Suggestions for Rural House Planning

Issued by Montana State College Extension Service, Bozeman
General Suggestions

1. Take plenty of time to make careful plans before attempting to build.

2. Be sure that the original plan includes all the details desired.

3. Do not make changes after construction has started. All such changes in plans cost extra money.

4. Most estimates are lower, rather than higher, than the actual cost.

5. If the desired type of house cannot be completed at once, build with the idea of finishing some rooms later rather than with the idea of adding rooms later.

6. In general, it is better to have a few large rooms which may be used for more than one purpose than to have many small ones.

7. The house may be built—
   (a) By employing day labor
   (b) By employing an architect
   (c) By contract

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Suggestions for Rural House Planning

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THIS publication has been planned with the idea of being helpful to the farmer who is planning to build a new house or remodel an old one. An attempt has been made to make the suggestions as practical as possible. Where more detailed information is desired, the list of references given on page 36 should be consulted.

The material contained in this bulletin was contributed by the Home Economics Extension Department and the Agricultural Engineering Department of Montana State College. Many of the plans presented were submitted by contestants in a recent Farm Home Contest conducted by the "Montana Farmer" cooperating with the Home Economics Extension Department.*

THE HOUSE EXTERIOR

The rural house is both the business and social center of the farm and for this reason should be the most important building.

*The following persons were winners in the contest: Mrs. Dan Dascher, Opheim; Miss Gay Gibson, Boxeman; Mrs. William N. Peters, Columbus; Raymond Taylor, Cascade; H. M. Aymar, Soo; A. N. Jensen, Paradise; Miss Bessie Stimpson, Belgrade; Mrs. L. A. Sales, Gallatin Gateway; A. E. Seamans, Huntley; and Miss Mary P. Holland, Cascade.
as well as the center of interest on the farm. Since the farm house does not bring in a visible income it often is given last consideration, and frequently the development of the permanent farm home is a slow process. Although health and happiness are not marketable commodities real profits accrue from household investments that insure more comfortable living conditions and a healthier population. The house is not a luxury but a part of one’s life and should give a “home feeling.”

The points that are most to be desired in a rural house are, comfort, privacy, efficiency, hospitality, beauty, and economy.

THE HOUSE AND ITS SURROUNDINGS

The best placing of the farm house depends on the location of the barns and out-buildings. Such matters as sunlight, view, prevailing winds, water supply and drainage, roadways, garden and shelterbelt, should be carefully considered in arranging farm buildings. The house should be given the best view and most prominent place on the building site with the barns and out-buildings. Such matters as sunlight, view, prevailing winds, water supply and drainage, roadways, garden and shelterbelt, should be carefully considered in arranging farm buildings. The house should be given the best view and most prominent place on the building site with the barns and out-buildings rather than in front of or in line with the house. People often locate the house in a certain place because it is cleared off, or is already fenced. There are a great many farm houses in Montana that might have modern sewage disposal, drainage, and water systems without much expense if greater care had been taken in the selection of building sites. (For further information consult Farmer's Bulletin 1132, “Planning the Farmstead”).

Whether an east, west, north, or south front is desired is a personal matter. However, since most shelterbelts in Montana should be located on the north and west sides of the buildings, it is well to plan, if possible, to have an eastern view or outlook. Almost any arrangement of rooms is possible so that one may plan to have the dining room and kitchen on the sunny side of the house if desired. In many modern homes the kitchen is sometimes placed in the front of the house.
Fig. 1. A suggested farmstead plan. The drawing is made to a scale of about 25 feet to the inch. The plot should be about 100 feet in width to carry out the plan. Water should be available for irrigating the roadside and foundation plantings.
In choosing the styles of architecture for the house the climate, surrounding country, and available materials should be considered.

A house should have simplicity and dignity. Any house that is pretentious is in poor taste and a pretentious small house generally is ridiculous.

A house with a low, snug and broad style of architecture such as the bungalow, semi-bungalow, or rambling type of house in which horizontal lines are emphasized, fits in best with the landscape and has less exposure to the winds, but houses of this style are expensive to build and to heat. The one and a half story bungalow is more economical since most or all of the bedrooms can be placed on the second floor thus saving the expense of additional roofing and fuel. The full two story square house is the cheapest to build considering the room it furnishes. Different styles of roofs may be used to add attractiveness to such houses.

METHODS OF BUILDING

The house may be built by day labor, by employing an architect, or by specific agreement with a contractor. The day labor method is the cheapest and is entirely satisfactory if the owner is qualified and has time to supervise his own building. Separate agreements are necessary with the different types of mechanics and the work must be planned to avoid overlapping and waste of time.

To employ an architect is a little more expensive but it is the easiest and most satisfactory method of building. The minimum charge of an architect for drawing plans, specifications, and letting the contract is four per cent of the total cost, and if supervision is included the charge is six per cent.

The contract agreement method is perhaps the most satisfactory for many, for when the agreement is drawn the owner is relieved of the responsibility of supervision. The contractor should be selected carefully and all possible details should be included in the specifications. A sample contract which proved entirely satisfactory for the construction of a town house is found on Page 68.
TYPES OF CONSTRUCTION WITH ESTIMATED COSTS

The materials of which a house is built are important factors, not only in the design and cost of a house, but also in the maintenance cost. In choosing materials it is well to take appearance, durability, and cost into consideration. The one should never be sacrificed for the other. Local materials should be used wherever available as they usually are cheaper and more appropriate. Frame, stucco, log, brick, and stone are styles and materials most available in Montana.

The Frame House

For those interested in holding down the cost of construction the following suggestions are presented:

1. Cement foundation with full basement.
2. Wooden joists (The size should be selected according to span. 2"x8" joists may be used for the small house. 2"x10" joists are used for the average house.)
3. Studs (2" x 4")
4. Shiplap, paper and beveled cedar siding. The estimated cost of frame construction with two coats of paint is about $1.70 per square yard of side area.
5. Cedar shingles
6. Shiplap sub floor
7. 6" pine flooring (painted or covered with linoleum)
8. Beaverboard or 1/4" plaster board for walls
9. Fir woodwork, stained

The estimated cost of materials for the above for a five room frame building equipped with pipeless furnace, running hot and cold water, with open drain or cesspool is about $2,000. About $1,000 additional should be allowed for labor. This labor cost can be reduced if the farmer does part of his own building including excavation, cement and carpenter work.

Additional rooms can be added on the same basis of estimate as above or at the rate of about $600 a room. Since prices vary in different parts of the state the local lumber dealer should be consulted for a more accurate estimate.

For those who have additional money to spend for a better house than is outlined above, the following substitutions are suggested:
(1) Oak floors for living and dining rooms (maple may be used for other rooms)
(2) Asphalt composition shingles
(3) Piped furnace
(4) Electricity and other modern conveniences
(5) Some built-in equipment

The following suggestions are offered as points to be insisted upon for good house construction:

(1) The lumber should be properly piled and protected on the job.
(2) In the design proper allowance should be made for lumber shrinkage. Quarter sawed lumber shrinks less than slash grain or flat grain lumber.
(3) It may seem unnecessary to recall the fact that the walls and framework of the house would be substantial, with all the important parts well tied together. Yet, whenever a high wind comes, we learn of roofs that merely rest on the top of brick walls, without being anchored by ties to the masonry, frame houses that get out of plumb because they have not had proper diagonal bracing; and porches and ells that become detached because they are not tied to the main structure. In regions subject to high winds, frame houses without plaster to add weight are in an especially dangerous position. The building code committee of the Department of Commerce recommends that all frame houses be anchored to the foundations. The too familiar sagging roof line is generally a sign of the spreading of side walls because of thrusting of the rafters, a condition which might have been taken care of by proper ties at the line where the roof meets the wall.
(4) The outside studdings should not be less than 2 x 4's and spaced not more than 16 inches apart.
(5) Sheathing should not be less than $\frac{3}{4}$ of an inch thick (nominal 1 inch material). It gives greater strength when put on diagonally. If put on horizontally the studs should be well braced at each corner. Sheathing should be laid tight and nailed with two 8-penny nails to each stud. Building paper should be used on sides.
(6) The size of girders and joists depends on the kind of material used and the loads, and should be figured by a competent
engineer where in doubt. Ordinarily, good fir joists of 2 x 6 material will be strong enough for spans up to twelve feet. Wood varies greatly in strength and this must be considered when figuring sizes of joists.

(7) All beams should be well bridged at least every eight feet of their length.

(8) Use double joists where there is much weight.

(9) Ceilings and walls may be made of lath and plaster, celotex, plasterboard, or some other form of wallboard.

The Log House

In some of the timbered areas of the state, a log house construction may reduce the cost of building. A log house well built is attractive, comfortable, and in keeping with timbered areas. The cost of logs will depend largely on the value of the timber in the woods, and the labor necessary to get it to the building site. The interior finish may be similar to that for a frame house, or some who desire a rustic effect may use the logs even for interior finish. In this case the logs usually are peeled and varnished.

One set of figures for a five room log house (15' x 34' with a 10' x 14' bedroom on either side and an 8' x 15' front porch), submitted by Mr. Charles Thomas of Proctor, Montana, is as follows:

<table>
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<th>Item</th>
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| Labor for peeling logs        | $100.00
| 2500 feet of lumber           | 65.00 |
| 2000 feet of dimension lumber | 40.00 |
| 21 windows                    | 84.00 |
| 9 doors                       | 38.00 |
| Hanging doors                 | 18.00 |
| 2000 feet flooring            | 80.00 |
| 10 rolls of roofing           | 45.00 |
| 3 kegs of nails               | 21.00 |
| Additional labor              | 300.00 |
| Total                         | $791.00 |

The above represents the cost of building but does not include cost of basement and fireplace. These prices will vary, of course, for different localities.
The Stucco House

The use of stucco is becoming more common and when a good grade of material is used and care is taken in its construction, satisfactory results seem to be obtained. There are two kinds of stucco finish, (1) Oriental, (2) Rock Bound. The former usually costs about $1.50 per sq. yd. completed and the latter about $2.00 per sq. yd. The Rock Bound is to be preferred because it will not crack. The Oriental finish sometimes cracks, particularly in cold climates. In either finish three coats should be used. The first two coats are of stucco and the third coat, which may contain pebbles, is ornamental. The use of pebbles prevents the color from running. Yellow and pink have not proven to be very satisfactory colors for this locality as the yellow runs and the pink stains. On the whole, particularly where pebbles are used, the light tans and grays have proved satisfactory.

Stucco is preferred to frame construction by some because when well done it gives better insulation and the cost of upkeep for paint is much less. There is the disadvantage, however, that the color can never be changed. The initial cost of stucco is about 20c more per square yard than for siding.

If stucco finish is to be used the studs should be continuous, the sheathing laid horizontally, and the corners well braced. Sheathing may be omitted and the stucco put on metal lath laid horizontally with the edges laced together. For this finish a one-to-three \((1:3)\) mortar should be used. If lime is used it should not exceed \(1/5\) the total amount. Three coats are recommended.

A very good five room stucco house may be built for about $4500.

The Brick Veneer or Stone Veneer House

Brick veneer or stone veneer houses are very satisfactory but both materials and labor costs usually are high under most Montana conditions.

FOUNDATIONS

There is only one type of house that looks well without a good foundation showing well above ground, and that is an English or Dutch Colonial house. These types, however, are not practical for farm houses as they are too expensive. A depth of two steps or about 15 inches should be allowed for the average foundation
SUGGESTIONS FOR RURAL HOUSE PLANNING

in order to insure adequate light and ventilation for the basement.

Foundations for a house with masonry walls should be of brick, concrete, concrete block, or stone. For a frame house any of the above materials may be used for the foundation, or a special salt glazed tile or vitrified fire clay tile (not ordinary building tile) may be used.

The foundation walls should extend below the frost line and at least eight inches above the ground surface. A tile drain should extend around the foundation on a level with or below the case, with fall enough to carry off excess water. Hard dry sand, gravel or clay, makes the best and most permanent foundation base. Where it is necessary to build on soft ground, piles should be sunk for foundation wall supports, or broad footings should be used. Wooden posts should be supported on metal or masonry footings which should extend three inches or more above the ground.

If there is no cellar under the house, openings should be left in the foundations for ventilation. The area of these openings should be 7% of the ground area inside the foundation.

Cement Mixtures

Good concrete is occasionally the product of good luck rather than good management. The careful builder will do well to consult the pamphlets of the Department of Agriculture and of the Portland Cement Association, which explain the proper mixtures, including the amount of water used—a most important factor—and means for determining whether or not the sand and gravel used contain too much silt or inorganic matter. Such precautions may take time but are well worth the assurance of a good piece of work. Furthermore, the pamphlets contain many helpful suggestions for lessening the amount of work involved. If the family cannot afford to take the precautions necessary for a good cellar and chooses not to have one it is better to rest the house on piers of adequate depth than on a shallow wall. In such a case there should be a free circulation of air under the house in order to prevent rapid decay of the floor joists and other wood on the under surface and heat insulation under the flooring is desirable in the climate of most parts of the country.

For basement walls exposed to moisture use a mixture of one part of cement, two parts of sand, and one part of gravel. For
building walls above ground use a mixture of one part cement, two and a half parts sand, and four parts gravel. Bank run gravel should not be used without screening and remixing in proper proportions. Use enough water to make a good working mixture but avoid using an excess of water. Mix thoroughly and work down well into the forms.

**ROOF LINES AND MATERIALS**

The roof lines are not only a considerable factor in the appearance of a house but of great importance from the practical point of view. Roof surfaces like wall surfaces should be as simple and as unbroken as possible with few and inconspicuous dormers. Windows and gable ends usually look better than dormers and give more light. Avoid roofs cut up with towers, turrets, or cupolas, as they are costly to build and usually do not justify the
expense. Wide eaves are usually most satisfactory for use in Montana to protect walls from melting snow and ice.

The one-third roof pitch (See Fig. 2) is the most suitable for Montana conditions because it best provides for drainage of rain and snow.

Needless to say, it does not pay to skimp on surfaces exposed to weather. It does not pay, for example, to expose too much of the shingle surface to the weather. The rural builder can make his labor count to full advantage in assuring good workmanship on roofing, flashing, weather boarding, and pointing up of brick walls. Furthermore, he can see that the openings around window frames in brick walls are well caulked.

Any roofing material of a grade not lower than class C as established by the Underwriters Laboratories (National Board of Fire Underwriters, 207 E. Ohio St., Chicago, Ill.) is satisfactory for roofs.

The wooden (cedar shingle) has been most used as a type of roof covering. The great danger of the wooden shingle is from chimney sparks and flying brands from burning buildings or bonfires. The wooden shingle is light in weight and has excellent insulating value, thus promoting comfort by equalizing attic temperatures. They can be easily applied, furnish attractive architectural effects, and give the most roof for the money.

Sparks or flying embers are more likely to roll or blow off from the smooth surface of a newly shingled roof than from an old roof with weather worn shingles having curled and broken edges. For this reason any treatment of shingles such as staining or creosoting the shingles, which will tend to maintain a smooth surface, incidentally improves their fire resistance as well as their wearing quality. Care should be taken to secure the best cedar shingle available. Shingles can be treated after purchasing with colored creosote at a cost of about $2.00 per thousand. If rain water for household purposes is to be collected from a roof, care must be taken to select treated shingles which will not contaminate the water.

For best results use edge-grain shingles free from knots and other imperfections and having a thickness at the butt of not less than four-tenths inch each. Shingles on a roof having a one-half
pitch or greater should be laid 4½ inches to the weather; 18 to 24-inch shingles can be laid safely with larger exposure.

Hot dipped, zinc coated, cut iron nails are best to hold shingles or plain cut or galvanized wire nails will serve fairly well. The heads of the nails should not be driven into the shingles. Untreated shingles should be thoroughly wet before laying or if very dry shingles are used, a small space should be left between shingles to prevent buckling. Green or treated shingles can be laid closer together.

Wood shingles may be laid directly on shingle lath. Composition shingles, slate metal, and tile roofs, must be laid over sheeting. Such roof coverings because of their weight require the use of heavier framing than would be needed for wood shingles.

The asphalt composition shingle is fairly inexpensive, durable, and attractive, but not fire resisting. It costs about twice as much as a cedar shingle but it lasts much longer. Some are stamped out into shapes about the size of shingles, others have the appearance of two or more shingles fastened together, and some are tapered.

Artificial tiles are made of cementing materials and asbestos fibers. This material is made into shingles of substantial thickness and of many colors. It is extremely durable as well as fireproof, but may be considered too expensive for the moderate priced Montana home unless this means of fireproofing is especially desired.

Sheet metal shingles are pressed from copper or zinc sheet metal tile covered with lead, all of which are very durable.

Flat roof coverings consist of layers of felt swabbed and stuck down in place with asphalt and protected on the surface with gravel. Some roofs made of this material are guaranteed against leakage for twenty years.

**Porches**

A large front porch is not a necessity in Montana but may be included if desired. A porch is more usable if it is screened or glassed, but whether this additional expense is justified, depends, of course, upon how much it will be used. There should always be at least a small front porch to serve as a protection over, and to mark, the entrance.
The back porch screened and glassed serves as a protection against the cold winds and blowing dirt. If it is of considerable size it can be used as a dining room during the summer when large numbers of farm hands are employed.

A porch should be room shaped rather than long and narrow. A porch that is 10 to 12 feet wide and 14 to 20 feet long, will be more satisfactory than one that is 6 to 8 feet wide and extends around two sides of the house. Furthermore, a rectangular porch will not darken so much of the interior as will one extending along the full length of the house.

THE FLOOR PLAN

NEED OF A HOUSE PLAN

A farm house is more difficult to plan than a town dwelling, because it must provide for so many needs. It not only must be a home, but also the business center and, to a limited extent, the store and the market. The farm house may be just as comfortable, convenient, and attractive as the town house. The house should be so arranged that the housewife can do a maximum amount of work with a minimum expenditure of time and energy. Proper consideration given to the planning of the house will eliminate waste space and energy and involve little additional expense in its construction. To rearrange a poorly planned house after it is constructed is difficult, costly, and more or less unsatisfactory; however, it sometimes is desirable. By rearranging one kitchen in the state it was possible to reduce the mileage traveled by one rural housewife in doing housework from seven to two miles a day.

In picking out the floor plan first find out how large a house can be secured for the amount of money available. Plan the house as a unit, based upon the desired size. If it is necessary to build a small house it is better to have fewer rooms than to have many small ones. In the small house it is well to combine rooms as the living and dining room, or dining room and kitchen; or include a closet bed in the living room to take the place of a guest bedroom.

In building a large house it usually is more satisfactory to build the entire structure at once and finish the interior as funds become available, rather than to start with a small house and add
to it later. The latter plan usually results in a poorly designed and arranged house.

Five rooms aside from bathroom are the minimum number that should be considered in building a house for the average farm family. A five-room house allows for three bedrooms, a combined living and dining room, and kitchen; or living room and a combined dining room and kitchen.

**SIZE OF ROOMS**

In the arrangement of rooms economy of space is essential. In laying out the rooms the main consideration is to provide means of getting from one part of the house to another without making one room a passageway. This, of course, always will happen if there is no hall. If a room is to be used as a passageway doors should be so arranged that the passageway is across one end or corner of the room wherever possible. The various rooms of the house should be conveniently and compactly grouped according to their use. In planning such groupings it is well to remember that spaciousness must be expressed in the living area, compactness in the working area, and privateness in the sleeping area.

Each bedroom should contain at least one clothes closet. Provision should be made for cross ventilation, but care should be taken to provide a location for the bed where it will be out of the draught from the open window. This arrangement usually can be made, where space is limited, by placing the windows close enough to the corners or by the use of a transom above the door. There must be enough space for the required furniture and for comfortable movement about the room.

The living room must be comfortable, cheerful, and homelike. It should be used at all times and not kept closed except when there is company. When possible a fireplace should be included in the plan. (See Farmers’ Bulletin No. 1230, “Chimneys and Fireplaces”).

**Minimum size of rooms:**

- **Living room**—144 sq. ft., narrowest dimension 11 ft.
- **Dining room**—120 sq. ft., narrowest dimension 10 ft.
- **Kitchen**—80 sq. ft., narrowest dimension 8 ft.
- **Bedroom, No. 1**—120 sq. ft., narrowest dimension 9 ft.
  - **No. 2**—100 sq. ft., narrowest dimension 8 ft.
  - **No. 3**—75 sq. ft., narrowest dimension 7 ft.
Bathroom—35 sq. ft., narrowest dimension 5 ft.

(A very satisfactory bathroom can be provided for in a 3 ft. 10 inch by 10 ft. 3 inch area—see Farmers' Bulletin No. 1426, "Farm Plumbing").

It is also economy to have the dimensions of the room correspond with standard rug sizes so that it is not necessary to purchase special sized rugs. The following gives an idea of standard rug sizes: 5 ft. x 8 ft.; 6 ft. x 9 ft.; 8 ft. 3 in x 10 ft. 6 in.; 9 ft. x 12 ft.; 10 ft. x 12 ft.; 12 ft. x 12 ft.; 12 ft. x 15 ft.

A washroom for men with a place for their everyday wraps and boots is considered one of the most important helps for the rural family. This washroom should have a door leading outside and also one leading to the dining room, making it unnecessary for the men to pass through the kitchen at meal time.

The milk separator is a problem in almost every rural home. It is possible to place the separator in the basement if there is a grade entrance from the outside and plenty of hot and cold water for proper cleansing. If there is a laundry or workroom on the first floor, the separator can be placed there. A small room connecting with both the kitchen and the rear entrance may be used for the separator or a separate building may be provided if a large amount of milk is handled. The kitchen is the least desirable place to keep a separator.

**CLOSETS AND STORAGE SPACES**

Built-in equipment is recommended for kitchens, closets, and bathrooms, but usually is not satisfactory, either from the standpoint of cost or of permanent satisfaction, for other rooms, with the possible exception of built-in bookcases in the living room, because of inability to change type or location of furniture.

The first step in good closet arrangement is to determine the function of each and build closets to fill a particular need.

**Food and Kitchen Utensil Storage Spaces**


**Cleaning Equipment**

The cleaning closet should be large enough to accommodate the necessary cleaning articles. Two feet wide by eighteen inches
deep and six feet high is a common size. The cleaning cabinet should be placed in the hall, laundry room, on the porch, or in the kitchen. (The porch or laundry room may be too damp for electrical equipment). A cleaning closet on each floor is desirable, the second one duplicating such equipment as brushes, broom, dust pan, and dust cloths.

**Clothes Closets**

A single bedroom should have one closet and a double bedroom, two closets if possible. The practical closet will have garments easily accessible, it will be well lighted, and properly protected from dust.

A pole takes care of a large number of hangers without crushing the garments and when used, the closet space need not be more than 27 inches deep. Above the pole may be shelves for hats with drop doors to protect them from dust.

Shoes may be taken care of in drawers of built-in cupboards or dressers, or by a simple arrangement consisting of a tilted shelf six or eight inches above the floor. To this is nailed two strips of quarter round
moulding, one to catch the heel of the shoe and a lower one for the toe of the shoe to rest against. Another method is to purchase metal racks which can be placed on the closet door.

**Household Linens**

Household linens should have a storage space that is convenient to the bathroom and bedrooms.
In planning the linen closet have enough shelves so that the linen need not be stacked in unwieldy piles. Make shelves ten or twelve inches wide. The most accessible shelves, or the middle ones, should hold the linen to be used every day and the higher and lower shelves should hold those articles that are used less often. These latter shelves should be enclosed, preferably by a door which drops down so it may serve as a sorting table when open. If the lower shelves are used for blankets, they may be cedar lined for protection from moths. A whole closet may be lined with cedar if desired. It is doubtful, however, whether or not the additional cost is justified unless local cedar can be obtained at a reasonably low price.

The Wrap Closet

Separate closets for wraps should be provided in the front entrance hall and at the rear entrance. A pole and heavy hangers will take care of heavy coats. Low hooks for children’s wraps should be added. There should be room for a hat shelf above, and a low shelf for rubbers below.

![Diagram of a closet shelf](image)

The basement steps leading to the grade door may be used for storing rubbers. The tread of the second step may be hinged to the riser above and the inside space enclosed to furnish a box for rubbers.

Books, Magazines and Toys

Books on open shelves or in bookcases add much to the charm of a room. Open shelves are either placed against the wall or re-
cessed in it in the construction of the house. An arrangement of shelves on either side of a fireplace or a window group is attractive.

Magazines are best placed in closed shelves below the bookshelves, or in window seat space if such is available. Magazines to be kept should be stored away in attic space for future use.

Toys should be stored in the playroom or child’s room if such a room is heated. Otherwise, the living room should contain a place for them. A window seat with doors in front and shelf arrangement on the interior, or shelves provided underneath the bookcases, may be used for a storage space for toys. A cupboard built especially for children’s toys is a convenience in the living room or child’s bedroom. Low shelves are more desirable than drawers for the reason that all toys may be much more readily seen and easily procured.
THE BASEMENT

A full sized basement with a grade door as well as an inside stairway should be included. It is recommended that the basement include some of the following features: furnace, fuel room, shower bath, storage room, children's play room, laundry, and a room for the hired man. A workshop may be arranged in the basement for use during cold weather.

THE LAUNDRY

The location of the laundry depends on the amount of money that can be spent and on the size of the house. A laundry on the first floor connecting with the kitchen is the ideal arrangement for step saving, especially if there are small children in the family. A laundry in the basement is the next best possibility. If the basement is used as a laundry, it should be well lighted, have a grade entrance door, hot and cold water, and a drain. It should also be large enough to dry the clothes during cold weather.

STEPS AND RISERS

A step 10 inches wide with 7½ inch riser makes a comfortable tread. In estimating the number of steps that will be needed, it is necessary to divide the height of the room (8½ or 9 feet) plus the floor thickness (about 12 inches where 10 inch joists are used and 10 inches where 8 inch joists are used) by the height of the riser (7½ inches) as—

\[
\frac{8\frac{1}{2} \text{ feet or 102 inches plus 12 inches, or}}{114 \text{ inches divided by 7.5 inches equals 15.2.}}
\]

Since 15.2 risers will be needed, the exact height of the riser would be—

\[
\frac{114 \text{ inches divided by 15 which equals 7.6 inches.}}
\]

A formula which is sometimes used in estimating the proportions of steps and risers is as follows:

Let \( r \) equal height of the riser (7½ inches)
Let \( t \) equal length of the tread (10 inches)
Then \( 2r + t \) equals 25, or
\[
2 \left(\frac{7}{2} \text{ inches}\right) + 10 \text{ inches, equals 25, or}
\]
\[
2 \left(7.5 \text{ inches}\right) + 10 \text{ inches equals 25, or}
\]
\[
15.2 \text{ inches plus 9.8 inches equals 25.}
\]

In this case a correct width of the step for 7.6 inch riser would be 9.8 inches.
The minimum width of the staircase should be about 3½ feet. Where a turn in the stairway is desired provision should be made for a landing rather than for a winding stairway. This may take a little additional space but it usually is worth it since it provides a safer and more comfortable approach to the floor above. The size of the landing for a 3½ foot wide stairway would be 3½ ft. by 7 ft. plus the thickness of the wall space between the two sections.

When possible to arrange, it usually is an economy of space and money to have the basement stairs directly under those leading to the second floor. Plans should be made for having at least 6½ feet of headroom for basement stairs. In planning for headroom it is necessary to estimate the number of risers which will be needed before the landing is made. Where a 7½ inch riser is used 12 risers would be the minimum to provide adequate headroom in the basement. (Some additional headroom may be provided by using 2 inch by 6 inch rather than larger joists for the steps.)

Where it is possible to arrange for a grade door entrance which is a few steps below the first floor level, a landing may be made below the 12 step level if desired. Twelve or thirteen steps to a run before a landing is made is as long as a run should be to be comfortable for the average person.

DOORS AND WINDOWS

In planning the door and window arrangement for the living room, give careful consideration to their placing so that it will be possible to arrange the furniture easily. Doors should be as few in number as is consistent with utility. This precaution will save space for furniture. There is economy in using stock size doors and windows. The most commonly used sizes of inside doors are:

- 2 ft. x 6 ft.;
- 2 ft. x 6 ft. 6 in.;
- 2 ft. 8 in. x 6 ft. 8 in.; and
- 2 ft. 6 in. x 6 ft. 6 in., all with a thickness of 1⅝ inches.

The most commonly used sizes of outside doors are:

- 2 ft. 10 in. x 6 ft. 10 in.; and
- 3 ft. x 7 ft., with a 1⅛ inches thickness. Any even width and length of windows such as 24 inches x 20 inches, 20 inches x 26 inches, 18 inches x 30 inches, and 20 inches x 30 inches, etc. are considered stock sizes. Window
sizes are given by the size of the glass, and sash sizes by the outside measurement.

In checking over the floor plan it is a very good idea to draw the various pieces of furniture to be used in each room to scale. Cut pieces of paper the proper size for various pieces of furniture and arrange them in the room floor plan to see if they can be properly placed in relation to the windows and doors and the passageway through the room.

ESSENTIALS OF A GOOD HOUSE PLAN

To summarize, a well planned rural home should have:

(1) A full basement well above ground so it can be well lighted and ventilated. It is the cheapest part of a house when you consider the room it can furnish. It should have a convenient grade entrance and provide a place for a heating plant, laundry room, room for storage of fuel, separator room, and work bench for winter where repair work can be done.

(2) A water supply system of one of the following types: (a) with a supply coming from an elevated tank in the attic, (b) from a pneumatic tank in the cellar, (c) from a cistern, (d) a creek, (e) a well or spring at an elevation above the house, (f) an artesian well, (g) or a hydraulic ram.

(3) A compact room arrangement that will allow a woman with two or three children to do her work without help and yet have some time for reading and social activities.

(4) A bathroom, washroom for the men, and plenty of storage space.

(5) An arrangement that allows separate sleeping rooms for the children.

(6) Acetylene, electricity, or other general lighting system.

(7) A central heating system in the basement.

(8) A yard that is fenced separate from the barn lots and provides a shelterbelt, grass, and flowers.

(9) A house with an accessible and attractive back door or work entrance.

(10) Screens for all windows and doors. (Unless screens are specifically mentioned as a part of the contract, they will not be included in the building plans.)
(11) A separate bunk house for hired men, or a well lighted and ventilated room in the basement for the help.

(12) A fireplace.

(13) A business office for large houses. This office should be of easy access on the first floor of the house. It should, if possible, have an outside entrance as well as connection with the living room.

FLOORS, WALLS, AND WOODWORK

FLOORS

Double floors are advisable. The under floor should be laid diagonally and covered with a layer of asbestos or floor felt for warmth and for deadening sound, and the second or finished floor placed on this.

The following will give an idea of the approximate price range of floorings. This of course will vary in different parts of the state.

- Oak—13/16 inches thick—$150.00 per thousand feet
- Oak—3/8 inches thick—$115.00 per thousand feet
- Maple—from $80.00 to $150.00 per thousand feet
- Fir—4 inches wide—$70.00 per thousand feet
- Hemlock—4 inches wide—$55.00 per thousand feet
- Pine—6 inches wide—$50.00 per thousand feet

The latter three woods are not recommended for floors upon which there is to be much wear unless they are to be kept covered with linoleum, varnish, or paint. Two coats of varnish over a filler makes a very satisfactory floor finish for both hard and soft wood. If linoleum is used it too should be kept varnished.

WALLS AND CEILINGS

Ceilings and walls may be made of lath and plaster, celotex, plasterboard, or some other form of wallboard. Cracked plaster can be avoided by employing a competent plasterer and by using good construction materials. Gypsum or lime may be used for plaster. If lime is used, Portland or Keene's cement can be added to make it hard. In general, smooth wall surfaces which can be painted or covered with oil cloth are desirable for the kitchen and bathroom. Either smooth or rough plaster may be used in
the other rooms depending upon whether paper or calsomine are to be used as a finish.

Following are some of the commonly used wall materials:

(a) Lath and plaster. This is the most common wall material found in the houses of today. The job should be done by a competent mechanic.

(b) Celotex is a cheap high grade insulation material. It must be plastered or papered or painted with cold water paint. It costs about 6c per square foot, which is about the same cost as lath and plaster when the cost of labor is included.

(c) Three-eighths inch plasterboard at 5½c per square foot is also a good material. It does not warp or buckle.

(d) Beaverboard and ¼ inch plasterboard at 5c per square foot affords a cheaper wall construction. No plaster is required for either plasterboard or beaverboard.

In general the average height of rooms in modern houses is about 8½ or 9 feet. With lower ceilings less heat is necessary.

WOODWORK

There is a tendency at present toward the use of less woodwork than was formerly used. In many houses no visible trim is used around the doors and windows. Wherever woodwork is used, care should be taken to avoid crevices which are dust collectors and are difficult to keep clean.

Where pictures are to be used, picture mouldings are desirable. Their placing depends upon the height of the room. For rooms that are not more than 9 or 9½ feet high they are usually placed at the top. For very high rooms, they usually are dropped some distance from the ceiling.

Fir and pine lumber (stained or painted) provide the best materials for use for woodwork in Montana homes. The cost of transportation for yellow pine and hardwoods makes their use prohibitive for low-cost Montana homes.

Woodwork may be stained or enameled. For wood finishing and refinishing see pages 80-83 of Montana Extension Service Bulletin No. 75, “The Kitchen.”
HEATING, VENTILATION AND LIGHTING

HEATING

Heating systems now in use are: fireplaces, stoves, and central plants or furnaces. Central heating plants may be of hot water, steam, vacuum, or hot air. Hot air plants are either of the pipe or pipeless furnace style.

Each system has certain advantages and disadvantages over the others and it is largely a matter of individual desires and prices that determine the system to be installed.

No matter what system or combination of systems of heating are used, plans should be made to have just one chimney with a separate flue for each system if possible.

The fireplace is probably the most primitive form of civilization’s heating apparatus, and is considered one of the most pleasant and delightful forms. The fireplace, however, as formerly constructed was an inefficient heating system but with modern designs are more efficient. The heating capacity is not large but under Montana conditions a well constructed fireplace will furnish sufficient heat in spring and fall when the days are chilly but not cold enough to demand a larger fire, and supplemental heat during extremely cold weather.

Fireplaces built on the inside wall where the furnace chimney can be used are much less expensive than those built on the outside wall.

The value of space occupied by a stove will cost from twelve dollars up, depending on its size and the cost of the house. Circulating hot air stoves are efficient and the development of the central heating plant for individual houses has made them available for the country homes.

Circulating Hot Air Stoves

Circulating hot air stoves have proven very satisfactory where it was impossible to install a regular heating system. This type of stove usually gives best satisfaction in a two story house although some Montana people have found them very satisfactory for the rambling type of house. They are comparatively cheap to install, are somewhat cleaner than the ordinary stove, but they utilize valuable floor space and do not do away with the necessity for having fuel and ashes in the house.
The Pipeless Furnace

The pipeless furnace has given good satisfaction in small houses. Such furnaces are low in initial cost, easy to install, and heat quickly. Among the disadvantages are that the register occupies valuable floor space, all rooms must be kept open to provide circulation of air and heat, dust from the furnace may circulate through the house, and it is difficult to maintain even temperatures particularly during windy weather.

The Piped Furnace

The furnace with hot and cold air pipes is used for both small and large houses. The advantages of this type of furnace are that in the rooms are considered. The cost of furnaces varies from cept during windy weather, and they provide good circulation and good ventilation if there are adequate cold and hot air pipes (one for each room is none too many).

Such furnaces, however, make it difficult to maintain even temperatures particularly during windy weather, and often there is a circulation of coal dust and ashes unless construction is very good.

The Hot Water Furnace

The advantages of hot water furnaces are that they supply an even heat, and rooms on windward sides can be heated satisfactorily provided the house is well insulated. Among their disadvantages are the expense of installation, they are slow in heating, require care to avoid freezing, and some mechanical ability is required to operate them properly.

Steam or Vapor Heat

Steam or vapor heat is favored by many because of the economical use of coal, the even distribution of heat, and rooms in windward sides can be heated satisfactorily. They are rather high in cost of installation, and care must be taken in their operation to avoid damage from over heating the boiler plate or from too high steam pressure.

Location of Furnace

It is considered economy of construction and operation to locate the furnace in the center of the basement. If the furnace is located on one side it should be placed on the side from which the strongest storm winds come.

Every modern home should have some type of furnace. The
furnace occupies cheap space in the basement while stoves occupy the highest priced space in the living and dining rooms. The cost of a furnace will compare favorably with that of stoves when cost of space occupied, convenience, and freedom from fuel and ashes in the rooms are considered. The cost of furnaces varies from eighty dollars up.

In heating houses it often is difficult to keep the air of the rooms moist enough for health and comfort. There is some disagreement among authorities as to what degree of humidity is necessary. Fifty percent humidity is considered by some to be a good average but it is almost impossible and not practical to try to attain this under ordinary conditions in Montana climate. Water pans are provided in furnaces to supply moisture but for Montana climate these pans generally do not have enough capacity. An effective way of keeping the water pans filled where running water is available is to insert an asbestos wick in a slit cut in the metal above the pan and allow water to drip onto this wick and run down to the pan. In this way the pan may be kept filled, thus increasing the evaporation into the circulating air.

**Insulation**

The subject of heating also may include a consideration of means of insulating from heat and cold. For this northern climate careful construction is important and all openings, corners, and breaks, must be carefully built to prevent heat and air leaks. Insulating material, if used wisely in connection with good construction, will insure freedom from drafts under ordinary climatic conditions. A number of good insulating materials from which selection may be made are on the market today. When money for insulating purpose is limited the order of insulation should be as follows:

1. The floor of the attic should be covered with wood flooring and building paper and all cracks and crevices through which air may circulate to the house below should be sealed. This prevents the heated air from passing out through the roof.
2. Insulate walls. This prevents a loss of heat through the side walls. Where walls are well insulated there should not be more than a degree of difference between temperatures in the middle and at the sides of rooms.
3. Add storm windows. Storm windows, well fitted, provide
a dead-air space which serves as insulation and prevents condensation of steam and formation of frost.

(4) Weather stripping is expensive but may be used if additional insulation is desired. It is well to use weather stripping on doors particularly on those placed on the side where additional protection is needed from prevailing winds.

Ventilation

Ventilation usually is obtained through doors and windows for dwellings. Windows that lower from the top are very desirable for ventilation, particularly in kitchens, and bedrooms where cross ventilation is not possible. The piped furnace also is an aid in ventilation. A well constructed heating system will include as many cold air returns as possible. (One cold air outlet and one hot air intake per room is none too many.) Both cold and hot air pipes should be large. This provides for a constant and complete circulation of cold air to and hot air from the furnace thus providing a more even heat in all portions of the room and house. Floor space for radiation can be saved by placing ventilators in the side wall.

Lighting

With the general improvement in living conditions there is a tendency to improve the systems of lighting. The burning taper or the tallow or wax candle is now seldom used for reading or studying, but is still used for artistic lighting effects. The cost of this kind of lighting is low.

Kerosene or coal oil wick lamps which were developed after the petroleum industry was developed in 1860 were a great improvement over the candle. The initial cost is low and the fuel is cheap and easily obtained. The use of a mantle greatly improves the efficiency of the kerosene lamp and the quality of the light, however, the original cost is greater and the cost of upkeep is slightly more expensive.

There are several other lighting systems available for the farmer including acetylene, gasoline, Blaugas, and electric.

Acetylene is a gas formed by bringing water into contact with calcium carbide. There are many types of acetylene generation including the automatic, the non-automatic, the water-to-carbide feet, and the carbide to water feed. If a plant of this kind is
installed, specific directions for its operation and care will be given and these should be carefully followed to eliminate danger from fire since acetylene is highly explosive. It is not poisonous, however, and if located the proper distance from the building and care is taken to replenish the supply during the day, there is practically no danger. The Underwriters Laboratories, Inc., 207 E. Ohio St., Chicago, Ill., has a list of inspected lighting and heating plants and it would be well to secure ratings on systems to be installed. The first cost of these lighting systems range from $150 to $500.

Gasoline must be converted into a gas before it is satisfactory for lighting purposes and for this three methods are used: first, heating as in a blow torch, gasoline stove, etc. This is the most dangerous method. Second, by letting air bubble through the gasoline. This type of generation is usually of large capacity and is comparatively safe when located underground outside of buildings. Third, by bringing air into contact with the surface of the gasoline in a large tank. This type is mostly used for larger plants than the farmer will use. The objection to gasoline plants is the danger from fire. The first cost varies from $25 to $500 but the operation cost is comparatively low.

Blaugas is an oil high in illuminants. The liquid gas is sold in steel tubes. The first cost will vary from $125 to $300.

Electricity for light and power has many advantages. The fire hazard is almost negligible. It is clean, odorless, and requires but very little attention. There are four sources of electricity that may be available to the farmer: first, high power lines or a regular city supply; second, the individual electric light plant with its gas engine, generator, and battery; third, the power of a nearby stream; and fourth, the power of the wind. The first of these sources is the most satisfactory but is the least available to the farmer. The cost of installing an individual plant varies from $225 to $600 and for the windmill type the cost may be greatly in excess of these figures.

The University of Missouri has prepared a table giving relative costs of operating different kinds of lights. These estimates are for the costs to operate a lamp for 40,000 candle power hours, which is equivalent to two 40 candle power lamps burning three hours each night for six months. The two 40 candle power lamps
are about equivalent to eight or more ordinary flat-wick coal oil lamps.

The table follows:

<table>
<thead>
<tr>
<th>Kind of Lamp</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline with gas mantle, gasoline 20c gal.</td>
<td>0.49</td>
</tr>
<tr>
<td>Kerosene lamp with mantle, kerosene 12c gal.</td>
<td>2.88</td>
</tr>
<tr>
<td>Blaugas, 10c lb.</td>
<td>3.33</td>
</tr>
<tr>
<td>Electric tungsten lamp, 10c kwh.</td>
<td>5.00</td>
</tr>
<tr>
<td>Acetylene light, carbide 4c lb.</td>
<td>6.68</td>
</tr>
<tr>
<td>Kerosene lamp, flat wick, kerosene 12c gal.</td>
<td>13.75</td>
</tr>
</tbody>
</table>

WATER SYSTEMS AND SEWAGE DISPOSAL

WATER SYSTEMS

Some system of getting hot and cold water under pressure to the kitchen sink, bathroom fixtures, and to laundry room should be included in the country house plan. The disposal of wastes also should be provided for in the planning.

There are places where water can be piped into the house under pressure and this affords an opportunity for an ideal installation. In other places, water can be forced to the house by a hydraulic ram stored in a pressure or elevated tank. The most common supply will be pumped from wells or cisterns.

The cost of the water supply system will depend upon the type to be installed and will vary from about $20 for the simplest kind of a system up to $400 or $500 for the more pretentious ones. The cost of plumbing can be reduced and simplified if care is taken to centralize it. Where it is necessary to place it on the outside wall care should be taken to have good insulation.

More detailed information on this question can be obtained in Montana Extension Bulletin No. 91, "The Domestic Water Supply on the Farm."

SEWAGE DISPOSAL

A sewage disposal system also should be planned for taking care of the wastes from the kitchen sink, laundry tubs, and bathroom. The design and construction of this system depends upon the local conditions at the site of the building including soil and subsoil types, topography, streams, watersupply, the kind of a water supply system, etc. The cost of the disposal system varies
SUGGESTIONS FOR RURAL HOUSE PLANNING

for a simple drain to $100 or more. More detailed information can be had on this question from Montana Experiment Station Bulletin No. 137, “The Septic Tank.”

FIRE AND LIGHTNING PROTECTION

Adequate protection against fire is particularly important for farm homes, where the services of city fire departments are not available. In many houses there is a free passage for air from the cellar to the attic between the studs in the outside walls. This means that a fire starting in the basement or on the first floor is given every opportunity to spread to the whole house. It also gives cold air from the attic free play to chill the basement and the side walls of rooms, and furnishes rats and mice opportunity to disport themselves (and die) wherever and whenever they please. The remedy is to insert masonry or some other incombustible material, or snugly fitted pieces of 2 x 4, in these spaces at the floor and the top ceiling levels.

Chimneys, fireplaces, stoves, furnaces and stove pipes frequently are the sources of fires. Farmers’ Bulletin No. 1230 of the Department of Agriculture, “Chimneys and Fire Places”, contains excellent material on the importance of flue lining and of incombustible materials around chimneys. This bulletin also tells how fireplaces may be equipped so as to serve as warm air heaters. Pamphlets of the Department of Agriculture and the Bureau of Standards contain directions for protection against lightning.

COSTS OF BUILDING

The cost of building a house depends upon many varying factors of which the principal ones are: size, kind and type of building; materials used and their cost; price of labor; location and availability of materials and labor; and other minor items such as weather conditions, efficiency of workmen, etc.

Estimates are sometimes made on the cost per cubic foot of the cubical contents of the building. This figure also varies greatly, depending upon the construction. For country houses, it may vary from less than twenty-five cents to more than fifty cents per cubic foot.

The cost of labor may vary from four or five dollars per day to ten or twelve or more per day, including board and lodging.
The costs of materials also vary widely throughout Montana and thus affect the cost of building. The following list of prices were obtained in Bozeman in 1929. The prices given can be used for estimating, but a competent contractor or lumber dealer should be consulted for more exact figures. It must be remembered that original estimates are almost universally lower than the final costs. In calling for bids on the materials, the specifications should be detailed enough that there will be no question about the kind and quality required.

The National Lumber Manufacturers Association, Washington, D. C. has published a bulletin on "The Cost of Comfort" which gives detailed costs of building walls, floors, and roofs of different materials and insulated in various ways. This publication may be referred to for more detailed information on costs of construction.

Following are current prices of some common building materials:

Heavy Lumber—2 x 4, 2 x 6, 2 x 8, 2 x 10. Lengths 8, 12, 14 and 16 feet. $40 per M.
Greater lengths $2.00 per M per two feet increase in length.
2 x 12—$2.00 per M higher than above.
The prices refer to common western fir.

Sheathing—1 x 4 to 1 x 12. Fir, western common pine, and hemlock, $42 per M.

Shingles—5 to 2, $6.00 per M.

Lath—Fir or pine, $9.00 per M.

Cement—Portland, $1.00 per sack. Keene, $2.75 per sack.

Plaster, $1.00 per sack.

Finish plaster, $1.00 per sack.

Plaster paris, $2.50 per sack.

Lime—Hydrated, $1.25 per sack.

Lump, $3.50 per barrel.

Plaster Hair, $1.25 per bushel.

Battens—½ x 3 fir, 3c per lineal foot.

Flooring—Fir, $75 per M.

Red Oak, $115 to $150 per M.

Maple, $80 to $150 per M.
Ceiling—Fir, $60 to $65 per M.
Rustic—Fir, $50 per M.
Stepping—Fir, $125 per M.
Finish—Fir 1 x 4 to 1 x 10, $100 per M.
    Fir 1 x 12, $110 per M.
    White Pine, $100 per M.
Building Paper—Resin, 6c per lb.
    Black insulating, per roll of 500 ft. $3.50.
Wall Boards—Compo board, $100 per M.
    Wall boards, $50 per M.
Roofing—$2.50 per roll of 100 sq. ft. and up depending on weight and quality.
    Slate surface, $4.75 and up.
    Asphalt shingles, $7.50 per sq. and up.
Moulding—1c per in. width per lineal foot.
Casing—Fir, $5.00 per 100 lineal feet.
Base—Fir, $6.00 per 100 lineal feet.
Window Stool—Fir, $10 per 100 lineal feet.
Windows—Prices depend upon size and weight of glass and the number of panes.
Doors—1½ inch thick, five panels. Sizes vary from 2-0x6-0 to 3-0x7-0 and prices from $4.00 to $5.65 each.
    1¾ inch thick, five panels. Sizes vary from 2-6x7-0 to 3-0 x 7-0 and prices from $6.30 to $7.00.
    1¾ inch thick, two panels. Sizes vary from 2-0x6-0 to 3-0x7-0 and prices range from $4.15 to $6.00 each.
    1¾ inch thick, one panel. Sizes vary from 2-0x6-0 to 3-0x7-0 and prices range from $4.50 to $6.60.
Front doors from $8.00 up.
Hardware—Nails, $5.00 per keg and up.
    Valley tin, 12½c per lineal foot.
    Hip shingles, $2.50 per 100.
    Ridge roll, 10c per lineal foot.
    Corner bead, 5c per lineal foot.
    Metal lath, 45c per sq. yd.
    Wire cloth, 5c per sq. ft.
    Butts, 20c and up depending on size and kind.
    Locks, $1.00 and up.
    Hinges, 15c and up.
Miscellaneous—Sash weights, $5.00 per 100 lb. Window screens —$1.50 and up.
   Sash cord, $1.50 per 100 feet.
   Sash pulleys, 8c each.
   Window spring bolts, 5c each.
   Sash lifts, 5c each.
   Sash locks, 15c each.
   Door bumpers, 10c each.
   Screen doors, $3.00 and up.

REFERENCE BULLETINS AND MAGAZINES

Bulletins—
   Beautifying the Farmstead, Farmers' Bulletin No. 1087.
   Planning the Farmstead, Farmers' Bulletin No. 1132.
   The Farm Kitchen as a Workshop, Farmers' Bulletin No. 607.
   Farm Home Conveniences, Farmers' Bulletin No. 927.
   Floors and Floor Coverings, Farmers' Bulletin No. 1219.
   Home Laundering, Farmers' Bulletin No. 1099.
   Methods and equipment for Home Laundering, Farmers' Bulletin No. 1497.
   Sewage and Sewerage of Farm Homes, Farmers' Bulletin No. 1227.
   Farm Plumbing, Farmers' Bulletin No. 1426.
   Chimneys and Fireplaces, Farmers' Bulletin No. 1230.
   Operating a Home Heating Plant, Farmers' Bulletin No. 1194.
   One-Register Furnaces, Farmers' Bulletin No. 1174.
   Convenient Kitchens, Farmers' Bulletin No. 1513.
   The Kitchen, Montana Extension Bulletin No. 75.
   The Domestic Water Supply on the Farm, Montana Extension Bulletin No. 91.
   The Clothes Closet, Montana Home Economics Extension Circular.
   The Septic Tank, Montana Experiment Station Bulletin No. 137.
   Trees and Shrubs on the Farm, Montana Experiment Station Circular No. 78.
   Lumber and its Utilization, National Lumber Mfrs. Ass’n, Washington, D. C.
Modern Home Interiors, National Lumber Mfgrs. Ass'n, Washington, D. C.
Electricity on the Farm, Committee on the Relation of Electricity to Agriculture, 1120 Garland Building, Chicago, Ill.
Bulletins of the Department of Commerce, Bureau of Standards, Washington, D. C., including:
- Thermal Insulation, Letter Circular No. 227
- Building and Housing
- Retail Building Material Prices
- Small House Plans

Magazines—
House Beautiful, 8 Arlington St., Boston, 17, Mass.
Better Homes and Gardens, Meredith Publishing Co., Des Moines, Iowa.

Farmers' Bulletins and bulletins of the Montana Experiment Station and Montana Extension Service, may be obtained from county extension agents. If more convenient, Farmers' Bulletins may be secured by writing to the United States Department of Agriculture, Washington, D. C., and the Montana bulletins, by writing to the Experiment Station or the Extension Service, Bozeman.
Some Suggested House Plans

The following plans include those submitted in the House-Plan contest conducted in 1928 by the "Montana Farmer" with the cooperation of the Montana Extension Service. Others have been selected from various sources to present different ideas and arrangements which it is thought might be of interest to Montana farm people.

FRONT ELEVATION

House Plan No. 1
First Floor plan

House Plan No. 1
BASEMENT PLAN

House Plan No. 2
FIRST FLOOR PLAN

BED ROOM
16' x 10'

CLO.
IN-A-DOOR
BED

SCREENED WRAPS
PORCH
8' x 10'

CLO.

LIVING-DINING ROOM
16' x 19'

KITCHEN
11' 6" x 14'

BATH
7' 6" x 7'

RANGE
SUPPL. C.O.O

CUPB. SINK CUPB.

PORCH

House Plan No. 2
BASEMENT PLAN

House Plan No. 3
SUGGESTIONS FOR RURAL HOUSE PLANNING

First Floor Plan

House Plan No. 3
HOUSE PLAN N 4

FRONT ELEVATION

House Plan No. 4
COAL BIN
6'0" x 19'0"

VEGETABLE CELLAR
10'6" x 14'0"

FURNACE ROOM
7'6" x 11'6"

FURNACE

HIRE MAN'S ROOM
10'6" x 14'0"

CUPBOARDS

FOOD CELLAR

CUPBOARDS

UNEXCAVATED

BASEMENT PLAN

House Plan No. 4
FIRST FLOOR PLAN

House Plan No. 4
First Floor Plan

House Plan No. 5
House Plan No. 6

FIRST FLOOR PLAN

LIVING-DINING ROOM
12' x 14'

BED ROOM
10' x 11'

KITCHEN
16' x 9'

SCREENED PORCH
4' WIDE

FURNACE R.M.
12' x 13'

FUEL R.M.
10' x 13'

LAUNDRY OR STORAGE
28' x 6'

BASEMENT PLAN
FIRST FLOOR PLAN

House Plan No. 7
Left Side Elevation

House Plan No. 8
FIRST FLOOR PLAN

House Plan No. 8
FUEL BIN
13' x 10'

FURNACE RM
12' x 10'

PIPELESS FURNACE

STORAGE
10' x 9'

FOOD CELLAR
15 1/2' x 9'

BASEMENT PLAN

House Plan No. 9
FIRST FLOOR PLAN

House Plan No. 9
HOUSE PLAN

Food Cellar

Spare Rm

Storage

Furnace

Fuel Room

BASEMENT PLAN

House Plan No. 10
House Plan No. 10

- **Kitchen**: 12' x 12'
- **Bedroom**: 12' x 12'
- **Living-Dining Room**: 12' x 18'
- **Porch**: 6' x 8.5'
- **Closet**: 3' x 4'
- **Wash Room and Laundry**: 8' x 9'

**First Floor Plan**
BASEMENT PLAN

House Plan No. 11
SUGGESTIONS FOR RURAL HOUSE PLANNING

House Plan No. 11

SCREENED PORCH
7 1/2 x 30°

PANTRY

KITCHEN
17° x 19°

BED ROOM
12° x 14°

WASH R.M.

BATH
10° x 7 1/2

CLO.

CLO.

CLO.

HALL

CLO.

CLO.

BED ROOM OR
LIBRARY
11 1/2 x 14°

DINING-LIVING
ROOM
21 1/2 x 16°

SCREENED PORCH
37° x 7 1/2

FIRST FLOOR PLAN
SECOND FLOOR PLAN

ROOF

HALL

STORAGE 7' x 8'

STORAGE 10' x 8'

BED ROOM 16' x 11.5'

BED ROOM 16' x 11.5'

House Plan No. 11
SUGGESTIONS FOR RURAL HOUSE PLANNING

VEGETABLE AND FRUIT
13' x 13'

LAUNDRY
15'5" x 13'

ENGINE AND TOOL ROOM
14'2" x 8'

PLAY ROOM OR STORAGE
17' x 19'

FURNACE ROOM
11'2" x 11'

FUEL ROOM
14' x 11'

BASEMENT PLAN

House Plan No. 12
FIRST FLOOR PLAN

House Plan No. 12
Second Floor Plan

House Plan No. 12
House Plan No. 13

FRONT ELEVATION
BASEMENT PLAN

House Plan No. 13
FIRST FLOOR PLAN

House Plan No. 13
SECOND FLOOR PLAN

CHAMBER 14\(\text{sq} \times 13\frac{1}{2}\) ft

CHAMBER 13\(\frac{1}{2}\) ft \(\times 12\) ft

BATH 8\(\text{sq} \times 9\) ft

HALL

CLO.

DOOR

CLO.
BASEMENT PLAN

FURNACE ROOM
15 1/2 x 14 1/2

LAUNDRY RM
12 1/2 x 12 1/2

STORAGE
16 1/2 x 12 1/2

COAL BIN
14 1/2 x 12 1/2

UNECAVATED

FIRST FLOOR PLAN

KITCHEN
13 1/2 x 12 1/2

DINING ROOM
15 1/2 x 14 1/2

BED ROOM
12 1/2 x 12 1/2

BED ROOM
12 1/2 x 12 1/2

LIVING ROOM
21 1/2 x 14 1/2

FRONT PORCH

House Plan No. 14
SECOND FLOOR PLAN

House Plan No. 14
A SAMPLE CONTRACT

CONTRACT BLANK
CONTRACTOR AND BUILDER

To..................................(Name)...........................................

..................................(Address).....................................

We herewith submit Specifications and Estimate for:..................................

...............(description and location of house)................................

Specifications for House

A seven room, story and a half Colonial cottage type residence to be
built according to drawings prepared by...........................................

and the following

specifications:

1. Size: 28' x 38'.
2. Foundation Walls: Concrete.
3. Basement: Full basement with three inch cement floor in laundry
and furnace rooms. Basement to be divided into laundry, furnace coal, and
miscellaneous storage room as shown in drawings. Vegetable room, built-in
miscellaneous storage room to have shelves on all sides of the room, two
screened ventilators in foundation, and a tight door. Laundry room to be
provided with drain in center of floor, two 12” shelves 4’ long, hot and cold
water taps and shower bath attachments. Coal room tightly sealed. Doors
on furnace, coal, and miscellaneous storage rooms as shown in drawings.
4. Wall covering: Six inch siding.
5. Roof: Wood shingles stained green.
6. Walls, color: Cream white—two coats. Trim same; sash black;
blinds, green.
7. Floors: In living room, dining room, hall and first floor bedrooms,
3½” oak finished with filler and two coats of varnish. In kitchen and bath
“A” grade inlaid linoleum. Linoleum to be cemented to floor over felt paper.
In second story bedrooms and hall, 3¼” fir finished with varnish stain. In
the attic portion, 8” ship lap.
8. Interior Walls: In the kitchen and bathroom smooth plaster, all
other rooms smooth plaster. Kitchen walls and ceiling painted two coats
old ivory. Bathroom walls and ceiling cream and woodwork enameled four
coats buff.
9. Interior Woodwork: Colonial window and door trim and moulding in
living room, dining room and hall, enameled four coats old ivory. Mission
window and door trim and moulding in all other rooms. Woodwork and
built-in features in kitchen enameled buff, four coats. Woodwork in bed-
rooms stained gray green with two coats of varnish. Picture moulding in
living room, dining room, and two downstairs bedrooms painted as wood-
work in respective rooms.
10. Doors: Front door, two panel Colonial designs with glass in upper
portion, weather stripped and screen door hung. Doors from hall to living
room and from living to dining room to be two doors of three-panel Colonial design operated similar to French doors. Kitchen to dining room to be of six-panel Colonial design. Bathroom door Florentine glass upper portion. Back door six light glass in upper portion with a combination screen door hung. All other doors one panel Laminex.

11. Windows: Colonial six light top sash, one light bottom sash for all windows. Size of windows shown on drawings.

12. Built-in features: Clothes chute in first floor hall under coat closet. Cooler in south wall, ice box (to be purchased by owner; built in), built-in cupboards west side of kitchen, on each side of sink, over ice box, and over down-cellar stairs, arch-topped book cases in living room, kitchen closet under stairs leading to second story, complete with shelves, coat closet in first floor hall, linen closet in bathroom, In-a-door bed closet and clothes closet in northeast bedroom (In-a-door bed to be supplied by owner). Closet in southeast bedroom and closets off both second-story bedrooms, shelf with door from floor up two feet under book cases. Two shelves to be built in each closet. Window seat in dining room to have three drawers. Location of all of these built-in features are shown on drawings.

13. Heating—warm air: Furnace of reliable make, ample size, properly installed. Provide as many cold air returns as practical. Laundry stove attached to hot water tank in furnace room.

14. Plumbing fixtures: Kitchen sink, bath tub, wash bowl, medicine closet and closet bowl of same quality as installed in the ..........house.

15. Electric wirings:

<table>
<thead>
<tr>
<th>Place</th>
<th>No. light outlets</th>
<th>Switches</th>
<th>No. plugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front door bell</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Living room</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Dining room</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Kitchen</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Porch light</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Hall</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Northeast bedroom</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Light in In-a-door bed closet</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bathroom</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Southeast bedroom</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>West second story bedroom</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>East second story bedroom</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Kitchen closet</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Hall (second story)</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

| Laundryroom                          | 1                 | 1        | 1         |
| Furnace room                         | 1                 | 1        | 0         |
| Miscellaneous storage room           | 2                 | 1        | 0         |
| Vegetable room                       | 1                 | 0        | 0         |
| Garage                               | 1                 | 1        | 0         |
| Pilot light, kitchen                 | 1                 | 0        | 0         |

(one of which is at bottom of stairs)
16. Hardware: Brass Colonial design latch on exterior front door. Glass knobs on all doors leading into first floor hall and dining room with bronze knobs on interior of these doors. All other doors bronze knobs. Glass knobs on door in built-in cupboards in kitchen and under bookcases. Brass hinges throughout.

17. Screens: One-half screen on following windows—one, living room west; one, dining room south; two, kitchen south; one, bedroom south; two, bedroom east; one, bathroom east; one, bedroom north; two, east bedrooms second story; two, west bedrooms second story; two, laundry rooms.

18. Porch: Colonial design. Floor cement surrounded with brick, one step approach.


20. Garage: 10' x 18' painted same as house with wood shingled stained green and of same general design as house, cinder floor, cinder drive leading to city sidewalk from which is made proper curb for car from city street.

21. Yard: Graded and leveled. Terrace front so as to bring house down to ground. This terrace to extend east and west only the length of house, sloping off to driveway on West and ..........on east.

22. Cement Walk: 4' wide from front of house to city sidewalk with brick step near center of yard at terrace. Cement walk from back door to cinder driveway.

23. Other Specifications: Items not covered in the foregoing specifications shall conform to good building practices in this community.

We hereby propose to erect the above complete in accordance with the above specifications for the sum of.......................... Dollars..........................

Payments to be made as follows:........................................................................

All material used in this contract is guaranteed to be as specified, and the entire job is to be done in a neat and substantial manner.

Any alteration or deviation from the specifications herein agreed upon involving extra cost of labor and material will be executed only upon written orders for same, and will become an extra charge over the sum mentioned in this contract. Agreements made with mechanics will not be recognized.

Date .................................. Signed........................................

This contract is void 10 days from date unless signed and returned to bidder.