inches o.c.

   (4) Shelf area:

<table>
<thead>
<tr>
<th>Living Unit of</th>
<th>Shelving (sq. ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2 bedrooms</td>
<td>9</td>
</tr>
<tr>
<td>3 and 4 bedrooms</td>
<td>12</td>
</tr>
</tbody>
</table>

b. Maximum depth of shelving which may be included in required area, 24 inches.

c. Volume of drawers may be substituted for a maximum of 50 percent of required shelf volume.

Example: Min. dimensions of required closets 602-4.1
accessible rod length

2'-0" min

6'

6'

12" min

max

12"

D

2'-6" min

type 1 reach-in

(type larger center rod)

accessible rod length

2'-0" min

6'

6'

12" min

max

12"

max

D

2'-6" min

type 2 reach-in

accessible rod length 602-4.1a (10a)
1. SHC-BRC Recommended Standards for Clothes Closets - Explanation

A. Accessible Rod Length

The Committee felt that a definition of the clothes closet requirements in terms of "accessible rod length" rather than size would be more useful in achieving the desired end. For this reason the term "accessible rod length" is suggested.

As long as the closets used in houses are limited to the minimum width of 3 feet with a 2-foot-wide door, accessibility is not a problem, but when the minimum closet is doubled, accessibility is paramount. In reality, a closet 2 feet deep and 6 feet wide is not fully accessible if only a 2-foot-wide door is used.

After considerable discussion, the Committee agreed that in a clothes closet of minimum depth (2'-0") any portion of the rod beyond 6 inches from the edge of the door jamb should not be considered accessible. (See detail 10a, type 1).

Providing a space 6 inches deep in front of the clothes (minimum closet depth = 2'-6") permits additional access to the clothes to the extent that 12 inches beyond the edge of each door jamb may be allowed as accessible. (See detail 10a, type 2).

In some instances, it is possible to "edge-in" in front of a rack of clothes on hangers. Previously published recommendations (Reference 3) show the clearance in front of clothes for edging-in should not be less than 1'-6". (See detail 10b, type 3).

The same published standards show the minimum necessary clearance to "walk-in" between two ranks of clothes to be 1'-8". "Walk-in" closets are
considered more desirable than "edge-in" closets. In addition, "walk-in" closets are more efficient in that fewer square feet of space are required to give 6 feet of accessible rod length.

B. Clothes Clearance

One member of the Committee wished to increase the requirements for the minimum depth (front-to-back) of wardrobe-type closets on the basis that certain types of clothing require a space deeper than 24 inches in order to prevent wear on sleeves, etc., which extend beyond the 24 inches and rub against the wall if stored in a closet of this dimension.* However, it was pointed out that the 24-inch standard had been in use for a number of years and was recommended by various references,** and that, desirable as it might be, any increase in the depth requirement would not fit within the framework of a "minimum requirement". The Committee did agree, however, that in wardrobe-type closets the rod should be centered in a 2-foot-deep closet. In other closets it should be located at least 12 inches from the back wall of the closet. This requirement was added to Figure (10) in the recommended MPS suggested by SHC-BRC. The Committee also felt that in those instances in which the depth of the closet exceeded 24 inches, the rod should be placed at least 13 inches from the back wall, provided this did not reduce other necessary clearances.

*Philson (Reference 29, page 7) shows that certain garments hung on rods in the open without the confining effects of walls actually occupy space deeper than 24 inches.

**McCullough (Reference 1, page 35) found that types of clothing are sufficiently uniform in their space requirements to establish depth required for closets. "Garments on hangers, even heavy coats, hung at right angles to the closet opening can be taken care of in a closet 24 inches deep." Thus the 2-foot depth, now required by Section 602-4.1a of the Minimum Property Standards, is an acceptable minimum for "storage units in which the rod for the hangers runs parallel with the opening." See also Reference (3).
C. Bedroom Closets

At the present time, the Minimum Property Standards requires a closet at least 3 feet wide in each bedroom. All members of the committee were in agreement that there was sufficient evidence of inadequate closet space in the master bedroom to justify an increase in this amount. Since the master bedroom is almost invariably occupied by two persons, storage space should be provided for each person. The Farrier report (Reference 2) gives an analysis of seven surveys which shows clothes rod requirements for a total of 4799 families. A listing of these surveys is shown below.

<table>
<thead>
<tr>
<th>Studies</th>
<th>Number of Families</th>
<th>Average Rod Requirements in inches</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pierce Study of Houses (1944)</td>
<td>39</td>
<td>Male 31</td>
<td>49</td>
</tr>
<tr>
<td>Pierce Study of Apartments (1944)</td>
<td>65</td>
<td>Male 24</td>
<td>54</td>
</tr>
<tr>
<td>War Housing (1944)</td>
<td>1062</td>
<td>Male 30</td>
<td>40</td>
</tr>
<tr>
<td>North East Farm Study (1949)</td>
<td>607</td>
<td>Male 40</td>
<td>35</td>
</tr>
<tr>
<td>North Central Farm Study (1951)</td>
<td>884</td>
<td>Male 68</td>
<td>89</td>
</tr>
<tr>
<td>Western Farm Study (1952)</td>
<td>607</td>
<td>Male 78</td>
<td>72</td>
</tr>
<tr>
<td>Southern Farm Study (1951)</td>
<td>1507</td>
<td>Male 18</td>
<td>42</td>
</tr>
<tr>
<td>Weighted average</td>
<td></td>
<td>Male 94</td>
<td></td>
</tr>
</tbody>
</table>

A weighted average for the entire group shows an average requirement for the men and women combined to be 94 inches. What appears more significant is the fact that only the Southern Farm survey, as reported by Farrier, shows a
need below 70 inches, and this requirement is 60 inches, considerably above the present FHA requirement of 36 inches. On the basis of this evidence and upon general observation, the Committee agreed to recommend as a reasonable minimum standard that, as a minimum reasonable recommendation, the master bedroom should have a clothes closet or closets which would provide a usable rod length of 72 inches.

Some argument can be made for the need for larger closets in other bedrooms, especially those that may be occupied by two persons, particularly teen-agers. However, since the majority of families buying new property insured by FHA are likely to have younger children whose needs are not so great, the Committee did not feel it could justify changing the closet requirement in bedrooms other than the master bedroom.

D. Coat Closet

A 3-foot-wide coat closet is now specified in Section 602-4.2 of the Minimum Property Standards. This width may not always be needed for outer garments. However, experience indicates the total specified clothes closet space is frequently too small and this extra space serves as overflow space for clothing which cannot be accommodated in bedroom closets or other storage. This is especially true of families with four or more people who are teen-agers or older.

It was, therefore, not considered wise to recommend a change in the coat closet rod length until a thorough study of the total required rod length throughout the entire house had been made.
2. Linen Closet Recommendations - Explanation

The net volume of linen storage space is indirectly specified by three of the current requirements in Section 602-4.3:

a. Minimum shelf 9 square feet for one or two bedrooms and 12 square feet for three or four bedrooms.

b. Space of shelves vertically, approximately 12 inches.

c. Shelving over 74 inches high shall not be included in the required shelf area.

Accordingly, the minimum volume required is 9 cubic feet for two-bedroom houses and 12 cubic feet for three-bedroom houses.

Based on the inventories of the six surveys he reviewed, Farrier (Reference 2) suggests certain areas as being adequate for linen and bedding storage. In the table below the areas are converted to volumes by multiplying the usable height of the closet by 7 feet, as it appears that Farrier assumed the closets would be full height.

<table>
<thead>
<tr>
<th>Area</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>War Housing Projects, 2'-6&quot; x 2'-0&quot;</td>
<td>5.0</td>
</tr>
<tr>
<td>Farm Surveys</td>
<td></td>
</tr>
<tr>
<td>Northeastern, 2'-0&quot; x 2'-0&quot;</td>
<td>4.0</td>
</tr>
<tr>
<td>North Central, 2'-6&quot; x 2'-0&quot;</td>
<td>5.0</td>
</tr>
<tr>
<td>Western states, 2'-6&quot; x 2'-0&quot;</td>
<td>5.0</td>
</tr>
<tr>
<td>Southern states (not given)</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Kitchen and dining room linens are excluded from this tabulation.

Wilson (Reference 3) recommends a 2' x 3' linen closet as a "good average size". McCullough (Reference 1, page 38) shows a 2' x 2' x 7' high unit for "bedding". Of this, only two drawers totaling 18 inches in height are allotted to sheets and pillowcases. These 6 cubic feet will hold 24 sheets and 36 pillowcases.
In McCullough's study (Reference 1, page 40) bathroom linens are included in a bathroom supply cabinet. This cabinet is 16 inches deep (front-to-back) and 24 inches wide. Four shelves totaling 28 inches in height accommodate the washcloths, hand towels, and bath towels. The gross volume of the space is 6.22 cubic feet. By examining the picture of the unit it can be determined that approximately 8 large bath towels, 12 medium size towels, 18 hand towels, and 24 washcloths or small hand towels are stored in this space.*

Accordingly, the McCullough study provides a total of 12.22 cubic feet for bed linens and bath linens. This is comparable to the present requirement in the MPS of FHA. Also, the quantity of items stored is comparable to Farrier's listing of possessions stored in farm houses in 1952 in the Western States, the largest listing in the surveys included in his study.

The Committee recognized that the linen closet specified in the MPS is too small to accommodate any bulky bedding items such as pillows, blankets, comforters, etc., and agreed that people are often forced to store these items elsewhere in the house, either in a general storage area, or on a top shelf in a closet.** The Committee agreed that no change should be made with respect to the linen closet specified in the MPS, particularly because of the lack of up-to-date knowledge of the number and type of possessions of this class held by homeowners.

*In the bathroom supply cabinet, the top two shelves are shown as storing bath mats, toilet tissue, and cleansing tissue. This addition increases the cabinet to a height of 42 inches and a total volume of 9.33 cubic feet.

**The Committee members wish to point out clearly that there is no intent of recommending storage of bedding on clothing closet shelves; rather, they recognize that this is one storage space employed when specific space is not available.
At the same time the Committee was dissatisfied with this disposition of bedding items and strongly recommended further research into the number of possessions of this class as well as research on the usual and desirable means of storing them.
5. W. C. P.ECO

STANDARDS

602-5 KITCHEN STORAGE

602-5.1 Each kitchen shall have accessible storage space for food and utensils, and space for such activities and equipment needed to perform the intended functions. Shelf space in a broom closet shall be classified as general storage.

602-5.2 Minimum Shelf and Counter Top Area*

a. Total shelving in wall and base cabinets, 50 square feet with not less than 20 square feet in either wall or base cabinets.
b. Minimum counter top area, 11 square feet.
c. Minimum drawer area, 11 square feet.
d. Area occupied by sink basin and by cooking units shall not be included in minimum counter top area.
e. Usable storage space in cooking ranges, when provided in the form of drawers or shelving may be included in the minimum shelf area.
f. In determining the required area of revolving base shelves (lazy susan) the area of each shelf may be considered to be the area of a square whose dimensions are equal to the diameter of the revolving shelf.

(Example: The diameter of the revolving shelf is 18 inches. The area of the shelf may be considered to be 1.5 feet x 1.5 feet, which is 2.25 square feet.)
g. Drawer area may be substituted for not more than 25 percent of required base shelf area.
h. If a range at least 39 inches in width or a 40-inch space for a range is provided, the following may be counted toward required areas:

1. Base cabinet shelving, 4 square feet.
2. Counter top, 2 square feet.
i. If range is not provided, provide at least a 40-inch space for range.

c. Height between counter top and wall cabinets shall be at least the following:

1. Over range and sink cabinets, 24 inches.
2. Over other base cabinets, 15 inches.
3. Wall shelving closer than the above dimension may be permitted, except over ranges, provided such shelving does not interfere with the use of the counter top. As a guide, wall shelving which does not project beyond a line drawn from the front edge of the wall cabinet at a 60 degree angle to the bottom of the wall cabinet, may be considered as not interfering with the use of the counter top. If shelving projects beyond such a line, the counter top shall not be included in the required area.

602-5.4 Depth of Shelving and Counter Top

That portion of shelving and counter top space less than or exceeding the following dimensions shall not be included in the required area:

<table>
<thead>
<tr>
<th>Minimum (inches)</th>
<th>Maximum (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Shelving</td>
<td>4</td>
</tr>
<tr>
<td>Base Shelving</td>
<td>12</td>
</tr>
<tr>
<td>Counter Top</td>
<td>15</td>
</tr>
</tbody>
</table>

602-5.5 Spacing of Shelving*

Clearance between shelving shall comply with the following to be included in required area:

<table>
<thead>
<tr>
<th>Depth of shelf (inches)</th>
<th>Minimum spacing (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 to 6</td>
<td>5</td>
</tr>
<tr>
<td>6 to 10</td>
<td>6</td>
</tr>
<tr>
<td>10 to 15</td>
<td>7</td>
</tr>
<tr>
<td>15 to 24</td>
<td>10</td>
</tr>
</tbody>
</table>

602-5.6 See Details 11 and 12 for examples of kitchen cabinet measurements.
3. Recommended Standards for Kitchen Storage - Explanation

A. Accessibility

The Minimum Property Standards require that "each kitchen shall have accessible storage space". Certain dimensions are given which limit the amount of shelving that can be used in accordance with depth, height, etc. Detail 11 of the present standards shows that the amount of shelf storage in cabinet corners that can be credited is determined by the access to the corner. Full credit is allowed if door access is from both sides; half credit if door access is from one side only.

In view of the fact that the accessibility of the back corner is limited even if access from both sides is available, it is recommended that only one-half of the corner area of each shelf be credited in the shelf area count. Detail 11* has been modified to show this recommendation.

B. Shelf Area and Drawer Area

The Minimum Property Standards (Paragraph 602-5.2a and c) requires 50 square feet of shelf space, with at least 20 square feet in wall cabinets and at least 20 square feet in base cabinets.

None of the surveys analyzed in the Farrier report provide any overall tabulation of kitchen storage needs, although requirements for dish storage were mentioned. A 1959 study by the Small Homes Council (Reference 5) suggests the storage space required for a limited list and a liberal list of kitchen supplies. The study also gives recommendations for minimum as well as ample space for these supplies. The space required for the storage of dishes needed by 4, 6, 8, or 10 people is also given in terms of minimum space and ample space.

*See page 26.
All of these recommendations are expressed in terms of lineal feet of frontage of storage cabinet, and, therefore, no credit is given for storage in the corners of kitchen cabinets.

Assuming that a limited list of supplies and dinnerware for 8 persons is to be stored in a minimum space, the Small Homes Council requirements translate to the following equivalent number of square feet:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Cabinet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>10.5</td>
<td>square</td>
</tr>
<tr>
<td>Dishes</td>
<td></td>
<td>feet</td>
</tr>
<tr>
<td>Total</td>
<td>21.0</td>
<td></td>
</tr>
<tr>
<td>Base Cabinet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cabinet</td>
<td>30.0</td>
<td>square</td>
</tr>
<tr>
<td>Space</td>
<td>51.0</td>
<td></td>
</tr>
<tr>
<td>Drawer Space</td>
<td>13.0</td>
<td></td>
</tr>
</tbody>
</table>

It is clear that the FHA standards are comparable to the SHC recommendations. Without more current information on kitchen requirements, the Committee was willing to let these standards continue. At the same time, it was recognized that the SHC study is based on a list of supplies and equipment that is now outdated, and that new investigations are needed in this field, particularly with reference to the increased number of packaged foods and small appliances now available and in use.

C. Revolving Shelves

Section 602-5.2f of the present Minimum Property Standards states that "shelf area of revolving base shelves (lazy-susan) may be considered as twice its actual area in determining required shelf area".

There does not seem to be any justification for doubling the amount of credit for the actual area of these shelves although this provision
may stem from an attempt to evaluate the extra accessibility of these shelves over normal corner shelves; however, a careful examination of this provision indicates that it is inequitable.

If it is assumed that the diameter of the rotating shelf is 18 inches to 24 inches, then it must be implied that shelving that is within 9 inches to 12 inches of the front of the cabinet is twice as valuable as more remote shelving. Accordingly, it would be consistent to double the credit for the first 9 inches to 12 inches of regular cabinet shelving. In effect this would reduce the actual amount of required base cabinet shelving required by one-third. It should also be pointed out that less-accessible shelving in the corner of regular cabinets will probably be used for dead storage, and that there is no similar compensating space in cabinets with rotating shelves.

A more logical solution to this problem would be to allow full credit for rotating shelves and reduced credit for corner storage as recommended above. A recommended change in Section 605-5.2f of the MPS is included in these recommendations. To simplify the calculation of the area of the shelf, it is proposed that the area of the shelf be considered to be the area of the enclosing square. Thus the area of the shelf may be calculated as the square of the diameter of the rotating shelf. This allows a bonus of about 27% over actual space provided.*

*At least one member of the Committee commented that no bonus should be given and pointed out that this method of calculation gave a larger bonus to rotating shelves that were only three-fourths of a circle.
D. Minimum Counter-Top Area

The Committee did not originally discuss the counter-top requirements of the Minimum Property Standards (602-5.2b), which calls for a minimum of 11 square feet, as it was not originally interpreted as a part of the storage requirements. Subsequent examination of this standard indicated that 11 square feet is indeed a minimum, especially when it is realized that the actual amount required can be reduced by 2 square feet when a credit for range top is used. The Small Homes Council has published the following recommendations: (Reference 11).

<table>
<thead>
<tr>
<th>Area Requirement</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frontage to left of sink</td>
<td>30 inches</td>
</tr>
<tr>
<td>to right of sink</td>
<td>36 inches</td>
</tr>
<tr>
<td>near range</td>
<td>24 inches</td>
</tr>
<tr>
<td>near refrigerator</td>
<td>15 inches</td>
</tr>
<tr>
<td>for mixing, etc.</td>
<td>36 inches</td>
</tr>
</tbody>
</table>

Small Homes Council Circular C5.32, Kitchen Planning Standards, further states:

"In a continuous assembly, some counter may be counted for more than one of the above functions; however, this multiple use should never reduce the amount of counter to such a point that recommended base cabinet requirements are cut."

This minimum would be equivalent to 15 square feet of counter space.

It is interesting to note that the MPS standard of 11 square feet provides only the amount of counter space on either side of the sink, as recommended by the Small Homes Council.

Later publications (Reference 13) place a more severe requirement on counter top. Kapple (Reference 12) proposes the minimum counter frontage should be 10 feet or an area of 20 square feet.

-23-
The Committee considered the 1-foot-wide space that might occur on some 39-inch ranges to be of doubtful value as a working counter and felt that the 11-square-foot counter requirement was an irreducible minimum.

Accordingly, a majority of the Committee agreed that counter-top credit of 2 square feet for 39-inch and larger ranges should be omitted and, therefore, item 602-5.2h(2) of the present MPS has been omitted in the recommendations.
605 ACCESS

605-1 OBJECTIVE

To provide openings adequate in size to admit furniture and equipment to all spaces and to permit inspection for repair and maintenance.

605-2 EXTERIOR DOORS

605-2.1 Minimum Sizes*

<table>
<thead>
<tr>
<th>Type of Door</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main entrance doors</td>
<td>3' 0&quot;</td>
<td>6' 6&quot;</td>
</tr>
<tr>
<td>Service doors</td>
<td>2' 6&quot;</td>
<td>6' 6&quot;</td>
</tr>
<tr>
<td>Garage doors, 1 car</td>
<td>8' 0&quot;</td>
<td>(f)</td>
</tr>
<tr>
<td>Garage doors, 2 car</td>
<td>15' 0&quot;</td>
<td>(f)</td>
</tr>
</tbody>
</table>

*If double entrance doors are used, minimum width of each door, 2' 6".
16' 4" clear in open position.

605-2.2 See 909-4 for construction and installation of exterior doors.

605-3 INTERIOR DOORS

605-3.1 Provide a door for each opening to a bedroom, bathroom, and toilet compartment. Doors to bathrooms and toilet compartments shall be of a conventional type, hinged or sliding, and shall have locks.

605-3.2 Minimum Size

a. Habitable rooms, 2 feet 6 inches wide.
b. Bathrooms, toilet compartments and closets other than linen, general storage and broom closets, 2 feet wide.
c. General storage and basement and service stair doors, 2 feet 6 inches wide.
d. Height, 6 feet 6 inches except that height of sliding or folding doors for wardrobe closets may be 6 feet provided depth of closet does not exceed 30 inches.*
e. When other than conventional hinged doors are provided, including folding and sliding doors, minimum clear opening shall be 2 feet 3 inches under (a) and 1 foot 9 inches under (b).*

605-3.3 See 909-5 for construction and installation of interior doors.

605-4 ATTIC SPACE

605-4.1 Access to attics shall be provided by means of conveniently located scuttles, disappearing or permanently installed stairways; minimum opening 14 x 22 inches.

605-4.2 If mechanical equipment such as an attic furnace is installed in attic space, access opening shall be of sufficient size to permit removal and replacement of equipment.

605-5 BASEMENTLESS SPACES

605-5.1 An access opening, at least 18 x 24 inches shall be provided.

605-5.2 If mechanical equipment is installed in basementless space, access opening shall be of sufficient size to permit removal and replacement of equipment.

605-5.3 If sill of access opening is below grade, provide areaway. See 609-4.*

606 PRIVACY

606-1 OBJECTIVE

To provide a degree of privacy, commensurate with desirable living conditions, by means of the proper location of exterior openings in relation to exterior conditions and the interior arrangements of rooms, particularly with reference to access to bathrooms from bedrooms.

606-2 ROOM ARRANGEMENTS

606-2.1 The room arrangements shown in table 6-1 are not acceptable.

606-2.2 An exception to (e) below may be permitted in specific cases when market acceptance of this type of planning is assured.

<table>
<thead>
<tr>
<th>Only Access From</th>
<th>Thru</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Habitable room</td>
<td>Bathroom</td>
</tr>
<tr>
<td>b. Habitable room</td>
<td>Habitable room</td>
</tr>
<tr>
<td>c. Habitable room</td>
<td>Habitable room</td>
</tr>
<tr>
<td>d. Bedroom</td>
<td>Bathroom</td>
</tr>
<tr>
<td>e. Bedroom</td>
<td>Habitable room</td>
</tr>
</tbody>
</table>

*TABLE 6-1*
602–6 GENERAL STORAGE*

602–6.1 Usable general storage space shall be provided for the storage of items and equipment essential to the use of the occupants. This storage shall be in addition to required closets and kitchen storage.

Usable general storage space shall be calculated in accordance with the guide shown in illustrations (12a) and (12b).

602–6.2 Minimum total volume (interior and exterior storage) 150 cubic feet plus 75 cubic feet per bedroom.

602–6.3 Interior Storage

a. At least 25 percent of the required total volume shall be located within the dwelling and shall be suitable for storage of items customarily stored inside. This space may be separate storage closets, utility rooms, attic space, suitable basement space, or similar spaces.

b. Conveniently accessible excess space in required bedroom or coat closets may be included as part of required interior storage volume provided at least one separate full height storage closet having a minimum depth of 18 inches and a minimum width of 36 inches or other equivalent storage area is provided.

Excess space in required closets shall not be included in the required inte-

rior storage volume unless it is conveniently accessible as defined by illustrations (12c) and (12d).

c. Required storage space in attics shall be accessible by means of a permanent or disappearing stairway.

602–6.4 Exterior Storage

a. At least 50 percent of the required total volume shall be located for convenient storage of items and equipment used out-doors. This space may be located in garage, storage lockers or within dwelling if readily accessible to the exterior.

b. Storage space in excess of 4 feet in depth or less than 1 foot in width or depth shall not be included in required volume.

c. Required storage space in attics shall be accessible by means of a permanent or disappearing stairway.

d. Space occupied by or necessary for the use and access of permanent equipment shall not be included in required volume.

602–6.5 Dimensions (Interior and Exterior)

a. Storage space less than 4 feet in height or greater than 8 feet in height shall not be included in required volume.

b. Storage space in excess of 4 feet in depth or less than 1 foot in width or depth shall not be included in required volume.

c. At least 60 percent of required exterior storage space shall have a minimum depth of 2 feet 6 inches.

d. Space occupied by or necessary for the use and access of permanent equipment shall not be included in required volume.
S. H. C. RECOMMENDED STANDARDS
(NEW PAGE)

**Type 5**
reach-in
(not over 4' deep)

\[ H = \text{height} \]

**Type 6**
walk-in
(efficient when width
\[ W \] is greater than 76')

\[ H = \text{height} \]

usable general storage space 602-6.1 (12a)
S. H. C. RECOMMENDED STANDARDS

(type 7)

usable general storage space

602-6.1

(type 8)

measurement of conveniently accessible

excess space in closets

602-6.3

H = height
S.H.C. RECOMMENDED STANDARDS

(new page)

**Type 9**
edge-in

clothes storage

\[ \text{vol} = \frac{E \times G \times H}{2} \]

general storage

\[ \text{vol} = C \times E \times H \]

door

2'6" min

4'0" max

1'0" min

**Type 10**
walk-in

clothes storage

\[ \text{vol} = \frac{E \times G \times H}{2} \]

general storage

\[ \text{vol} = C \times E \times H \]

door

2'6" min

**Type 11**
walk-in

clothes storage

\[ \text{vol} = D \times E \times H \]

door

2'6" min

**Measurement of conveniently accessible excess space in closets** 602-6.3

\[ H = \text{height} \]

(12d)
4. General Storage Recommendations - Explanation

A. Access

Section 605-3.2b and e of the current FHA Minimum Property Standards allow doors to general storage as narrow as 2 feet (less with sliding or folding doors). In basementless houses, the large items are usually stored in the general storage area. For this reason it is equally important to require a 2'-6" wide access to the general storage as it is to basements (Section 605-3.2c). Accordingly, modifications of section 605-3.2b and 605-3.2e have been recommended. (See page 25).

The usable space within a general storage closet may be seriously limited if the door is only 2'-6" wide. Full access doors with openings equal to at least two-thirds of the closet width* permit access to virtually all of the closet. For this reason, the entire area of a closet having a depth of 4 feet or less and having a wide opening can be considered to be usable. If the openings are narrower than the two-thirds requirement, it is usually necessary to step inside of the closet to reach stored items. In this case the usable space should be determined by allowing a walk-in access space 2'-6" wide by a minimum of 1 foot deep. This allows some space to maneuver items in and out of the storage area. These recommendations are shown in details (12a) and (12b).

*Expressed in a different way, the creditable width of the closet may not extend beyond either jamb more than one-fourth the width of the opening.
B. Usability

In closets with narrower openings the space in the corners is not readily accessible, and some reduction in credit is indicated. Following the procedure established in the analysis of the kitchen storage, only half of the space in the corners is considered usable. See details (l2b) and (l2d).

C. Excess Space in Closets

Section 602-6.3b of the Minimum Property Standards states, in part:

"Conveniently accessible excess space in required bedroom or coat closets may be included as part of required interior storage volume provided at least one separate full height storage closet having a minimum depth of 18 inches and a minimum width of 36 inches or other equivalent storage area is provided."

Recommendations for the definition of "conveniently accessible" excess space in this case are shown in details (l2c) and (l2d). In general these follow the principles developed previously.

D. Volume Requirements

Knowledge of the total volume of storage requirements for families is needed in order to evaluate their general storage needs. The only overall studies of the volume of storage needs and usage have been based upon assumed quantities or upon case studies of less than a significant number of families. Such a study for six families was made for this research project.* All six of the families surveyed lived in basementless houses with 3 bedrooms; one family had a garage, another family had a

*See Appendix B
carport. The net space used for general storage by the families married 4 or 5 years varied from a minimum of 121 cubic feet to a maximum of 366 cubic feet. The family married 23 years was using a net cubage of 967 cubic feet. The amounts mentioned are net storage cubage occupied; in several instances objects are stored on the floor and no use is made of the space above them. For example, in one garage 566 cubic feet of storage occupied 100 square feet of area.

The Committee agreed that these general storage standards are minimal for houses without basement, garage, or attic. However, since the overall general storage needs cannot be conclusively established, the Committee felt that it was important to avoid any increase in the standards which would increase the cost of houses built under these standards. Therefore, they agreed that, pending further research, the recommended increase in the master bedroom closets space should be offset by an equal reduction in the general storage space. The 3 feet of additional rod, recommended for the closet in the master bedroom, will require a closet addition 3 feet wide, 2 feet deep, and 8 feet high, or 48 cubic feet. Hence, they recommend a corresponding 50-foot reduction in the general storage space requirement. This means that the general storage requirement for a three-bedroom house will become 375 cubic feet.

This change has the effect of requiring a lesser amount of exterior storage. Under the suggested regulations, a minimum of 187.5 cubic feet is required for a three-bedroom house, contrasted with 212.5 cubic feet under the current standards. The Committee agreed that this slight change in favor of interior storage was not undesirable especially since additional general
storage for "exterior" items, such as garden tools, bicycles, etc. can be added at a later date more readily than can storage in bedrooms, linen closets, and other "interior" storage. For this reason interior storage may be considered more critical than exterior storage.

E. Interior General Storage

In evaluating interior general storage requirements, an unpublished paper concerning general storage needs in small houses was examined. (Reference 14). The study lists the following items that are owned by half or more of the 103 families. * Half of those who own the items use them frequently.

- Cleaning supplies
- Cleaning equipment
- Supplies for care of clothing
- Supplies for care of shoes
- Sewing supplies
- Card table
- Folding chairs

- Books
- Small electrical appliances
- Ironing board
- Clothes basket
- Small tools
- Stepladder

If it is assumed that these items are stored inside, some rough allotment of space for their storage can be made by using Bulletin 557 (Reference 1) as a guide.

Cleaning equipment, including space for a folding ironing board, can be accommodated in a space 2' x 2' x 7'. (Reference 1, page 52). If shallow shelving is built on the back of the door of this cabinet, cleaning supplies and small tools may be stored in the same space.

Card tables and folding chairs will require a space 3' (wide) x 2' x 3' (high).

The space above the card tables will be adequate for the most common sewing supplies and other supplies used in the care of clothing, exclusive
of laundry supplies. This space includes room for a portable sewing machine, but does not include space for a dress form, a folding sewing table, a folding cutting table, nor does it include space for hanging unfinished sewing work.

A space one-foot wide will accommodate a stepladder and the space above the stepladder should be sufficient for shoe cleaning supplies.

This allotment accounts for all of the items in the above list excepting books and small electrical appliances. Books will undoubtedly be cared for in book cases rather than in general storage space. It must be assumed that small electrical appliances will be stored near the point of use.

The total gross space required for this storage is 2' x 6' x 8' or 96 cubic feet, as shown in Figure A.

Under the recommendations in this report, the minimum acceptable interior storage space for a three-bedroom house is 25% of 375 cubic feet or 94 cubic feet. This figure is comparable to the space allotted in the above exercise.
F. Exterior General Storage

The previously mentioned study (Reference 14) lists the following items owned by half or more of the families, and half of those who own them use them seasonally:

- Lawn mower
- Hoe
- Rake
- Lawn broom
- Lawn clippers
- Garden hose
- Lawn chairs
- Grill
- Large thermos
- Picnic equipment
- Recreation equipment
- Electric fan
- Paint and removers
- Storm windows
- Storm doors
- Screen doors
- Window screens
- Christmas decorations

In estimating the amount of space required for these items, the following allotments may be made:

<table>
<thead>
<tr>
<th>Item</th>
<th>Dimensions</th>
<th>Cubic Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screens, etc.</td>
<td>2(\frac{1}{2}) x 3' x 8'</td>
<td>60</td>
</tr>
<tr>
<td>Garden tools, garden hose</td>
<td>6' x (\frac{3}{4}) x 8'</td>
<td>24</td>
</tr>
<tr>
<td>Lawn mower</td>
<td>2' x 3' x 4'</td>
<td>24</td>
</tr>
<tr>
<td>Grill</td>
<td>2' x 2' x 4'</td>
<td>16</td>
</tr>
<tr>
<td>Christmas decorations</td>
<td>2' x 2' x 2'</td>
<td>8</td>
</tr>
<tr>
<td>Picnic equipment</td>
<td>2' x 3' x 2'</td>
<td>12</td>
</tr>
<tr>
<td>Thermos bottle</td>
<td>1' x 1' x 1'</td>
<td>1</td>
</tr>
<tr>
<td>Electric fan</td>
<td>1' x 1' x 1'</td>
<td>1</td>
</tr>
<tr>
<td>Paint, etc.</td>
<td>2' x 3' x 1'</td>
<td>6</td>
</tr>
<tr>
<td>Recreation equipment</td>
<td>2' x 3' x 1'</td>
<td>6</td>
</tr>
</tbody>
</table>

\[\text{Total} = 60 + 24 + 24 + 16 + 8 + 12 + 1 + 1 + 6 + 6 = 158 \text{ cubic feet}\]

The total gross storage space * required for this storage is 6'-6" (wide) x 3'-6" x 8'-0" (high), or 182 cubic feet, an amount less than the minimum required exterior storage for a three-bedroom house which is 50% of 375 cubic feet or 187.5 cubic feet.

*See Figure B, following page.
Figure B.
Exterior General Storage Allotment
182 cubic feet

*No articles assigned to top 1-foot space.
The new recommended total general storage (including both interior and exterior) requirement for a three-bedroom house is 375 cubic feet of which 278 cubic feet have been allocated in the above exercises.

The remaining 97 cubic feet are available to accommodate one or more of the less frequently owned items, such as a bicycle, tricycle, stroller, garden cart, etc. In addition, any extra items not accounted for in the interior storage listing will probably have to be accommodated in this small remaining cubage.

Obviously the storage is tight, and for a two-bedroom house (minimum, 300 cubic feet) would be even tighter. Nevertheless, these figures do indicate these requirements can be considered a reasonable minimum until such time as more adequate information concerning the possessions of average families is available.

* The study (Reference 14) reports:

"When groups of items were rated, more than half of the families felt their storage for out-of-season clothing, blankets and other covers, toys, and hobby and recreation items was inadequate. Forty per cent or more considered storage inadequate for in-season clothing, cleaning supplies and equipment, and garden and lawn equipment. Storage for kitchen utensils, dishes, and linens was rated more adequate, yet more than one-fourth of the families felt their storage for any of these groups of items was inadequate.

"Adequacy of storage for individual items was not rated as low as for groups of items. It may have been that individual items were not so troublesome as the required combination to fit into available storage. Even so, one-fourth or more of the families rated their storage inadequate for almost every item about which they were asked. Some of the items for which storage was most critical were those connected with children such as bicycles, tricycles, strollers, and wagons."
VII. GENERAL COMMENTS

Since the Committee did not recommend increasing the storage volume required in the MPS, some persons may infer that the storage as specified is adequate. On the contrary, there are a number of indications that storage space is inadequate in some parts of the house, but the Committee did not feel that the information available was sufficient to justify an increase in total storage requirements, especially since, whenever possible, it was desirable to avoid increasing the cost of the small home. Information on the possessions and storage arrangements of families living in "FHA type" housing is badly needed.

As the work proceeded, it became apparent that the Committee's efforts were focusing on better distribution and accessibility of storage.

The requirements for increased accessibility, either through greater opening width or access clearances, may cause some increase in price, but, in recent years, several new and less costly large-size doors have become available. In some instances it is likely that the added costs of these doors will be offset by the savings in framing and wall finish material.

For those instances in which wall space in the room is of prime importance, acceptable arrangements for walk-in and edge-in closets have been shown. These closet types allow the use of smaller door sizes. Walk-in closets are to be preferred over edge-in closets.

Several times members of the Committee pointed out the desirability of storage designed and/or equipped in such a manner that it could be used more efficiently. These remarks included comments on sliding shelves, special racks and the like. Comments were also made on the effectiveness of adjustable shelving.
arranged in such a manner as to permit the accommodation of various sized articles with resulting convenience and efficiency. Along these same lines it was also pointed out that some of the specified spacings of shelving, etc. led to poor storage. For example, cups are not stored efficiently on shelves spaced 12 inches apart. At the same time the committee recognized that it was impossible to write regulations which would achieve the end desired.

The Committee also became very much aware of the fact that people seem to talk a lot about storage, but do little about it. The six local case studies provided examples of storage space that could be used much more efficiently if the householder would spend a day's work and a small amount of money in improving it with shelving, racks, and the like. However, since this appears to be done infrequently, we must assume that storage has a low priority on the consumers time and money.

When a complete and current survey of stored items and the storage space needed is available, better standards can be written.
VIII. RECOMMENDATIONS FOR RESEARCH

There is a need for a comprehensive study of the storage space usage and the possessions stored by families living in homes which are representative of those covered by the FHA mortgage insurance program.

Such a research program would entail the following activities:

1. Preparation of survey guides by the research agency. These guides would be designed to give information on these aspects of storage:
   a. Articles stored
   b. Dimensions and volume of storage space used
   c. Dimensions and volume of storage available
   d. Location of storage
   e. Unstored articles
   f. Access to storage

   The following information would also be obtained if feasible:
   a. Length of married life
   b. Family composition
   c. Family income
   d. Occupational group
   e. Time in present house
   f. Previous housing

2. Selection of survey sample with reference to:
   a. Representative FHA housing
   b. Location in the United States
   c. Urban, suburban
   d. Statistical accuracy

3. Survey conducted with the assistance of the Home Economics departments of the land grant educational institutions in the U. S. or by local memberships of the Home Economists in Homemaking sections or the Consumers Interest Committee of the American Home Economics Association.

4. Data processing conducted by the central research agency.

5. Report embodying:
   a. Summary of information accumulated
   b. Interpretation of data
   c. Recommendations

It is suggested that the basic program would be financed by the Federal Housing Administration, but it is hoped that the individual surveys can be undertaken by the Home Economics departments of land grant institutions through the support they receive from U.S.D.A. funds.

*(A pilot survey would be employed to test the structuring of the interview-survey guide.)*
IX. GUIDE FOR APPRAISAL

The difficulty with any minimum standard is that it is applied to all cases including houses that are definitely not in the minimum category. In order to maintain marketability, better houses should have higher standards. One way of achieving this objective is to set up an appraisal guide which will credit housing facilities in accordance with the general quality of the house being appraised.

The following guide is suggested for purposes of discussion:

Guide for Appraisal

<table>
<thead>
<tr>
<th>Suggested Minimum Standards</th>
<th>For Category**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>602-4.1 Bedroom Closets</td>
<td></td>
</tr>
<tr>
<td>Rod length (feet)</td>
<td></td>
</tr>
<tr>
<td>Master Bedroom and any two person bedroom</td>
<td>6</td>
</tr>
<tr>
<td>Secondary, one person bedroom</td>
<td>3</td>
</tr>
<tr>
<td>602-4.3 Linen Closet</td>
<td></td>
</tr>
<tr>
<td>Shelving (square feet)</td>
<td></td>
</tr>
<tr>
<td>1 and 2 bedroom</td>
<td>9</td>
</tr>
<tr>
<td>3 and 4 bedroom</td>
<td>12</td>
</tr>
<tr>
<td>602-5 Kitchen Storage</td>
<td></td>
</tr>
<tr>
<td>602-5.2 area (square feet)</td>
<td></td>
</tr>
<tr>
<td>Wall Cabinet Shelf</td>
<td>20</td>
</tr>
<tr>
<td>Base Cabinet Shelf or Pull out Storage</td>
<td>20</td>
</tr>
<tr>
<td>Both Wall and Base Cabinet</td>
<td>50</td>
</tr>
<tr>
<td>Drawer or pull out tray</td>
<td>11</td>
</tr>
<tr>
<td>Counter</td>
<td>11</td>
</tr>
<tr>
<td>602-6 General Storage</td>
<td></td>
</tr>
<tr>
<td>602-6.2 Total Volume (cubic feet)</td>
<td></td>
</tr>
<tr>
<td>LU 1 BR</td>
<td>225</td>
</tr>
<tr>
<td>LU 2 BR</td>
<td>300</td>
</tr>
<tr>
<td>LU 3 BR</td>
<td>375</td>
</tr>
<tr>
<td>LU 4 BR</td>
<td>450</td>
</tr>
</tbody>
</table>

*Suggested by W. H. Kapple, SHC-BRC

**Category A = Minimum, 800 - 1200 square feet in house (if three bedroom).
Category B = Normal, 1200 - 1600 square feet in house (if three bedroom) costing 100% more than Category A.
Category C = Optimum, over 1600 square feet in house (if three bedroom) costing 200% more than Category A.
APPENDIX A

BIBLIOGRAPHY

1) McCullough, Helen E., Space Design for Household Storage, University of Illinois Agricultural Experiment Station, Bulletin 557, 1952.

2) Farrrier, Clarence W., FINAL DRAFT - Primary Report on Study of Storage Space Requirements for Homes, Standards and Studies Section, Federal Housing Administration, March 21, 1960.

3) Wilson, Maude, Closets and Storage Spaces, U. S. Department of Agriculture Farmers Bulletin No. 1865, November 1940.


5) McCullough, Helen E., Cabinet Space for the Kitchen, University of Illinois, Small Homes Council Circular C5.31, 1949.

6) Peart, Mary; and King, Virginia, "General Storage Needs in Small Houses as Related to Family Characteristics," a thesis submitted to the faculty of Purdue University, June 1960.

7) Philson, Kathryn, Folded Garment Storage for Southern Farm Home, Agricultural Experiment Station, Auburn University, Bulletin 341, May 1962.

8) Woolrich, Avis M.; and Herrington, Jack D., Storage Units for Household Linens, United States Department of Agriculture, Agricultural Information Bulletin 150, Washington, D. C.


10) Hawes, Mary H., "Quantity and Cost Budgets for Two Income Levels--Prices for the San Francisco Bay Area," Heller Committee for Research in Social Economics of the University of California, September 1961.

Bibliography - continued


14) Peart, Virginia; McConnell, Janet; Pifer, Glenda; Risk, Fidelia; and Johnson, Kathleen, General Storage Needs in Small Houses - a Pilot Study, 1962.


23) McCullough, Helen E.; and Farnham, Mary B., Space and Design Requirements for Wheelchair Kitchens, University of Illinois, Agricultural Experiment Station, Bulletin 661, 1960.
Bibliography - continued


28) McCullough, Helen E., Household Storage Units, University of Illinois, Small Homes Council, Circular C5.1, 1953.

29) Philson, Kathryn, Rod Closets for Southern Farm Homes, Auburn University Agricultural Experiment Station, Bulletin 325, March 1960.

30) McCullough, Helen E.; Philson, Kathryn; Smith, Ruth H.; Wood, Anna L.; and Woolrich, Avis, Space Standards for Household Activities, University of Illinois Agricultural Experiment Station (with others), Bulletin 686, May 1962.

Plus other items listed in the bibliography attached to the Farrier report.
APPENDIX B

CASE STUDIES

CASE STUDY—GENERAL STORAGE

During September, 1962, five brief case studies* were made in Champaign-Urbana to evaluate the adequacy of general storage in basementless houses.

**GENERAL STORAGE**

(in cubic feet)

<table>
<thead>
<tr>
<th>Gross</th>
<th>Family #1</th>
<th>Family #2</th>
<th>Family #3</th>
<th>Family #4</th>
<th>Family #5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available</td>
<td>410</td>
<td>n.o.</td>
<td>375</td>
<td>407</td>
<td>355</td>
</tr>
<tr>
<td>Used</td>
<td>366</td>
<td>970</td>
<td>217</td>
<td>268</td>
<td>121</td>
</tr>
<tr>
<td>Inside</td>
<td>83</td>
<td>69</td>
<td>40</td>
<td>73</td>
<td>18</td>
</tr>
<tr>
<td>Outside</td>
<td>114</td>
<td>566</td>
<td>130</td>
<td>70</td>
<td>62</td>
</tr>
<tr>
<td>Attic</td>
<td>122</td>
<td>252</td>
<td>0</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Inside Unstoried</td>
<td>20</td>
<td>10</td>
<td>n.o.</td>
<td>n.o.</td>
<td>21</td>
</tr>
<tr>
<td>Outside Unstoried</td>
<td>27</td>
<td>73</td>
<td>47</td>
<td>45</td>
<td>20</td>
</tr>
</tbody>
</table>

n.o.** not observed

Following are the conclusions of this study which was made to serve as background for use at the meeting of specialists.

a. The net general storage space used by families of a four or five-year marriage was far less than that used by the family of a twenty-year marriage. (i.e. 121 to 366 cubic ft. vs. 970 cubic ft.)

b. The needs for general storage are most critical in houses without basement, garage, or accessible attic.

c. None of the families used all of the cubage available, presumably due to inadequate shelving, etc., and all but family #2 (married 23 years) used less storage than the 425 cubic feet required by the MPS. Nevertheless, all families left some articles outdoors for lack of proper storage space.

d. Even though the attic access was difficult and there was no attic floor, three of these families stored over 80 cu. ft. of items in the attic. All families with minimum general storage and 20" x 22" trap door wanted better attic access.

*made by William H. Kapple, SHC-BRC
e. The 23-year family lived in a house with two car garage but no basement. They used 200 sq. ft. of garage floor for general storage (566 net cubage) and 217 sq. ft. of storage space in the attic with disappearing stair. (i.e. approximately 2280 cu. ft. of gross general storage space allowing 8'0" high space in garage and 3'2" for the average height of the space in attic.)

f. Only 40% of the shallow general outdoor storage was used by the family living in a house with a carport. (Depth front to back only 8" and 12"). This five-year family reported that the lack of space to store lawn mower, bicycle and other large items was not yet critical. It would, however, become critical when the children grow older and they purchase instead of rent their dwelling.
March 1963

FINAL REPORT

HOUSEHOLD STORAGE STUDY

prepared by the

SMALL HOMES COUNCIL - BUILDING RESEARCH COUNCIL

of the

UNIVERSITY OF ILLINOIS

in accordance with

CONTRACT NO. HA(---)fh-847

between the UNITED STATES OF AMERICA (FEDERAL HOUSING ADMINISTRATION)

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I. OBJECTIVE OF THE STUDY

The major objective of this study was to review and recommend improvements in the requirements for storage facilities needed in residences of one or two living units as specified in the Minimum Property Standards of the Federal Housing Administration. The recommendations for storage standards incorporated as part of this report are based upon a review of published and unpublished literature available, and upon the experience and opinion of a committee of experts assembled by the contractor, the Small Homes Council-Building Research Council of the University of Illinois, Urbana, Illinois.

A second objective of the study was to make recommendations as to the kind and type of additional studies which might be advisable or necessary to further the first objective in those areas in which information is presently inadequate.

II. PROCEDURE

The procedure used in the study involved the following steps:

a. The review of pertinent literature.

b. The convening of a committee of specialists to discuss the problems and the literature pertaining thereto, and to make recommendations with respect to the storage requirements in the Minimum Property Standards of the Federal Housing Administration.

c. The preparation of the preliminary draft of the report including the recommendations.

d. The review of the draft by committee members.

e. The preparation of this document, the final report.
COMMITTEE OF SPECIALISTS ON STORAGE REQUIREMENTS OF FHA MINIMUM PROPERTY STANDARDS
(Meeting held October 2-3, 1962, Urbana, Illinois)

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III. LITERATURE REVIEW

The basis for the literature review was the comprehensive Primary Report on Study of Storage Requirements for Homes, written by Clarence W. Farrier, Engineering Consultant, for the Standards and Studies Section of the Federal Housing Administration, along with the appended "Bibliography of Publications Reviewed for Primary Report of Technical Studies of Storage Space Requirements for Homes".

A significant portion of the Farrier report is the tabulated information obtained from six inventory surveys of the possessions of a total of 4771 families. The two earliest of these surveys were studies of urban families made 18 years ago; the other four were studies of farm families made 10 to 13 years ago. Following tabulation of the data, the Farrier report shows computations of space required to store the inventoried items.

Committee members knew of more recent studies conducted on a more limited basis. Comments on certain of these studies are included later in this report and the reports are listed in Appendix A.

Other items in the literature detail the amount of space required for various items to be stored. There appears to be adequate information of this type.
IV. PURPOSE OF FHA STANDARDS

FHA standards serve a dual purpose. The prime purpose is concerned with protection of the investment in the house. A second purpose is to improve the quality of housing in the United States, and to make good housing available to the maximum number of people.

FHA standards are designed to establish long-range market value in houses financed under the FHA insurance program. It is believed that most persons buying these homes are young families who are making their first home purchase and that their accumulation of household items is in the earlier stage.* Generally, their storage requirements are less than older families. Older families are likely to demand greater storage facilities and, therefore, houses that have limited storage may be excluded from this particular part of the housing market. Hence, to assure a reasonable continuation of value, minimum storage standards should at least meet the needs of families married five to ten years. Nevertheless, minimum space standards should not be raised without a full understanding of the possible effects on the cost of houses and the consumers ability to pay greater costs. Every effort should be made to avoid penalizing low-income families by increases which raise costs.

*Data reported in "Quarterly Reports on FHA Trends" beginning with the first quarter of 1959 and continuing through the third quarter of 1962 indicate that between 36% and 44% of the mortgagors (of FHA insured loans) of proposed construction are under 30 years old and from 59% to 65% are under 35 years of age. The respective percentages for mortgagors of existing properties are 33% to 40% and 55% to 59%.
V. APPROACH TO THE PROBLEM

1. General Premises

Based on the previous comments, the Committee approached the study of recommendations with the following premises:

A. Information on storage needs as evidenced through possession surveys is out of date and incomplete, particularly with respect to typical families living in suburban areas and purchasing homes through the FHA mortgage insurance program. Due to this lack of adequate knowledge on storage needs, the problem should be approached from the point of view that changes should be recommended only in those instances where inequities clearly exist.

B. Accumulation will always expand to fill the space available; therefore, surveys of stored materials should be examined carefully.

C. In general, FHA Minimum Property Standards should be consistent with the goal of providing suitable housing for the lower income groups. Storage requirements should not be so high as to price the house out of the market.

D. Sufficient storage space should be provided so as not to reduce the possibility of resale as little as possible.

E. The evaluation of storage requirements must consider the total needs. Limited space in storage of one type, such as kitchen cabinets, can be offset by extra storage space and closets of another type, such as general storage. The key to better minimum standards lies in the identification of critical types of storage which surveys and case studies show to be undersized frequently.
F. The six case studies (Appendix B) indicate that available storage space is often not utilized to the best advantage. In the case studies, the amount of general storage cubage actually used varied from 52% to 78% of the available cubage. For example, the space above wheeled vehicles, garden equipment, etc. stored in a garage is frequently unused, thereby reducing the effectiveness of area occupied by 40% to 50%. An arrangement of shelving would make this space more useful, but the homeowner seldom goes to the effort of making this provision. Such inefficient use of storage often results in reports of inadequate storage. Additional storage to overcome this type of inadequacy should not be required.

2. Accessibility and Usability

Throughout the study the importance of and definition of "accessibility" and "usability" was considered.

The suitability of storage varies with:

a. width of unit
b. depth of unit
c. height of unit
d. minimum access opening
e. width of access opening related to the unit dimensions, particularly the unit width
f. clearances in the unit
g. facilities appropriate to the items stored.

Different dimensions are suitable for different types of storage. Generally, these dimensions have been established by the FHA with one exception: the relation of the access opening to the width and depth of the closet.
Obviously, a 2-foot-wide door on a 8-foot-wide closet does not make it possible to use the entire area of the closet. Some reduction factor must be applied to the area in order to make a proper allowance for the reduced usability of the space. Throughout the study the committee and/or the contractor has established certain recommendations for determining the usability of the space as related to its accessibility.
VI. SHC-BRC RECOMMENDED STANDARDS

On the following pages are the recommended standards as suggested by the Small Homes Council-Building Research Council following the meeting of the Committee of Specialists. These SHC-BRC recommendations are shown as modifications of the current Minimum Property Standards. Certain recommended additions to the MPS are indicated by the notation "new page"; other changes are indicated by being enclosed in a box.

The recommended standards are followed by an explanation of the recommendations.
S. H. C. RECOMMENDED STANDARDS

602-4 CLOSETS
602-4.1 Bedroom Closet
Each bedroom shall have at least one closet having a minimum:

a. Accessible rod length for master bedroom, 6 feet (may be in two closets); accessible rod length for each other bedroom, 3 feet. Accessible rod length is defined in accordance with details (10a) and (10b).
b. Depth, 2 feet clear, for required rod length.
c. Height: adequate to permit 5 feet clear hanging space for at least the required rod length.
d. One shelf [for required rod length] with at least 8 inches clear space over shelf.
e. At least one-half the closet floor depth shall be flat.
f. See Detail 10 for examples.

602-4.2 Coat Closet
A coat closet shall be provided reasonably accessible to the living areas, having the same minimum size and equipment as bedroom closets.

602-4.3 Linen Closet
a. A linen closet shall be provided near bedrooms having a minimum:
   (1) Depth, 14 inches.
   (2) Width, 18 inches.
   (3) Spacing of shelving, approximately 12 inches o.c.
   (4) Shelf area:

<table>
<thead>
<tr>
<th>Living Unit of</th>
<th>Shelves (sq. ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2 bedrooms</td>
<td>9</td>
</tr>
<tr>
<td>3 and 4 bedrooms</td>
<td>12</td>
</tr>
</tbody>
</table>

b. Maximum depth of shelving which may be included in required area, 24 inches.
c. Volume of drawers may be substituted for a maximum of 50 percent of required shelf volume.

Example: min. dimensions of required closets 602-4.1
S. H. C. RECOMMENDED STANDARDS
(NEW PAGE)

accessible rod length

\[ \text{type 1 reach-in} \]

\[ \text{6'0'' min} \]

\[ \text{2'0'' min} \]

\[ \text{D} \]

\[ \text{2'8'' min (if larger, center rod)} \]

\[ \text{12'' min} \]

\[ \text{12'' min} \]

\[ \text{12'' max} \]

\[ \text{12'' max} \]

\[ \text{door} \]

\[ \text{accessible rod length} \]

\[ \text{type 2 reach-in} \]

\[ \text{12'' max} \]

\[ \text{2'0'' min} \]

\[ \text{12'' max} \]

accessible rod length 602-4.1a (10a)

-10-
S.H.C. RECOMMENDED STANDARDS

(type 3)

edge-in

(type 4)

walk-in

accessible rod length

602-4.1a

(10b)
A. Accessible Rod Length

The Committee felt that a definition of the clothes closet requirements in terms of "accessible rod length" rather than size would be more useful in achieving the desired end. For this reason the term "accessible rod length" is suggested.

As long as the closets used in houses are limited to the minimum width of 3 feet with a 2-foot-wide door, accessibility is not a problem, but when the minimum closet is doubled, accessibility is paramount. In reality, a closet 2 feet deep and 6 feet wide is not fully accessible if only a 2-foot-wide door is used.

After considerable discussion, the Committee agreed that in a clothes closet of minimum depth (2'-0") any portion of the rod beyond 6 inches from the edge of the door jamb should not be considered accessible. (See detail 10a, type 1).

Providing a space 6 inches deep in front of the clothes (minimum closet depth = 2'-6") permits additional access to the clothes to the extent that 12 inches beyond the edge of each door jamb may be allowed as accessible. (See detail 10a, type 2).

In some instances, it is possible to "edge-in" in front of a rack of clothes on hangers. Previously published recommendations (Reference 3) show the clearance in front of clothes for edging-in should not be less than 1'-6". (See detail 10b, type 3).

The same published standards show the minimum necessary clearance to "walk-in" between two ranks of clothes to be 1'-8". "Walk-in" closets are
considered more desirable than "edge-in" closets. In addition, "walk-in" closets are more efficient in that fewer square feet of space are required to give 6 feet of accessible rod length.

B. Clothes Clearance

One member of the Committee wished to increase the requirements for the minimum depth (front-to-back) of wardrobe-type closets on the basis that certain types of clothing require a space deeper than 24 inches in order to prevent wear on sleeves, etc., which extend beyond the 24 inches and rub against the wall if stored in a closet of this dimension. However, it was pointed out that the 24-inch standard had been in use for a number of years and was recommended by various references, and that, desirable as it might be, any increase in the depth requirement would not fit within the framework of a "minimum requirement". The Committee did agree, however, that in wardrobe-type closets the rod should be centered in a 2-foot-deep closet. In other closets it should be located at least 12 inches from the back wall of the closet. This requirement was added to Figure (10) in the recommended MPS suggested by SHC-BRC. The Committee also felt that in those instances in which the depth of the closet exceeded 24 inches, the rod should be placed at least 13 inches from the back wall, provided this did not reduce other necessary clearances.

*Philson (Reference 29, page 7) shows that certain garments hung on rods in the open without the confining effects of walls actually occupy space deeper than 24 inches.

**McCullough (Reference 1, page 35) found that types of clothing are sufficiently uniform in their space requirements to establish depth required for closets. "Garments on hangers, even heavy coats, hung at right angles to the closet opening can be taken care of in a closet 24 inches deep." Thus the 2-foot depth, now required by Section 602-4.1a of the Minimum Property Standards, is an acceptable minimum for "storage units in which the rod for the hangers runs parallel with the opening." See also Reference (3).
C. Bedroom Closets

At the present time, the **Minimum Property Standards** requires a closet at least 3 feet wide in each bedroom. All members of the committee were in agreement that there was sufficient evidence of inadequate closet space in the master bedroom to justify an increase in this amount. Since the master bedroom is almost invariably occupied by two persons, storage space should be provided for each person. The Farrier report (Reference 2) gives an analysis of seven surveys which shows clothes rod requirements for a total of 4799 families. A listing of these surveys is shown below.

<table>
<thead>
<tr>
<th>Studies</th>
<th>Number of Families</th>
<th>Average Rod Requirements</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pierce Study of Houses</td>
<td>39</td>
<td>Male 31  Female 49</td>
<td>80</td>
</tr>
<tr>
<td>(1944)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pierce Study of Apartments</td>
<td>65</td>
<td>Male 24  Female 54</td>
<td>78</td>
</tr>
<tr>
<td>(1944)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>War Housing</td>
<td>1062</td>
<td>Male 30  Female 40</td>
<td>70</td>
</tr>
<tr>
<td>(1944)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North East Farm Study</td>
<td>607</td>
<td>Male 40  Female 35</td>
<td>75</td>
</tr>
<tr>
<td>(1949)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Central Farm Study</td>
<td>884</td>
<td>Male 68  Female 89</td>
<td>157</td>
</tr>
<tr>
<td>(1951)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western Farm Study</td>
<td>607</td>
<td>Male 78  Female 72</td>
<td>150</td>
</tr>
<tr>
<td>(1952)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern Farm Study</td>
<td>1507</td>
<td>Male 18  Female 42</td>
<td>60</td>
</tr>
<tr>
<td>(1951)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted average</td>
<td></td>
<td></td>
<td>94</td>
</tr>
</tbody>
</table>

A weighted average for the entire group shows an average requirement for the men and women combined to be 94 inches. What appears more significant is the fact that only the Southern Farm survey, as reported by Farrier, shows a
2. **Linen Closet Recommendations - Explanation**

The net volume of linen storage space is indirectly specified by three of the current requirements in Section 602-4.3:

- a. Minimum shelf 9 square feet for one or two bedrooms and 12 square feet for three or four bedrooms.
- b. Space of shelves vertically, approximately 12 inches.
- c. Shelving over 74 inches high shall not be included in the required shelf area.

Accordingly, the minimum volume required is 9 cubic feet for two-bedroom houses and 12 cubic feet for three-bedroom houses.

Based on the inventories of the six surveys he reviewed, Farrier (Reference 2) suggests certain areas as being adequate for linen and bedding storage. In the table below the areas are converted to volumes by multiplying the usable height of the closet by 7 feet, as it appears that Farrier assumed the closets would be full height.

<table>
<thead>
<tr>
<th>Storage of Bath Linens, Bed Linens and Bedding</th>
<th>Area in square feet</th>
<th>Volume in cubic feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>War Housing Projects, 2'-6&quot; x 2'-0&quot;</td>
<td>5.0</td>
<td>35.0</td>
</tr>
<tr>
<td>Farm Surveys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeastern, 2'-0&quot; x 2'-0&quot;</td>
<td>4.0</td>
<td>28.0</td>
</tr>
<tr>
<td>North Central, 2'-6&quot; x 2'-0&quot;</td>
<td>5.0</td>
<td>35.0</td>
</tr>
<tr>
<td>Western states, 2'-6&quot; x 2'-0&quot;</td>
<td>5.0</td>
<td>35.0</td>
</tr>
<tr>
<td>Southern states (not given)</td>
<td>5.0</td>
<td>35.0</td>
</tr>
</tbody>
</table>

Kitchen and dining room linens are excluded from this tabulation.

Wilson (Reference 3) recommends a 2' x 3' linen closet as a "good average size". McCullough (Reference 1, page 38) shows a 2' x 2' x 7' high unit for "bedding". Of this, only two drawers totaling 18 inches in height are allotted to sheets and pillowcases. These 6 cubic feet will hold 24 sheets and 36 pillowcases.
In McCullough's study (Reference 1, page 40) bathroom linens are included in a bathroom supply cabinet. This cabinet is 16 inches deep (front-to-back) and 24 inches wide. Four shelves totaling 28 inches in height accommodate the washcloths, hand towels, and bath towels. The gross volume of the space is 6.22 cubic feet. By examining the picture of the unit it can be determined that approximately 8 large bath towels, 12 medium size towels, 18 hand towels, and 24 washcloths or small hand towels are stored in this space.*

Accordingly, the McCullough study provides a total of 12.22 cubic feet for bed linens and bath linens. This is comparable to the present requirement in the MPS of FHA. Also, the quantity of items stored is comparable to Farrier's listing of possessions stored in farm houses in 1952 in the Western States, the largest listing in the surveys included in his study.

The Committee recognized that the linen closet specified in the MPS is too small to accommodate any bulky bedding items such as pillows, blankets, comforters, etc., and agreed that people are often forced to store these items elsewhere in the house, either in a general storage area, or on a top shelf in a closet.** The Committee agreed that no change should be made with respect to the linen closet specified in the MPS, particularly because of the lack of up-to-date knowledge of the number and type of possessions of this class held by homeowners.

*In the bathroom supply cabinet, the top two shelves are shown as storing bath mats, toilet tissue, and cleansing tissue. This addition increases the cabinet to a height of 42 inches and a total volume of 9.33 cubic feet.

**The Committee members wish to point out clearly that there is no intent of recommending storage of bedding on clothing closet shelves; rather, they recognize that this is one storage space employed when specific space is not available.
At the same time the Committee was dissatisfied with this disposition of bedding items and strongly recommended further research into the number of possessions of this class as well as research on the usual and desirable means of storing them.
602-5 KITCHEN STORAGE

602-5.1 Each kitchen shall have accessible storage space for food and utensils, and space for such activities and equipment needed to perform the intended functions. Shelf space in a broom closet shall be classified as general storage.

602-5.2 Minimum Shelf and Counter Top Area*

a. Total shelving in wall and base cabinets, 50 square feet with not less than 20 square feet in either wall or base cabinets.

b. Minimum counter top area, 11 square feet.

c. Minimum drawer area, 11 square feet.

d. Area occupied by sink basin and by cooking units shall not be included in minimum counter top area.

e. Usable storage space in cooking ranges, when provided in the form of drawers or shelving may be included in the minimum shelf area.

f. In determining the required area of revolving base shelves (lazy susan) the area of each shelf may be considered to be the area of a square whose dimensions are equal to the diameter of the revolving shelf.

(Example: The diameter of the revolving shelf is 18 inches. The area of the shelf may be considered to be 1.5 feet x 1.5 feet, which is 2.25 square feet.)

g. Drawer area may be substituted for not more than 25 percent of required base shelf area.

h. If a range at least 39 inches in width or a 40-inch space for a range is provided, the following may be counted toward required areas:

(1) Base cabinet shelving, 4 square feet.

(2) Counter top, 2 square feet.*

i. If range is not provided, provide at least a 40-inch space for range.

602-5.3 Height of Shelving and Counter Top*

a. Shelving and counter top space above the following heights shall not be included in required area:

(1) Wall shelving, 74 inches.

(2) Counter top, 38 inches.

b. Counter top space below 30 inches above floor shall not be included in required area.

c. Height between counter top and wall cabinets shall be at least the following:

(1) Over range and sink cabinets, 24 inches.

(2) Over other base cabinets, 15 inches.

(3) Wall shelving closer than the above dimension may be permitted, except over ranges, provided such shelving does not interfere with the use of the counter top. As a guide, wall shelving which does not project beyond a line drawn from the front edge of the wall cabinet at a 60 degree angle to the bottom of the wall cabinet, may be considered as not interfering with the use of the counter top. If shelving projects beyond such a line, the counter top shall not be included in the required area.

602-5.4 Depth of Shelving and Counter Top

That portion of shelving and counter top space less than or exceeding the following dimensions shall not be included in the required area:

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Shelving</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Base Shelving</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Counter Top</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

602-5.5 Spacing of Shelving*

Clearance between shelving shall comply with the following to be included in required area:

<table>
<thead>
<tr>
<th>Depth of shelf (inches)</th>
<th>Minimum spacing (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 to 6</td>
<td>5</td>
</tr>
<tr>
<td>6 to 10</td>
<td>6</td>
</tr>
<tr>
<td>10 to 15</td>
<td>7</td>
</tr>
<tr>
<td>15 to 24</td>
<td>10</td>
</tr>
</tbody>
</table>

602-5.6 See Details 11 and 12 for examples of kitchen cabinet measurements.
3. Recommended Standards for Kitchen Storage - Explanation

A. Accessibility

The Minimum Property Standards require that "each kitchen shall have accessible storage space". Certain dimensions are given which limit the amount of shelving that can be used in accordance with depth, height, etc. Detail 11 of the present standards shows that the amount of shelf storage in cabinet corners that can be credited is determined by the access to the corner. Full credit is allowed if door access is from both sides; half credit if door access is from one side only.

In view of the fact that the accessibility of the back corner is limited even if access from both sides is available, it is recommended that only one-half of the corner area of each shelf be credited in the shelf area count. Detail 11* has been modified to show this recommendation.

B. Shelf Area and Drawer Area

The Minimum Property Standards (Paragraph 602-5.2a and c) requires 50 square feet of shelf space, with at least 20 square feet in wall cabinets and at least 20 square feet in base cabinets.

None of the surveys analyzed in the Farrier report provide any overall tabulation of kitchen storage needs, although requirements for dish storage were mentioned. A 1959 study by the Small Homes Council (Reference 5) suggests the storage space required for a limited list and a liberal list of kitchen supplies. The study also gives recommendations for minimum as well as ample space for these supplies. The space required for the storage of dishes needed by 4, 6, 8, or 10 people is also given in terms of minimum space and ample space.

*See page 26.
All of these recommendations are expressed in terms of lineal feet of frontage of storage cabinet, and, therefore, no credit is given for storage in the corners of kitchen cabinets.

Assuming that a limited list of supplies and dinnerware for 8 persons is to be stored in a minimum space, the Small Homes Council requirements translate to the following equivalent number of square feet:

<table>
<thead>
<tr>
<th>Cabinet Type</th>
<th>Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Cabinet</td>
<td></td>
</tr>
<tr>
<td>General Dishes</td>
<td>10.5</td>
</tr>
<tr>
<td>Total</td>
<td>21.0</td>
</tr>
<tr>
<td>Base Cabinet</td>
<td></td>
</tr>
<tr>
<td>Total Cabinet Space</td>
<td>30.0</td>
</tr>
<tr>
<td>Drawer Space</td>
<td>13.0</td>
</tr>
<tr>
<td>Total</td>
<td>51.0</td>
</tr>
</tbody>
</table>

It is clear that the FHA standards are comparable to the SHC recommendations. Without more current information on kitchen requirements, the Committee was willing to let these standards continue. At the same time, it was recognized that the SHC study is based on a list of supplies and equipment that is now outdated, and that new investigations are needed in this field, particularly with reference to the increased number of packaged foods and small appliances now available and in use.

C. Revolving Shelves

Section 602-5.2f of the present Minimum Property Standards states that "shelf area of revolving base shelves (lazy-susan) may be considered as twice its actual area in determining required shelf area".

There does not seem to be any justification for doubling the amount of credit for the actual area of these shelves although this provision
may stem from an attempt to evaluate the extra accessibility of these shelves over normal corner shelves; however, a careful examination of this provision indicates that it is inequitable.

If it is assumed that the diameter of the rotating shelf is 18 inches to 24 inches, then it must be implied that shelving that is within 9 inches to 12 inches of the front of the cabinet is twice as valuable as more remote shelving. Accordingly, it would be consistent to double the credit for the first 9 inches to 12 inches of regular cabinet shelving. In effect this would reduce the actual amount of required base cabinet shelving required by one-third. It should also be pointed out that less-accessible shelving in the corner of regular cabinets will probably be used for dead storage, and that there is no similar compensating space in cabinets with rotating shelves.

A more logical solution to this problem would be to allow full credit for rotating shelves and reduced credit for corner storage as recommended above. A recommended change in Section 605-5.2f of the MPS is included in these recommendations. To simplify the calculation of the area of the shelf, it is proposed that the area of the shelf be considered to be the area of the enclosing square. Thus the area of the shelf may be calculated as the square of the diameter of the rotating shelf. This allows a bonus of about 27% over actual space provided.*

---

*At least one member of the Committee commented that no bonus should be given and pointed out that this method of calculation gave a larger bonus to rotating shelves that were only three-fourths of a circle.
D. Minimum Counter-Top Area

The Committee did not originally discuss the counter-top requirements of the Minimum Property Standards (602-5.2b), which calls for a minimum of 11 square feet, as it was not originally interpreted as a part of the storage requirements. Subsequent examination of this standard indicated that 11 square feet is indeed a minimum, especially when it is realized that the actual amount required can be reduced by 2 square feet when a credit for range top is used. The Small Homes Council has published the following recommendations: (Reference 11).

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frontage to left of sink</td>
<td>30 inches</td>
<td>area = 5 square feet</td>
</tr>
<tr>
<td>to right of sink</td>
<td>36 inches</td>
<td>6 &quot; &quot;</td>
</tr>
<tr>
<td>near range</td>
<td>24 inches</td>
<td>4 &quot; &quot;</td>
</tr>
<tr>
<td>near refrigerator</td>
<td>15 inches</td>
<td>2.5 &quot; &quot;</td>
</tr>
<tr>
<td>for mixing, etc.</td>
<td>36 inches</td>
<td>6 &quot; &quot;</td>
</tr>
</tbody>
</table>

Small Homes Council Circular C5.32, *Kitchen Planning Standards*, further states:

"In a continuous assembly, some counter may be counted for more than one of the above functions; however, this multiple use should never reduce the amount of counter to such a point that recommended base cabinet requirements are cut."

This minimum would be equivalent to 15 square feet of counter space.

It is interesting to note that the MPS standard of 11 square feet provides only the amount of counter space on either side of the sink, as recommended by the Small Homes Council.

Later publications (Reference 13) place a more severe requirement on counter top. Kapple (Reference 12) proposes the minimum counter frontage should be 10 feet or an area of 20 square feet.
The Committee considered the 1-foot-wide space that might occur on some 39-inch ranges to be of doubtful value as a working counter and felt that the 11-square-foot counter requirement was an irreducible minimum.

Accordingly, a majority of the Committee agreed that counter-top credit of 2 square feet for 39-inch and larger ranges should be omitted and, therefore, item 602-5.2h(2) of the present MPS has been omitted in the recommendations.
S. H. C. RECOMMENDED STANDARDS

605 ACCESS

605-1 OBJECTIVE

To provide openings adequate in size to admit furniture and equipment to all spaces and to permit inspection for repair and maintenance.

605-2 EXTERIOR DOORS

605-2.1 Minimum Sizes*

<table>
<thead>
<tr>
<th>Type of Door</th>
<th>Minimum Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main entrance door</td>
<td>120&quot; x 96&quot;</td>
</tr>
<tr>
<td>Service doors</td>
<td>24&quot; x 96&quot;</td>
</tr>
<tr>
<td>Garage doors, 1 car</td>
<td>84&quot; x 96&quot;</td>
</tr>
<tr>
<td>Garage doors, 2 car</td>
<td>120&quot; x 96&quot;</td>
</tr>
</tbody>
</table>

*If double entrance doors are used, minimum width of each door, 72".

605-2.2 See 909-4 for construction and installation of exterior doors.

605-3 INTERIOR DOORS

605-3.1 Provide a door for each opening to a bedroom, bathroom, and toilet compartment. Doors to bathrooms and toilet compartments shall be of a conventional type, hinged or sliding, and shall have locks.

605-3.2 Minimum Size

a. Habitable rooms, 2 feet 6 inches wide.

b. Bathrooms, toilet compartments and closets other than linen and broom closets, 2 feet wide.

c. General storage and basement and service stair doors, 2 feet 9 inches wide.

d. Height, 6 feet 6 inches except that height of sliding or folding doors for wardrobe closets may be 6 feet provided depth of closet does not exceed 30 inches.

e. When other than conventional hinged doors are provided, including folding and sliding doors, minimum clear opening shall be 2 feet 3 inches under (a) and 1 foot 9 inches under (b).

605-3.3 See 909-5 for construction and installation of interior doors.

605-4 ATTIC SPACE

605-4.1 Access to attics shall be provided by means of conveniently located scuttles, disappearing or permanently installed stairways; minimum opening 14 x 22 inches.

605-4.2 If mechanical equipment such as an attic furnace is installed in attic space, access opening shall be of sufficient size to permit removal and replacement of equipment.

605-5 BASEMENTLESS SPACES

605-5.1 An access opening, at least 18 x 24 inches shall be provided.

605-5.2 If mechanical equipment is installed in basementless space, access opening shall be of sufficient size to permit removal and replacement of equipment.

605-5.3 If sill of access opening is below grade, provide areaway. See 609-4.

606 PRIVACY

606-1 OBJECTIVE

To provide a degree of privacy, commensurate with desirable living conditions, by means of the proper location of exterior openings in relation to exterior conditions and the interior arrangements of rooms, particularly with reference to access to bathrooms from bedrooms.

606-2 ROOM ARRANGEMENTS

606-2.1 The room arrangements shown in table 6-1 are not acceptable.

606-2.2 An exception to (e) below may be permitted in specific cases when market acceptance of this type of planning is assured.

<table>
<thead>
<tr>
<th>Only Access From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitable room</td>
<td>Bedroom</td>
</tr>
<tr>
<td>Habitable room</td>
<td>Bathroom</td>
</tr>
<tr>
<td>Habitable room</td>
<td>Habitable room</td>
</tr>
<tr>
<td>Bedroom</td>
<td>Bathroom</td>
</tr>
<tr>
<td>Bedroom</td>
<td>Another bedroom</td>
</tr>
<tr>
<td>Bedroom</td>
<td>Habitable room</td>
</tr>
</tbody>
</table>

*TABLE 6-1*
S.H.C. RECOMMENDED STANDARDS

602-6 GENERAL STORAGE

602-6.1 Usable general storage space shall be provided for the storage of items and equipment essential to the use of the occupants. This storage shall be in addition to required closets and kitchen storage.

Usable general storage space shall be calculated in accordance with the guide shown in illustrations (12a) and (12b).

602-6.2 Minimum total volume (interior and exterior storage) 150 cubic feet plus 75 cubic feet per bedroom.

602-6.3 Interior Storage

a. At least 25 percent of the required total volume shall be located within the dwelling and shall be suitable for storage of items customarily stored inside. This space may be separate storage closets, utility rooms, attic space, suitable basement spaces, or similar spaces.

b. Conveniently accessible excess space in required bedroom or coat closets may be included as part of required interior storage volume provided at least one separate full height storage closet having a minimum depth of 18 inches and a minimum width of 36 inches or other equivalent storage area is provided.

Excess space in required closets shall not be included in the required interior storage volume unless it is conveniently accessible as defined by illustrations (12c) and (12d).

c. Required storage space in attics shall be accessible by means of a permanent or disappearing stairway.

602-6.4 Exterior Storage

a. At least 50 percent of the required total volume shall be located for convenient storage of items and equipment used outdoors. This space may be located in garage, storage lockers or within dwelling if readily accessible to the exterior.

b. Storage space in excess of 4 feet in depth or less than 1 foot in width or depth shall not be included in required volume.

c. At least 60 percent of required exterior storage space shall have a minimum depth of 2 feet 6 inches.

d. Space occupied by or necessary for the use and access of permanent equipment shall not be included in required volume.
S. H. C. RECOMMENDED STANDARDS

(type 5)
reach-in
(not over 4' deep)

H = height

(type 6)
walk-in
(efficient when width
W is greater than 76")

H = height

usable general storage space 602-6.1 (12a)
S. H. C. RECOMMENDED STANDARDS

(type 7)
walk-in

H = height

usable general storage space 602-6.1 (12b)

(type 8)
reach-in

H = height

measurement of conveniently accessible excess space in closets 602-6.3 (12c)

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S.H.C. RECOMMENDED STANDARDS (NEW PAGE)

**Type 9**
Edge-in

**Type 10**
Walk-in

**Type 11**
Walk-in

Measurement of conveniently accessible excess space in closets 602-6.3

H = height
4. General Storage Recommendations - Explanation

A. Access

Section 605-3.2b and e of the current FHA Minimum Property Standards allow doors to general storage as narrow as 2 feet (less with sliding or folding doors). In basementless houses the large items are usually stored in the general storage area. For this reason it is equally important to require a 2'-6" wide access to the general storage as it is to basements (Section 605-3.2c). Accordingly, modifications of section 605-3.2b and 605-3.2e have been recommended. (See page 25).

The usable space within a general storage closet may be seriously limited if the door is only 2'-6" wide. Full access doors with openings equal to at least two-thirds of the closet width* permit access to virtually all of the closet. For this reason, the entire area of a closet having a depth of 4 feet or less and having a wide opening can be considered to be usable. If the openings are narrower than the two-thirds requirement, it is usually necessary to step inside of the closet to reach stored items. In this case the usable space should be determined by allowing a walk-in access space 2'-6" wide by a minimum of 1 foot deep. This allows some space to maneuver items in and out of the storage area. These recommendations are shown in details (12a) and (12b).

*Expressed in a different way, the creditable width of the closet may not extend beyond either jamb more than one-fourth the width of the opening.
B. Usability

In closets with narrower openings the space in the corners is not readily accessible, and some reduction in credit is indicated. Following the procedure established in the analysis of the kitchen storage, only half of the space in the corners is considered usable. See details (12b) and (12d).

C. Excess Space in Closets

Section 602-6.3b of the Minimum Property Standards states, in part:

"Conveniently accessible excess space in required bedroom or coat closets may be included as part of required interior storage volume provided at least one separate full height storage closet having a minimum depth of 18 inches and a minimum width of 36 inches or other equivalent storage area is provided."

Recommendations for the definition of "conveniently accessible" excess space in this case are shown in details (12c) and (12d). In general these follow the principles developed previously.

D. Volume Requirements

Knowledge of the total volume of storage requirements for families is needed in order to evaluate their general storage needs. The only overall studies of the volume of storage needs and usage have been based upon assumed quantities or upon case studies of less than a significant number of families. Such a study for six families was made for this research project.* All six of the families surveyed lived in basementless houses with 3 bedrooms; one family had a garage, another family had a

*See Appendix B
carport. The net space used for general storage by the families married 4 or 5 years varied from a minimum of 121 cubic feet to a maximum of 366 cubic feet. The family married 23 years was using a net cubage of 967 cubic feet. The amounts mentioned are net storage cubage occupied; in several instances objects are stored on the floor and no use is made of the space above them. For example, in one garage 566 cubic feet of storage occupied 100 square feet of area.

The Committee agreed that these general storage standards are minimal for houses without basement, garage, or attic. However, since the overall general storage needs cannot be conclusively established, the Committee felt that it was important to avoid any increase in the standards which would increase the cost of houses built under these standards. Therefore, they agreed that, pending further research, the recommended increase in the master bedroom closets space should be offset by an equal reduction in the general storage space. The 3 feet of additional rod, recommended for the closet in the master bedroom, will require a closet addition 3 feet wide, 2 feet deep, and 8 feet high, or 48 cubic feet. Hence, they recommend a corresponding 50-foot reduction in the general storage space requirement. This means that the general storage requirement for a three-bedroom house will become 375 cubic feet.

This change has the effect of requiring a lesser amount of exterior storage. Under the suggested regulations, a minimum of 187.5 cubic feet is required for a three-bedroom house, contrasted with 212.5 cubic feet under the current standards. The Committee agreed that this slight change in favor of interior storage was not undesirable especially since additional general
storage for "exterior" items, such as garden tools, bicycles, etc. can be added at a later date more readily than can storage in bedrooms, linen closets, and other "interior" storage. For this reason interior storage may be considered more critical than exterior storage.

E. Interior General Storage

In evaluating interior general storage requirements, an unpublished paper concerning general storage needs in small houses was examined. (Reference 14). The study lists the following items that are owned by half or more of the 103 families.* Half of those who own the items use them frequently.

<table>
<thead>
<tr>
<th>Cleaning supplies</th>
<th>Books</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning equipment</td>
<td>Small electrical appliances</td>
</tr>
<tr>
<td>Supplies for care of clothing</td>
<td>Ironing board</td>
</tr>
<tr>
<td>Supplies for care of shoes</td>
<td>Clothes basket</td>
</tr>
<tr>
<td>Sewing supplies</td>
<td>Small tools</td>
</tr>
<tr>
<td>Card table</td>
<td>Stepladder</td>
</tr>
<tr>
<td>Folding chairs</td>
<td></td>
</tr>
</tbody>
</table>

If it is assumed that these items are stored inside, some rough allotment of space for their storage can be made by using Bulletin 557 (Reference 1) as a guide.

Cleaning equipment, including space for a folding ironing board, can be accommodated in a space 2' x 2' x 7'. (Reference 1, page 52). If shallow shelving is built on the back of the door of this cabinet, cleaning supplies and small tools may be stored in the same space.

Card tables and folding chairs will require a space 3' (wide) x 2' x 3' (high).

The space above the card tables will be adequate for the most common sewing supplies and other supplies used in the care of clothing, exclusive
of laundry supplies. This space includes room for a portable sewing machine, but does **not** include space for a dress form, a folding sewing table, a folding cutting table, nor does it include space for hanging unfinished sewing work.

A space one-foot wide will accommodate a stepladder and the space above the stepladder should be sufficient for shoe cleaning supplies.

This allotment accounts for all of the items in the above list excepting books and small electrical appliances. Books will undoubtedly be cared for in book cases rather than in general storage space. It must be assumed that small electrical appliances will be stored near the point of use.

The total gross space required for this storage is 2' x 6' x 8' or 96 cubic feet, as shown in Figure A.

Under the recommendations in this report, the minimum acceptable interior storage space for a three-bedroom house is 25% of 375 cubic feet or 94 cubic feet. This figure is comparable to the space allotted in the above exercise.
F. Exterior General Storage

The previously mentioned study (Reference 14) lists the following items owned by half or more of the families, and half of those who own them use them seasonally:

<table>
<thead>
<tr>
<th>Item</th>
<th>Allotments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawn mower</td>
<td>Picnic equipment</td>
</tr>
<tr>
<td>Hoe</td>
<td>Recreation equipment</td>
</tr>
<tr>
<td>Rake</td>
<td>Electric fan</td>
</tr>
<tr>
<td>Lawn broom</td>
<td>Paint and removers</td>
</tr>
<tr>
<td>Lawn clippers</td>
<td>Storm windows</td>
</tr>
<tr>
<td>Garden hose</td>
<td>Storm doors</td>
</tr>
<tr>
<td>Lawn chairs</td>
<td>Screen doors</td>
</tr>
<tr>
<td>Grill</td>
<td>Window screens</td>
</tr>
<tr>
<td>Large thermos</td>
<td>Christmas decorations</td>
</tr>
</tbody>
</table>

In estimating the amount of space required for these items, the following allotments may be made:

<table>
<thead>
<tr>
<th>Item</th>
<th>Allotments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screens, etc.</td>
<td>2(\frac{3}{8}) x 3' x 8' = 60 cubic feet</td>
</tr>
<tr>
<td>Garden tools, garden hose</td>
<td>6' x (\frac{3}{4}) x 8' = 24 &quot; &quot;</td>
</tr>
<tr>
<td>Lawn mower</td>
<td>2' x 3' x 4' = 24 &quot; &quot;</td>
</tr>
<tr>
<td>Grill</td>
<td>2' x 2' x 4' = 16 &quot; &quot;</td>
</tr>
<tr>
<td>Christmas decorations</td>
<td>2' x 2' x 2' = 8 &quot; &quot;</td>
</tr>
<tr>
<td>Picnic equipment</td>
<td>2' x 3' x 2' = 12 &quot; &quot;</td>
</tr>
<tr>
<td>Thermos bottle</td>
<td>1' x 1' x 1' = 1 &quot; &quot;</td>
</tr>
<tr>
<td>Electric fan</td>
<td>1' x 1' x 1' = 1 &quot; &quot;</td>
</tr>
<tr>
<td>Paint, etc.</td>
<td>2' x 3' x 1' = 6 &quot; &quot;</td>
</tr>
<tr>
<td>Recreation equipment</td>
<td>2' x 3' x 1' = 6 &quot; &quot;</td>
</tr>
</tbody>
</table>

The total gross storage space\(^*\) required for this storage is 6'-6" (wide) x 3'-6" x 8'-6" (high), or 182 cubic feet, an amount less than the minimum required exterior storage for a three-bedroom house which is 50% of 375 cubic feet or 187.5 cubic feet.

\(^*\) See Figure B, following page.
Figure B.
Exterior General Storage Allotment
182 cubic feet

No articles assigned to top 1-foot space.
The new recommended total general storage (including both interior and exterior) requirement for a three-bedroom house is 375 cubic feet of which 278 cubic feet have been allocated in the above exercises.

The remaining 97 cubic feet are available to accommodate one or more of the less frequently owned items, such as a bicycle, tricycle, stroller, garden cart, etc. In addition, any extra items not accounted for in the interior storage listing will probably have to be accommodated in this small remaining cubage.

Obviously the storage is tight, and for a two-bedroom house (minimum, 300 cubic feet) would be even tighter.* Nevertheless, these figures do indicate these requirements can be considered a reasonable minimum until such time as more adequate information concerning the possessions of average families is available.

*The study (Reference 14) reports:

"When groups of items were rated, more than half of the families felt their storage for out-of-season clothing, blankets and other covers, toys, and hobby and recreation items was inadequate. Forty per cent or more considered storage inadequate for in-season clothing, cleaning supplies and equipment, and garden and lawn equipment. Storage for kitchen utensils, dishes, and linens was rated more adequate, yet more than one-fourth of the families felt their storage for any of these groups of items was inadequate.

"Adequacy of storage for individual items was not rated as low as for groups of items. It may have been that individual items were not so troublesome as the required combination to fit into available storage. Even so, one-fourth or more of the families rated their storage inadequate for almost every item about which they were asked. Some of the items for which storage was most critical were those connected with children such as bicycles, tricycles, strollers, and wagons."
VII. GENERAL COMMENTS

Since the Committee did not recommend increasing the storage volume required in the MPS, some persons may infer that the storage as specified is adequate. On the contrary, there are a number of indications that storage space is inadequate in some parts of the house, but the Committee did not feel that the information available was sufficient to justify an increase in total storage requirements, especially since, whenever possible, it was desirable to avoid increasing the cost of the small home. Information on the possessions and storage arrangements of families living in "FHA type" housing is badly needed.

As the work proceeded, it became apparent that the Committee's efforts were focusing on better distribution and accessibility of storage.

The requirements for increased accessibility, either through greater opening width or access clearances, may cause some increase in price, but, in recent years, several new and less costly large-size doors have become available. In some instances it is likely that the added costs of these doors will be offset by the savings in framing and wall finish material.

For those instances in which wall space in the room is of prime importance, acceptable arrangements for walk-in and edge-in closets have been shown. These closet types allow the use of smaller door sizes. Walk-in closets are to be preferred over edge-in closets.

Several times members of the Committee pointed out the desirability of storage designed and/or equipped in such a manner that it could be used more efficiently. These remarks included comments on sliding shelves, special racks and the like. Comments were also made on the effectiveness of adjustable shelving.
arranged in such a manner as to permit the accommodation of various sized articles with resulting convenience and efficiency. Along these same lines it was also pointed out that some of the specified spacings of shelving, etc. led to poor storage. For example, cups are not stored efficiently on shelves spaced 12 inches apart. At the same time the committee recognized that it was impossible to write regulations which would achieve the end desired.

The Committee also became very much aware of the fact that people seem to talk a lot about storage, but do little about it. The six local case studies provided examples of storage space that could be used much more efficiently if the householder would spend a day's work and a small amount of money in improving it with shelving, racks, and the like. However, since this appears to be done infrequently, we must assume that storage has a low priority on the consumers time and money.

When a complete and current survey of stored items and the storage space needed is available, better standards can be written.
VIII. RECOMMENDATIONS FOR RESEARCH

There is a need for a comprehensive study of the storage space usage and the possessions stored by families living in homes which are representative of those covered by the FHA mortgage insurance program.

Such a research program would entail the following activities:

1. **Preparation of survey guides** * by the research agency. These guides would be designed to give information on these aspects of storage:
   a. Articles stored
   b. Dimensions and volume of storage space used
   c. Dimensions and volume of storage available
   d. Location of storage
   e. Unstored articles
   f. Access to storage

   The following information would also be obtained if feasible:
   a. Length of married life
   b. Family composition
   c. Family income
   d. Occupational group
   e. Time in present house
   f. Previous housing

2. **Selection of survey sample** with reference to:
   a. Representative FHA housing
   b. Location in the United States
   c. Urban, suburban
   d. Statistical accuracy

3. **Survey conducted** with the assistance of the Home Economics departments of the land grant educational institutions in the U.S. or by local memberships of the Home Economists in Homemaking sections or the Consumers Interest Committee of the American Home Economics Association.

4. **Data processing** conducted by the central research agency.

5. **Report embodying**:  
   a. Summary of information accumulated  
   b. Interpretation of data  
   c. Recommendations

It is suggested that the basic program would be financed by the Federal Housing Administration, but it is hoped that the individual surveys can be undertaken by the Home Economics departments of land grant institutions through the support they receive from U.S.D.A. funds.

*(A pilot survey would be employed to test the structuring of the interview-survey guide.)*
IX. GUIDE FOR APPRAISAL

The difficulty with any minimum standard is that it is applied to all cases including houses that are definitely not in the minimum category. In order to maintain marketability, better houses should have higher standards. One way of achieving this objective is to set up an appraisal guide which will credit housing facilities in accordance with the general quality of the house being appraised.

The following guide is suggested for purposes of discussion:

Guide for Appraisal*

<table>
<thead>
<tr>
<th>Suggested Minimum Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Category**</td>
</tr>
<tr>
<td>A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>602-4.1 Bedroom Closets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rod length (feet)</td>
</tr>
<tr>
<td>Master Bedroom and any two person bedroom</td>
</tr>
<tr>
<td>Secondary, one person bedroom</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>602-4.3 Linen Closet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelving (square feet)</td>
</tr>
<tr>
<td>1 and 2 bedroom</td>
</tr>
<tr>
<td>3 and 4 bedroom</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>602-5 Kitchen Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>602-5.2 area (square feet)</td>
</tr>
<tr>
<td>Wall Cabinet Shelf</td>
</tr>
<tr>
<td>Base Cabinet Shelf or Pull out Storage</td>
</tr>
<tr>
<td>Both Wall and Base Cabinet</td>
</tr>
<tr>
<td>Drawer or pull out tray</td>
</tr>
<tr>
<td>Counter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>602-6 General Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>602-6.2 Total Volume (cubic feet)</td>
</tr>
<tr>
<td>LU 1 BR</td>
</tr>
<tr>
<td>LU 2 BR</td>
</tr>
<tr>
<td>LU 3 BR</td>
</tr>
<tr>
<td>LU 4 BR</td>
</tr>
</tbody>
</table>

*Suggested by W. H. Kapple, SHC-BRC

**Category A = Minimum, 800 - 1200 square feet in house (if three bedroom).
Category B = Normal, 1200 - 1600 square feet in house (if three bedroom) costing 100% more than Category A.
Category C = Optimum, over 1600 square feet in house (if three bedroom) costing 200% more than Category A.
APPENDIX A

BIBLIOGRAPHY

1) McCullough, Helen E., Space Design for Household Storage, University of Illinois Agricultural Experiment Station, Bulletin 557, 1952.

2) Farrier, Clarence W., FINAL DRAFT - Primary Report on Study of Storage Space Requirements for Homes, Standards and Studies Section, Federal Housing Administration, March 21, 1960.

3) Wilson, Maude, Closets and Storage Spaces, U. S. Department of Agriculture Farmers Bulletin No. 1865, November 1940.


5) McCullough, Helen E., Cabinet Space for the Kitchen, University of Illinois, Small Homes Council Circular C5.31, 1949.

6) Peart, Mary; and King, Virginia, "General Storage Needs in Small Houses as Related to Family Characteristics," a thesis submitted to the faculty of Purdue University, June 1960.

7) Philson, Kathryn, Folded Garment Storage for Southern Farm Home, Agricultural Experiment Station, Auburn University, Bulletin 341, May 1962.

8) Woolrich, Avis M.; and Herrington, Jack D., Storage Units for Household Linens, United States Department of Agriculture, Agricultural Information Bulletin 150, Washington, D. C.


10) Hawes, Mary H., "Quantity and Cost Budgets for Two Income Levels--Prices for the San Francisco Bay Area," Heller Committee for Research in Social Economics of the University of California, September 1961.


14) Peart, Virginia; McConnell, Janet; Pifer, Glenda; Risk, Fidelia; and Johnson, Kathleen, General Storage Needs in Small Houses - a Pilot Study, 1962.


23) McCullough, Helen E.; and Farnham, Mary B., Space and Design Requirements for Wheelchair Kitchens, University of Illinois, Agricultural Experiment Station, Bulletin 661, 1960.
Bibliography - continued


28) McCullough, Helen E., Household Storage Units, University of Illinois, Small Homes Council, Circular C5.1, 1953.

29) Philson, Kathryn, Rod Closets for Southern Farm Homes, Auburn University Agricultural Experiment Station, Bulletin 325, March 1960.

30) McCullough, Helen E.; Philson, Kathryn; Smith, Ruth H.; Wood, Anna L.; and Woolrich, Avis, Space Standards for Household Activities, University of Illinois Agricultural Experiment Station (with others), Bulletin 686, May 1962.

Plus other items listed in the bibliography attached to the Farrier report.
During September, 1962, five brief case studies* were made in Champaign-Urbana to evaluate the adequacy of general storage in basementless houses.

**Case Study: General Storage**

<table>
<thead>
<tr>
<th>Gross Available</th>
<th>Family #1</th>
<th>Family #2</th>
<th>Family #3</th>
<th>Family #4</th>
<th>Family #5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used</td>
<td>366</td>
<td>970</td>
<td>217</td>
<td>268</td>
<td>121</td>
</tr>
<tr>
<td>Inside</td>
<td>83</td>
<td>69</td>
<td>40</td>
<td>73</td>
<td>18</td>
</tr>
<tr>
<td>Outside</td>
<td>114</td>
<td>566</td>
<td>130</td>
<td>70</td>
<td>62</td>
</tr>
<tr>
<td>Attic</td>
<td>122</td>
<td>252</td>
<td>0</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Inside Unstored</td>
<td>20</td>
<td>10</td>
<td>n.o.</td>
<td>n.o.</td>
<td>21</td>
</tr>
<tr>
<td>Outside Unstored</td>
<td>27</td>
<td>73</td>
<td>47</td>
<td>45</td>
<td>20</td>
</tr>
</tbody>
</table>

n.o.** not observed

Following are the conclusions of this study which was made to serve as background for use at the meeting of specialists.

a. The net general storage space used by families of a four or five-year marriage was far less than that used by the family of a twenty-year marriage. (i.e. 121 to 366 cubic ft. vs. 970 cubic ft.)

b. The needs for general storage are most critical in houses without basement, garage, or accessible attic.

c. None of the families used all of the cubage available, presumably due to inadequate shelving, etc., and all but family #2 (married 23 years) used less storage than the 425 cubic feet required by the MPS. Nevertheless, all families left some articles outdoors for lack of proper storage space.

d. Even though the attic access was difficult and there was no attic floor, three of these families stored over 80 cu. ft. of items in the attic. All families with minimum general storage and 20" x 22" trap door wanted better attic access.

*made by William H. Kapple, SHC-BRC

-45-
e. The 23-year family lived in a house with two car garage but no basement. They used 200 sq. ft. of garage floor for general storage (566 net cubage) and 217 sq. ft. of storage space in the attic with disappearing stair. (i.e. approximately 2280 cu. ft. of gross general storage space allowing 8'0" high space in garage and 3'2" for the average height of the space in attic.)

f. Only 40% of the shallow general outdoor storage was used by the family living in a house with a carport. (Depth front to back only 8" and 12"). This five-year family reported that the lack of space to store lawn mower, bicycle and other large items was not yet critical. It would, however, become critical when the children grow older and they purchase instead of rent their dwelling.