PRACTICAL SUGGESTIONS ON FRAME HOUSE CONSTRUCTION

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PRACTICAL SUGGESTIONS ON FRAME HOUSE CONSTRUCTION*

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It is profitable to the home owner or prospective home owner to know the principal points of good house construction. Time spent in obtaining such knowledge will return rich dividends. "What will my house be worth five or ten years from now?" is a question every person building or remodeling a house should ask himself. It is the purpose of this chapter to present briefly and in simple terms the construction principles and practices that the house owner can easily comprehend and that will help him to make his house satisfactory and substantial. Such knowledge will aid the prospective builder in understanding construction, especially valuable in dealing with carpenter, contractor, or architect, and to gauge bids intelligently. In addition, great satisfaction is derived from knowing that an investment has been safeguarded and that the house is well built.

This discussion is given on the assumption that the house is in a climate subject to a wide range of temperatures and weather conditions such as prevail in our northern regions. The same insulation in building is not required in southern areas as in the colder climates, nor is the same rigidity necessary in different parts of the country to resist windstorms. However, the principles of good house construction are very similar for all regions. It is clearly realized that no general instructions can be sufficiently specific to fit the varied conditions of the whole United States, but the presentation is such that it is hoped the prospective builder can select what is applicable to his case and particular conditions.

The foundation, the floor system, consisting of posts, girders, and joists; the walls and partitions, built of studding; the roof, and other special parts, like chimneys and fireplaces, porches, frames for doors and windows, lathing and plastering, and inside finish form the main parts of a house, and its erection is not highly complicated. In the following pages, these main parts are discussed in the order in which they are built.

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The Foundations and Footings

The observance of a few general principles in building a foundation will help to prevent many difficulties. A poor foundation will mean uneven floors, cracked basement walls, broken plaster, sticking doors and windows, and many other expensive annoyances.

When full basements are used, foundation walls, when built of solid concrete, should have a minimum thickness of 8 inches; when built of brick, concrete blocks, or coursed stone, they should be not less than 12 inches thick, and when built of rubble stone they should be not less than 16 inches thick.[1] When no basement is used, and the wall is simply laid in a trench, foundation walls of brick, concrete blocks, or coursed stone may be 8 inches thick and extend at least 8 inches above the adjacent ground and the bottom should be below the frost line.

Foundation walls for houses, either with or without basement, are usually set on an enlarged base of concrete called a "footing" which furnishes a bearing surface against the soil beneath. The foundation walls support the outside walls of the house and about half the weight of the floor area. The rest of the weight comes upon bearing posts in the basement or, if there is no basement, upon an inside wall or piers. Footings for these bearing posts or walls should also be provided. Footings for wooden posts should extend sufficiently above the level of the ground in which they are placed to keep the lower end of the post dry and sound.

All footings should be flat on the bottom and their depth should be equal to half their longest side unless they are reinforced with rods. It is impossible to recommend a width of footing because so much depends upon the bearing value of the local soil. General rules have to be considered with relation to local conditions. Excavations for all footings should extend below soft, loamy soil, and, if possible, to a hard subsoil or rock bed. Drainage, level with the footings, should be provided on the uphill side of all foundation walls built into a side hill, or where there may be trouble from ground water. No permanent building should be erected on fresh fill. For deep fills, two years

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[1] For detailed specifications as to dimensions see Building Code Committee of the U. S. Dept. Com. "Recommended Minimum Requirements for Small Dwelling Construction," Washington (U. S. Bureau of Standards), U. S. Government Printing Office, 1923. (Revised report now being printed.)

or more should elapse before building and then the footings should be increased in size from half again to double the normal size.[2]

Sills

Sills are planks or timbers resting upon the foundation. Upon the sills rest the walls and the first-floor joists. Occasionally sills are omitted and the floor joists rest directly upon the foundation. This practice is not recommended because of the difficulty of obtaining a level surface upon which the joist can rest. Sills bedded in mortar make a much more suitable bearing surface.

For small buildings of light frame construction, a 2- by 6-inch sill is generally large enough. For two-story structures solid sills 4 inches deep are preferable. Box sills consisting of a plate under the joist and a header nailed to the ends of the joists are common. Wherever the building is supported on posts or piers, it is necessary to increase the sill size. It is then acting as a girder and its size is determined by rules applying to girders.

Where high winds occur, it is important to anchor the sills rigidly to the foundation as mentioned in the preceding section. For this purpose 3/4-inch bolts, at intervals of about 6 or 8 feet and extending about 18 inches into the foundation wall, are recommended. The sills should be set back about 3/4 inch from the face of the wall to allow for sheathing. In placing them, mortar is first spread on the foundation and the sill immediately laid. Gentle tapping is necessary to secure an even bearing throughout its length. The nuts of the bolts can at first be tightened by using only the fingers and, after the mortar has set, they can be tightly drawn with a wrench. Solid sills should be lapped at the corners with a halved joint but need not be spliced on the sides of the building if well anchored.

If wood-destroying termites or "white ants" are prevalent in the locality, the sill should be laid in mortar rich in cement on a foundation or piers extending at least 18 inches above the ground. If the termites are of the variety that makes tunnels of earth up the outside of masonry, a metal shield should be provided under the sill.

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[2] A full discussion on foundations was presented at the Conference under the title "Foundations for Farm and Village Dwellings," by G. M. Warren, Associate Highway Engineer, T. A. H. Miller, Agricultural Engineer, and Wallace Ashby, Senior Agricultural Engineer, all of the Bureau of Agricultural Engineering of the U. S. Dept. Agr., and has been reproduced in mimeographed form by the Bureau of Agricultural Engineering, U. S. Dept. Agr., Washington, D. C.

In the absence of a shield, the sill should be treated with creosote, zinc chloride, or other chemical that poisons the wood so that the ants will not attack it.

Framework

Girders and Posts.--A girder is a large beam, either solid or built-up from planks on edge, the function of which is to support the inner ends of the floor joists. In some of the early colonial buildings, this support was obtained by putting in interior foundation walls. By using girders resting on posts, considerable expense is saved and partitions in the basement eliminated.

No simple rule can be given for determining the proper size of a girder and the number of posts to support it. In general, it may be said that the distance, in feet, between posts should not be greater than the height, in inches, of the girder. Joints in built-up girders should occur only at the supports. Since wood is less resistant to crushing across the grain than it is to crushing with the grain, it is good practice to use a hardwood bolster cut with the grain, or a metal plate between the top of the bearing post and the bottom of the girder. Bearing posts need to be at least 6 inches square. As pointed out in the discussion of footings, the posts should be set on masonry. This should be at least 3 inches above the basement floor.

Joists.--Joists are planks set on edge, usually spaced 16 inches apart on centers, that carry the floors or ceiling between supports. Joists must not only be strong enough to carry the load that comes upon them, but they must also be stiff enough to prevent undue bending or vibration. The stiffness of a joist is very dependent upon its height, but is little influenced by the grade of material. Consequently, a low-grade material with a greater height will probably give a better floor at the same price than could be obtained with a high-grade but shallower material.

Several of the listed references[3] have tables which give joist sizes adequate to carry ordinary floor loads and to prevent vibration

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[3] See Federal Board for Vocational Education in cooperation with National Committee on Wood Utilization of the U. S. Dept. Com., "Light Frame House Construction," Bul. No. 145, Washington, U. S. Government Printing Office, 1930. (Revised 1931.)
Building Code Committee of the U. S. Dept. Com., op.cit.
National Lumber Manufacturers' Assn., Maximum Span for Joists and Rafters, Washington, The Association, 1930.
The publications contain many illustrations that show in a graphic way the points discussed in this chapter.

harmful to plaster. The sizes vary with the span, species of wood, and grade. As an illustration, it will be found that a fair grade of Douglas-fir or southern yellow pine joists spaced 16 inches on centers should be at least 2 by 6 inches for a 10-foot span, 2 by 8 inches for spans from 10 to 14 feet, and 2 by 10 inches for spans from 14 to 16 feet. It is usually not economical to use greater lengths. In any case, the length should be sufficient for at least a 3-inch bearing at each end and 4 inches is preferable.

When the joists rest on a ribbon board, which is a horizontal strip of wood notched into the studs, they should be placed next to and spiked securely to the studs. When set on a plate, they should be securely toenailed thereto. If there is a box header across the ends, it should be spiked securely into the ends of the joists.

Wherever it is necessary to cut regular joists to provide an opening, as for a stair-well, it is necessary to provide auxiliary joists, called headers, at right angles to those that are cut. The ends of the header are supported on regular or extra joists which are called trimmers. Special precautions about nailing should be taken in placing headers and trimmers and, while the same material as for joists is usually used, long headers should be carefully selected to eliminate injurious defects. It is very often necessary to reinforce or double the trimmers.

Bathroom joists support heavy plumbing fixtures and very often a tile floor. Furthermore, they are often considerably weakened by cutting for pipes. Special precautions must, therefore, be taken in framing for bathroom floors to prevent undue weakening.

All joists should be stiffened with bridging, which is composed of diagonal pieces, usually 1 by 3 or 1 by 4 inches, nailed to form an "X" between the joists. Rows of bridging should not be farther apart than 7 or 8 feet.

Walls

Outside Walls.--The framework or skeleton of a frame house is composed of closely spaced, vertical members called studs, horizontal girts or plates at the story levels, corner posts at the intersections of the walls, and some style of bracing. To this framework, sheathing and siding are applied on the outside and lath or plaster base and plaster on the inside.

Wood studding should be not less than 2 by 4 inches and spaced not more than 16 inches apart on centers. In the style of construction in which the studs are only one story in height, they are

capped with a plate. It is good practice to use 2- by 4-inch pieces for this plate in order to secure a good lap joint at corners and at partition intersections. In the style of construction in which the studs extend in one piece from the foundation to the roof, the joists above the first floor are supported on a ribbon board notched into the studs. This ribbon board should be at least 1 by 4 inches.

Corner posts are commonly built-up of wall studding. In order to secure a good nailing surface for sheathing and to provide for nailing the lath at the inside corner, three studs should be used.

Proper bracing of a frame building is of great importance. In a building with sheathing, there is no better bracing for the exterior walls than sheathing laid diagonally. If horizontal sheathing is laid when thoroughly dry, a rigid wall is obtained. As a rule, however, walls with horizontal sheathing but without other braces will ultimately skew out of shape, especially when subjected to high winds. Bracing that is practically as effective as diagonal sheathing can be obtained by notching long diagonal strips of 1- by 4-inch lumber into the studs and nailing them securely. Braces made by cutting pieces of 2- by 4-inch lumber on an angle and placing them between the studs on a diagonal line at the corners are not so effective as the long let-in strips.

Where windows or doors occur in outside walls or in partitions, a part of the studs must be cut out. It is necessary to put some form of header over such opening to support the lower ends of the studs that have been cut. Likewise, a "rough sill" must be placed at the bottom of the window openings. Some headers support considerable load while some carry only the weight of the framing above. Headers necessarily vary in size, according to the load carried and the width of opening, from 2 by 4's on edge to double 2 by 8's or larger, and finally to a rigid truss framework over large openings. It is desirable to double the vertical studs on the sides of openings.

Because of the long flue-like air spaces between the studs, it is possible for flames from a fire to gain access to these passages and work rapidly up through the building. At the various floor levels, the flames may spread horizontally across the building. Fire-stops are important to prevent such spreading through the building. Various methods of construction suitable stops to delay the spread of fire are described and illustrated in a number of references given later.[4]

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[4] See first two references in footnote 3, p. 4. See also National Lumber Manufacturers' Assn., House Framing Details, Washington, The Association, 1929 (3rd edition). See also "Fire Protective Construction on the Farm," Farmers' Bul. No. 1590, Washington, U. S. Government Printing Office.

Partitions.--The individual member of interior partitions, such as plates, studs, headers, and the like, are about the same as those in the outside walls. Unlike the outside wall, the partition rarely rests upon a solid foundation. Its support, therefore, must be given special attention. When a partition that does not support a load from above runs parallel to the joist, it is common to double the joists that support it. This is scarcely adequate, if the partition supports a load, and it is recommended that at least two joists in addition to the regular ones be placed under such partitions and its support should be given special consideration.

When nonbearing partitions cross the joists near the center of the span, the joists should be of the size required for a 2-foot greater span. Bearing partitions running at right angles to the joists near the center of the span should be avoided, unless some special provision is made to insure adequate support.

The framing of openings in partitions has already been mentioned in the discussion of walls.

Subfloor and Outside Sheathing

It is good practice from the standpoint of stiffening the floor, deadening sound, and of insulation, to lay a subfloor over the floor joist and cover it with building paper or floor felt. Over this may be laid the finished floor. It is an advantage to lay the subfloor diagonally as it adds stiffness to the building and leaves the choice of running the finish floor either parallel or at right angles to the joist.

Like the subfloor, outside sheathing is nailed to the wall framework and forms a base for the finish siding. It stiffens and strengthens the building when laid diagonally, and furnishes insulation. Building paper should be placed between the sheathing and the outside finish to prevent the passage of air through the walls.

Roof

Rafters.--Rafters are to the roof what joists are to the floor. Spacings vary from 16 to 24 inches, but for the ordinary roof 20 inches on centers is common spacing. The size of rafter depends upon the span, the weight of roof material, and the snow and wind loads. Recommendations as to allowable loads in conjunction with joist tables may be obtained from a number of sources.[5]

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[5] See references in footnote 4, p. 6.

Rafters should be notched over and bear not less than 3 inches on the plate and, wherever possible, ceiling joists should be run across the building to connect the base of the rafters at or near the plate.

Sheathing and Roofing.--Roof sheathing laid across the rafters provides a nailing surface for the finish roofing. It stiffens the roof frame and helps to insulate the building. Roof boards need to be seasoned when laid. They should be not less than 3 inches wide by nominal 1 inch in thickness. A tight board deck is preferable to the shingle lath often used.

Roof shingles are of three kinds -- wood, a mixture of felt and asphalt covered with crushed slate, and a combination of asbestos and cement. Manufacturers' specifications regulate the laying of composition shingles. Metal roofings of various forms, and slate and tile are also available.

Wood shingles come in 16-, 18-, and 24-inch lengths which, on a roof of good pitch, should be laid not more than 5, 5-1/2, and 7-1/2 inches to the weather, respectively. It is very important that they be nailed with hot-dipped, galvanized steel, copper, or bronze nails and not with ordinary steel or iron nails. In order to make a tight joint around the chimney at the roof, flashing is nailed to the roof along with the shingles and bent up against the chimney wall. Counter flashing is set into the brickwork and bent down over the flashing. Copper or other noncorrosive metal is the best material to use for flashing.

Chimneys and Fireplaces

A chimney should be built from the ground up and should rest on a good masonry foundation. It never should be supported on any timber construction of the building. It is a mistake to place joists, wooden beams, or rafters within 2 inches of its outside face.

Chimneys properly constructed with a flue lining are much more efficient, although without flue lining they may be cheaper. If the walls are less than 8 inches thick, a flue lining must be used to prevent cracks through which flue gases may escape. This is most important since about one dwelling fire in six is brought about by a defective chimney. It is not always possible to arrange the rooms for a chimney near the center of the building. If placed in an outside wall, the exposed wall of a chimney should be at least 8 inches thick.

Brick chimneys give best service if capped with stone, concrete, or cast iron. Unless a chimney is capped, the top courses may become loose and, therefore, dangerous. It is essential that smokepipes be tightly fitted and well anchored to the chimney. It is hazardous to have them placed less than 18 inches from woodwork, unless shielded.

Insurance companies demand that the back and sides of fireplaces be constructed of fire brick only. The brick should be laid flat with the long sides exposed and the walls should never be less than 8 inches thick. No wooden mantel or other woodwork should be placed within 8 inches of the side or top of any fireplace. Except in massive construction, it is practically necessary to have the masonry over any fireplace opening supported with a metal bar.

Porches

It is quite essential that the porch be well built. Proper foundations, bearing posts, porch piers, and their footings are as essential for the porch as for the main part of the building.

Masonry piers or wood posts that support the porch should rest on footings. Masonry piers are commonly used from the footings to the underside of the porch framework for porches less than 2 or 3 feet above the ground. For porches more than 2 or 3 feet above the ground, it is more economical to use wooden posts. The posts should be not less than 5 by 5 inches and the masonry work of the foundation should extend from below the frost line to at least 6 inches above the ground.

Porch joists and girders perform the same function as similar members in the main building, and the principles governing their design are the same.

It is customary to use matched porch flooring with the joints sealed with white lead. Edge-grain material is preferable to flat grain. The floor needs to be slightly sloped to permit rapid water drainage. Porch floors should be kept well painted.

Practically any species of lumber handled commercially is suitable for porch columns, provided the material is seasoned, is kept well painted and is constructed to prevent the retention of water at the base. In order to give an appearance of solidity, porch posts are usually of a large size and commonly built-up.

Window and Door Frames

The necessity for headers or lintels over window and door openings and extra studding at the sides has already been mentioned. Into the opening is set a frame. Careful construction here prevents streaked walls at the sides of windows and doors and water stains below windows. Sealing the joints around these openings, particularly around windows, will prevent the soiling of the wall and will lower the heat loss by retarding air leakage.

Door frames are classed as millwork; that is, they are made of finished wood and manufactured in millwork plants and planing mills. In an ordinary frame house they are held in place by blocks and wedges driven between the studding and jamb. The jamb is that part of the frame which forms a lining for the opening and usually receives the door. All jambs must be free from twist, the side jambs plumb and the head jamb square across the top. The problem of setting a door jamb plumb and true will be made easier and the workmanship much improved if straight studs and headers are selected and set plumb on the sides and level across the top with reasonable allowance for wedging.

In the cheaper construction it is common to set the door frames before plastering, in which case the jambs serve as plaster grounds. In better work the frames are not set until after the plastering is done, in which case it is necessary to provide grounds at the opening.

Window frames also come to the job made up. Frames of many different designs are on the market, each intended to minimize air and water leakage.

There are two principal types of windows, namely, the casement window, which has a frame similar to that of a door, and the double-hung window for which sash weight space must be provided. Double-hung windows are usually more serviceable and durable than casements. Window frames are usually installed during the erection of the wall, long before plastering is done. The frame, therefore, furnishes a satisfactory ground for plastering.

Insulation

The importance of proper insulation as related to fuel economy and comfort cannot be overemphasized; proper insulation is money well invested. Heat is lost from a house by leakage around the doors and windows, and by the transmission of heat through the materials of the walls, floors, and roof. Careful fitting reduces air leakage around windows and doors and weatherstripping pays for itself in reduced fuel bills. In a poorly built house, air leakage through the walls can be eliminated almost entirely by using good building paper that is carefully lapped and that covers the entire wall surface under the finish siding or other exterior covering.

Heat loss by transmission through the solid building materials may be considerable and its effect is independent of actual air leakage. There are a number of insulating materials on the market which, when used on the walls, floors, roof, on the top ceiling joists, or between the studs, help to reduce this form of heat loss. Ordinary frame walls having some form of flexible insulation nailed in between the studs have

a high insulating value. Storm windows cut heat losses through glass to less than half.

Finish Siding

The outside layer of boards on a frame wall is called siding. It forms a weather-resisting surface and helps to keep out the wind and rain. Shingle wall coverings are also used to serve the same purpose.

Except where there is little cold weather or where other provisions have been made for insulation, the use of siding without sheathing is excusable only on the grounds of rigid economy. The necessity for bracing where sheathing is omitted has already been mentioned. Drop siding, which comes in various forms, all of which are so milled as to secure a lap or rabbetted joint, is more suitable than bevel siding for direct application to studs without sheathing. If bevel siding is preferred, the heavier patterns should be used. All joints should occur at the studs.

The purpose of the siding is more fully realized if sheathing is used; the siding is reinforced and the building is strengthened. Any of the various types of siding may be used when placed over wood sheathing and the joints may occur anywhere.

Siding may also be placed over various patent materials which are sold as sheathing to be used in place of lumber. The nail holding power of these materials is considerably less than that of wood. Therefore, the siding can be nailed only at the studs and care must be taken to use nails long enough to extend well into the studs.

At the corners of the building, the siding is either butted against corner boards or is mitered. Good results are secured both ways but mitering requires very careful workmanship. It is good practice to place a water table at the lowest part of the outside finish in order to prevent water from entering the joint between the masonry and the sill. It also adds to the appearance of the building.

Lath and Plaster

One of the most common forms of inside wall finish is plaster on wood lath. On first-class work a number 1 grade of lath should be used. Wood laths should always be thoroughly wet as late as practicable before the application of the plaster, otherwise they will swell enough to crack the plaster. They should be spaced at intervals not less than 1/4 inch. Joints should be broken every sixth or eighth course.

There are several forms of expanded metal and fabricated wire lath on the market. They are desirable from practically every standpoint except that they are more expensive than wood lath.

Gypsum board and other types of wall board also are used as a plaster base. When such boards are used, headers should be framed between the studs at all horizontal joints. These boards should be applied in accordance with manufacturers' directions.

Wherever trim is nailed against the plaster, it is important that the adjacent plaster surface be flat and true. To avoid unevenness and to furnish a means of nailing the trim, grounds are used. They should be used at the baseboard, around doors and windows, unless the frame is used for a ground, for chair rails, picture mold, cornice mold, or wherever trim may come in contact with the plaster.

Gypsum wall plasters have practically supplanted lime for plastering purposes, chiefly because they set and attain their full strength much more rapidly. Certain local and seasonal conditions affect these plasters unless they are properly handled. In order to obtain first-class work, it is necessary to adhere strictly to the manufacturers' directions for mixing and applying them.

It is becoming more and more the custom to finish one or more rooms or parts of rooms with boards or plywood paneling instead of plaster. Boards for so-called knotty finish should be of species which, when dry, hold knots tightly. Boards placed vertically secure the best effects. Plywood panels should be installed in such a way as to allow for slight shrinkage or expansion.

Interior Trim and Finish Floors

If trim is to be mitered at the corners, it is well to use narrow material, as less difficulty will result from openings up of joints. If material more than 2 or 3 inches in width is used, it must be thoroughly dry. In any form of square-cut trim, the width may be greater. The back of the trim should be concave so as to fit well against the plaster. It should be primed on the back and particularly on the edges of mitered joints before it is put in place.

Finish flooring must be of thoroughly seasoned lumber, and should be laid only after the plaster is fully dried and other work in the house is finished. It is bad practice to store finish flooring in the building while it contains wet plaster. The subfloor should be covered with a layer of heavy, coated building paper or incombustible floor felt or gypsum board before laying the floor proper. Joints should be well distributed. The strips should be well nailed and the nails set. Any pieces that do not draw up well should be driven up fairly tight with a block.

Finished floors are sometimes laid directly upon the joists but this practice is not recommended except where rigid economy demands it. When so laid, all joints of the first floor, whether end-matched or not, should be over the joists. On the second floor, or where there is no possibility of heavy concentrated loads, joints with end-matched flooring may be at random.

General Considerations

Choice of Materials.--The first two essentials in the construction of a house are good workmanship and good materials. For the framework, the basic requirements in lumber are strength, suitable nail-holding qualities, and a reasonable freedom from tendency to warp. A variety of species are suitable for all parts of the house frame. The sills or other members if placed near the ground, should be of material selected for resistance to decay. The choice of species for the outside wall covering depends largely upon the location of the building but, in any event, a wood that takes paint well and one that has been found satisfactory under local conditions should be used. The species of wood used for shingles are mainly western red cedar, white cedar, redwood, and cypress. White pine and southern pine have found a rather extensive local use. For porch girders, joists, and posts, decay resistance is a leading consideration although construction to secure good drainage and under-ventilation is far more important. The choice of species for interior woodwork is largely a matter of cost and personal taste.

Condition of Lumber.--Wood swells and shrinks with changes in moisture content; across the grain these changes may be large, along the grain they are usually negligible. It is vitally important, therefore, that the lumber used in a house be thoroughly seasoned. When so seasoned, the changes in dimensions are limited to those which take place as the lumber adjusts its moisture content to the seasonal variations in the surrounding atmosphere. The changes usually are not of a magnitude that will cause harm. In this connection, it must be remembered that, while seasoned lumber and well-seasoned and intelligently manufactured millwork may be specified and delivered on the job, the value of these precautions may be sacrificed if the material is not protected from the weather before and during installation.

Lumber Grades.--The occurrence of knots and other defects in relation to appearance and general utility value is the basis of grading. For any one part of a frame house, there are frequently two grades from which to choose.

There are two "select" grades suitable for natural finishes, known as "A select" and "B select," and two for paint finishes --

"C select" and "D select." In some species the higher "common" grades can be painted.

For unexposed parts, the grades called "commons" are ordinarily used. "Number 1 common" and "Number 2 common" allow knots and other defects limited in size, which must be relatively sound and tight, the piece to be usable as a whole. "Numbers 3, 4, and 5 common" contain progressively coarser defects and permit some waste. Not all the above grades are obtainable in all species. The local lumber retailer is a good source of further information. The best way to secure lumber of uniform and satisfactory quality is to buy that which has been grade-marked by the manufacturers.

Millwork, including doors, sash, etc., is not covered by the grades described. These items are usually bought as finished products. They are very largely clear of natural defects. Different qualities are sometimes referred to as "first quality" and "second quality." Hardwood trim sometimes is graded along with other millwork and sometimes according to a standard "A" grade, similar to the top select grades of general building lumber.

Hardwood flooring is available in several grades. Oak flooring is graded as "clear," "select," and "Number 1 and Number 2 common." The "Number 2 common" grades are not used often in residential construction as a finish floor. Maple, beech, and birch flooring are graded as "first grade," "second grade," and "third grade," the latter a factory floor grade. The top grade in hardwood flooring is practically free of all defects and the second grade is limited to a few small defects.