PRE-ASSEMBLED NON-LOAD-BEARING INTERIOR PARTITION PANELS

A system of panelizing non-load-bearing partitions with horizontal and vertical panels developed by the University of Illinois Small Homes Council under a research grant given by the Lumber Dealers Research Council.

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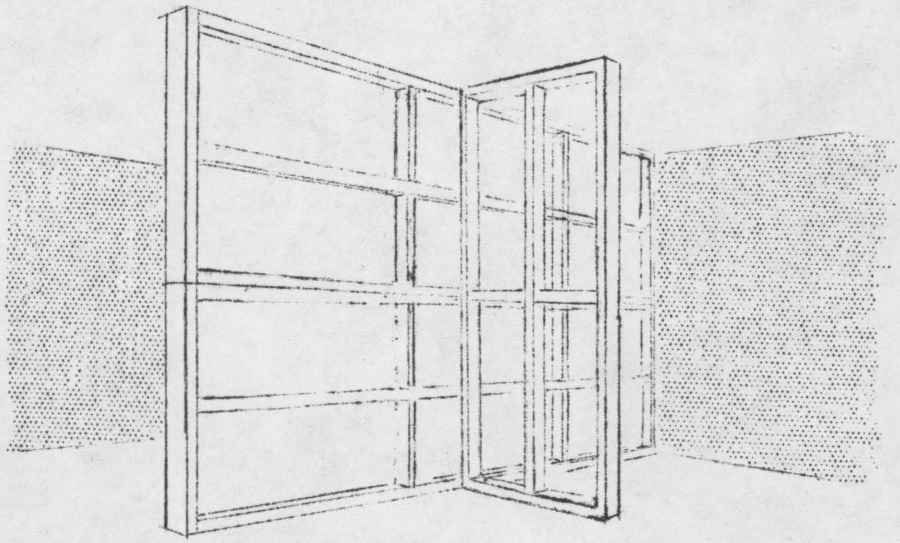


INTERIOR PARTITIONS

The use of roof trusses creates within a house a completely open space which can be developed into room units in any desired manner with non-load-bearing partitions. A number of non-load-bearing partitions can also be used in houses having either flat or extremely low-pitched roofs, the roof joists spanning from exterior walls to a center load-bearing partition.

The Small Homes Council has developed a non-load-bearing interior partition which can be made from pre-assembled panels, thus giving the builder a savings similar to those achieved by pre-assembled exterior wall panels. In a previous research project sponsored by the Lumber Dealers Research Council, the Small Homes Council developed non-load-bearing storage partitions made from thin-wall laminated panels. These partitions can be pre-assembled and placed within the house. (See Small Homes Council Circular, STORAGE PARTITIONS, and instruction sheet, CONSTRUCTION OF STORAGE PARTITIONS.

OBJECTIVE OF PANEL SYSTEM FOR INTERIOR NON-LOAD-BEARING PARTITIONS

The objective in developing a method to panelize interior non-load bearing partitions is to give the builder a more economical operation. Roof trusses, exterior wall panels and floor panels are three components that are now being successfully panelized. Partition panels will add another

panelized component to house framing, allowing additional savings in labor realized by building with pre-assembled parts instead of pieces of lumber.

In determining a suitable system for panelizing interior partitions, the requirements of the fabricator, the builder and the house itself must be considered. For the fabricator, the following factors must be considered: material, the panel construction method, storage and transportation of panels; for the builder, ease of handling and erection for economy; for the house itself, structural acceptance, flexibility of use, and simplicity from the standpoint of design.

The one prerequisite for the design of the Small Homes Council partition panels was that the panels be made on the same jig as is used for exterior wall panels in order to eliminate the need for two separate jigs. This simplifies fabrication and provides a panel of a size which is easily erected and which fits the modular dimensions of the house.

HORIZONTAL PANELS VS. VERTICAL PANELS

Builders have learned that a more efficient use of material is realized by the application of wallboard in a horizontal position. This theory of horizontal application was applied to the interior partition panel design. In studying the relationships between the construction, the wallboard material and a partition wall, it was seen that the standard ceiling height is 8 feet, plus or minus a fraction of an inch, while the length of the wall varies. Wallboard material has a standard width of 4 feet and the length

varies from 6 feet to 12 feet. This also applies to the wall-panel jig. Each of these elements has one standard dimension and one variable dimension. The horizontal panel system coordinates these standard widths and variable lengths to simplify the design, construction and erection of interior partitions.

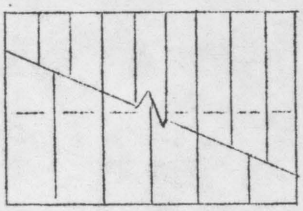
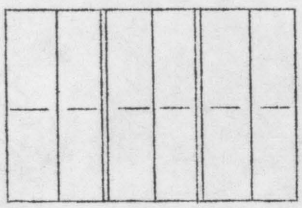
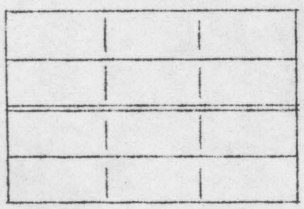
The first approach to the design of the partition panel system used a 4' x 8' vertical panel, similar to the exterior wall-panel system without the header. Several house plans were selected to study the adaptability of these panels to the plans. These 4' x 8' vertical panels had many disadvantages. For example, a wall 11 feet long would require two standard 4' x 8' vertical panels plus one panel 3 feet in width. This condition existed in about every case studied and presents a problem. Very few standard 4' x 8' vertical panels could be used in panelizing an entire house because partitions seldom fall on a multiple of 48 inches. At least two-thirds of all the panels were of a different width--that is, a special size. Extra studs were required for nailing at the perpendicular intersection of walls, thus making special panels out of standard 4' x 8' panels. Door panels could not be standard because every partition required a different door location in relation to the side of the panel.

A special attempt was made to design a house plan consisting entirely of standard 4' x 8' vertical panels. This could not be accomplished because many special panels were still required. A limitation was placed on room sizes, resulting in room sizes and shapes that were not in accordance with good planning principles.

With horizontal panels, an 11 foot wall can be built with two panels,

each laid on edge in a horizontal position and one placed on top of the other. The two panels placed on edge conform to the 8 foot ceiling height. The length of the panel will be exactly the length of the wall, 11 feet.

A quantity survey was made on a dozen plans to compare the framing material required for a plan using the conventional framing method with studs 16 inches on center and the same plan with horizontal panels. It was found that the conventional method required 989 lineal feet of 2" x 4" members and the panel system required 783 lineal feet of framing material. This is very typical of the results found in each case studied.

12 Foot Section	Conventional	Straight Wall	With one wall intersection and corner.
		lin. ft. of 2 x 4 framing required	
	16" o.c.	116	140
	24" o.c.	92	116
	4 x 8 Vertical Panels	108	124
	4 x 12 Horizontal Panels	104	104

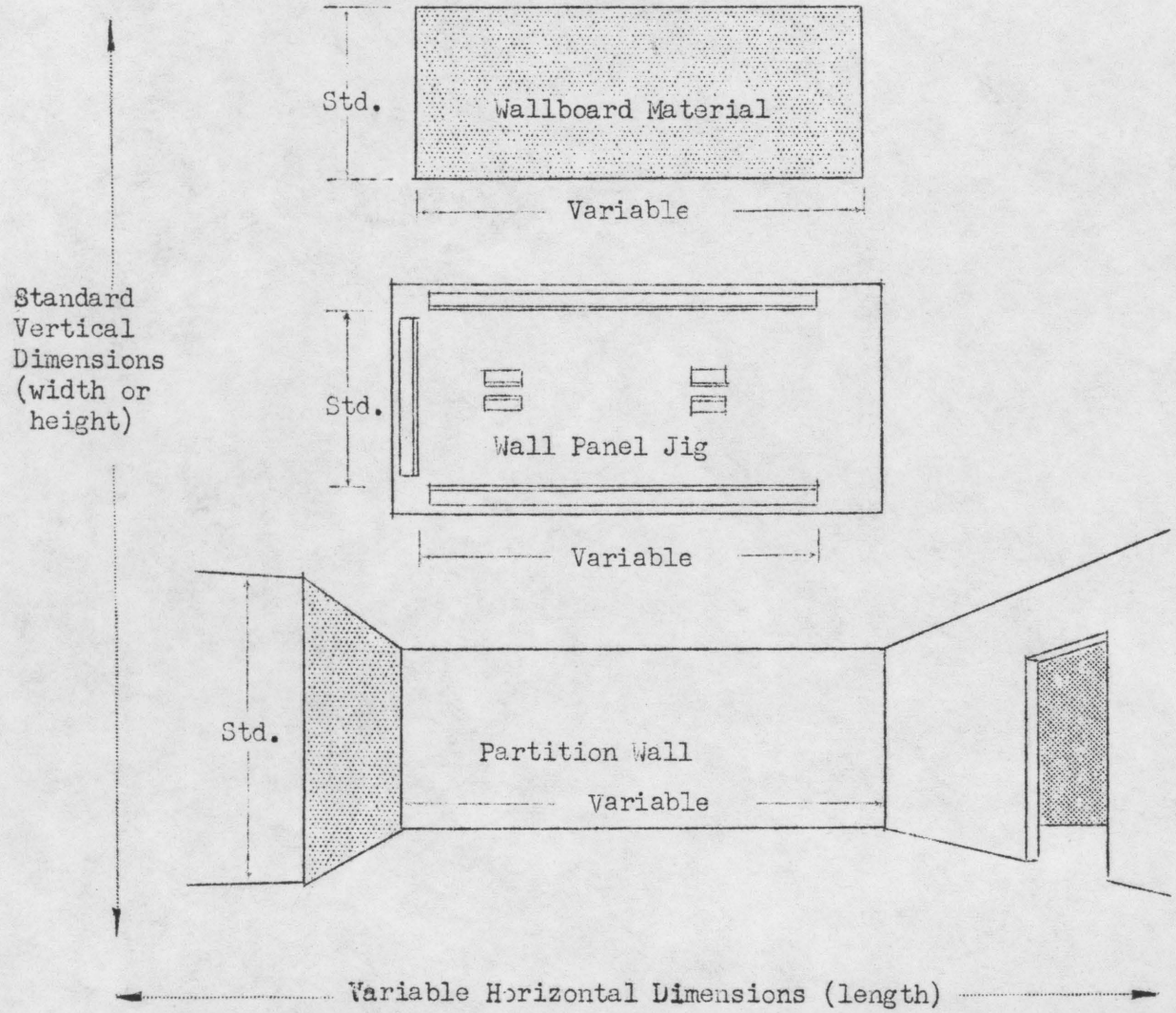
The sketches above show a comparison of the framing material required for 12 foot sections of partitions using conventional framing - studs 16" o.c. and 24" o.c., vertical panels, and horizontal panels.

DESCRIPTION OF PARTITION PANELS

The system developed for panelizing interior partitions primarily uses horizontal panels. These panels are built in the standard wall panel jig and consist of 2 x 4 framing with wallboard applied to one side. The panels are 48 inches high, two panels being used for an 8-foot ceiling height. The panels can be varied from 4 feet to 12 feet, depending on the length of the partition desired. Vertical panels are used for walls less than 4 feet in length and in combination with horizontal panels for partitions more than 12 feet long. One feature in the design of the horizontal panel is the horizontal members, which run the length of the panel. These members provide a nailing surface and eliminate the need for any extra studs, for nailers, at wall intersections.

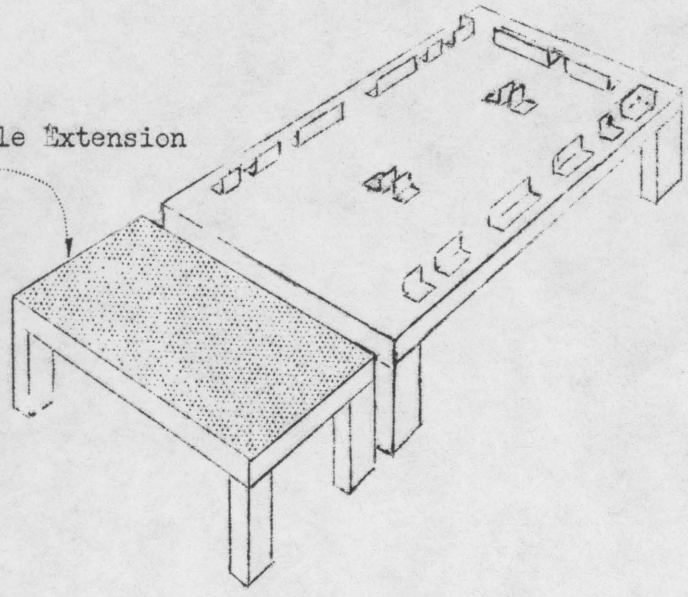
Due to the extreme variations in dimensions of interior partitions, a panel of a standard length and width to meet all conditions cannot be developed. The panel system presented here is a design tool, the principles of which can be applied to the panelization of non-load-bearing partitions of any length.

Coordination of Standard and Variable Dimensions



CONSTRUCTION OF PARTITION PANELS IN A WALL-PANEL JIG

All interior panels can be built in the standard or exterior wall-panel jig; however, since the maximum length of the interior wall panels so built will be 12'-0", an extension to the wall-panel jig is required. A 4' x 4' flat surface table can be used to extend the length of the jig. The extension table should be light in construction so that it can be moved to and from the jig when desired.

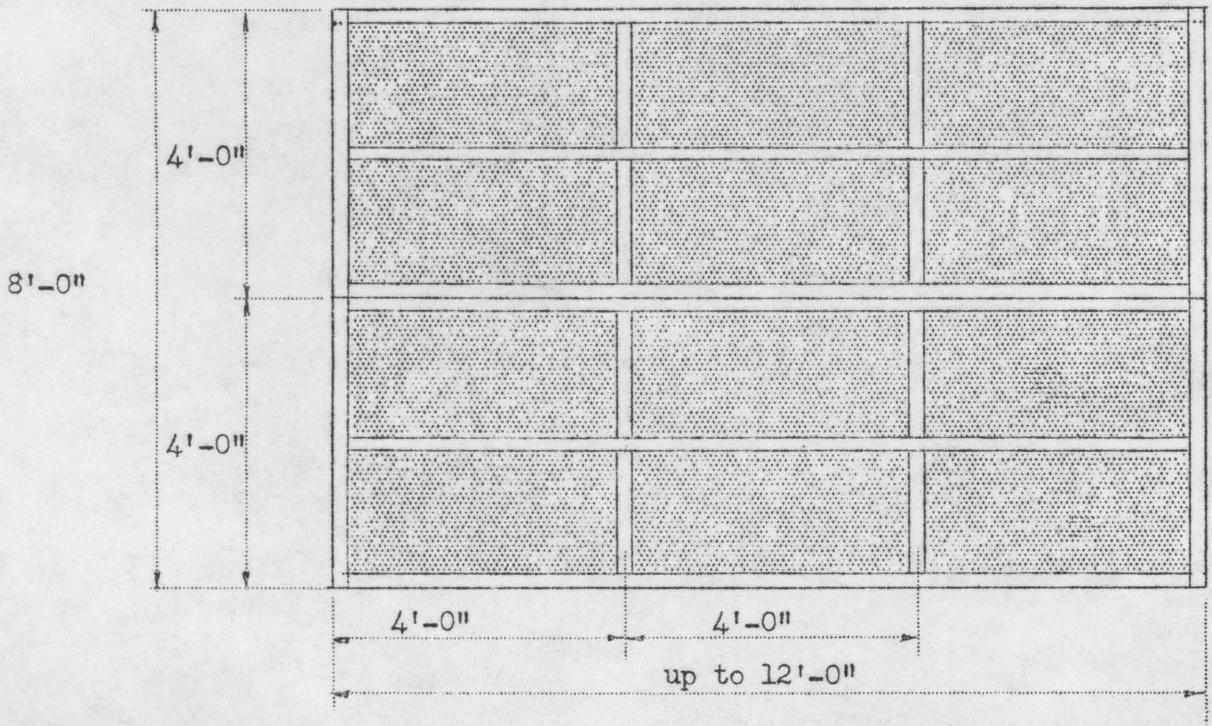


PANELS FOR PARTITION WALLS 4'-0" TO 12'-0"

One pair of horizontal panels (as shown below) are used for all wall lengths between 4 feet and 12 feet - 12 feet being the maximum length of wallboard material. The vertical nailers placed between the horizontal members should be spaced 48 inches on center, measuring from one end of the panel. These nailers give vertical support for long panels and also provide a nailing surface for wallboard applied to the back side of the panel after erection. It is possible to use vertical nailers spaced 24 inches on center and to omit the interior horizontal member running the length of the panel. By doing this, exactly the same amount of lumber and the same number of pieces will be used. This omission may seem desirable, but it is not recommended. The interior horizontal member running the length of the panel serves a definite purpose--it provides complete flexibility by allowing two partitioned walls to intersect at any point without the necessity of using the usual nailer studs required if vertical studs only were used. This is illustrated in the section, "Wall Intersections".

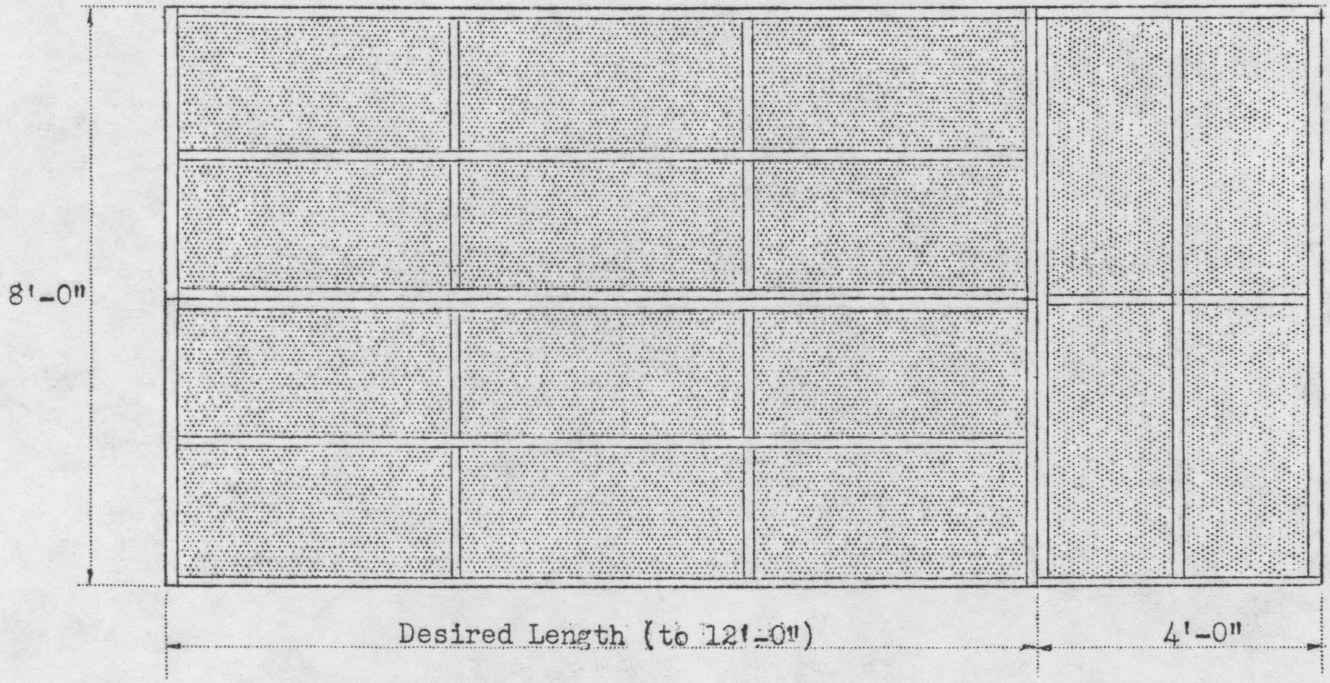
The sketch below shows two horizontal panels in place to form a partition wall. The panel is 4 feet high and thus, using two horizontal panels together, gives an 8 foot ceiling height. If an 8'-0" finish-floor to ceiling dimension is maintained, no shims will be required; however, if shimming is desired a finished-floor to ceiling dimension can be 8'-0-3/8" or 8'-0-1/2", and the shims can be placed under the lower panel.

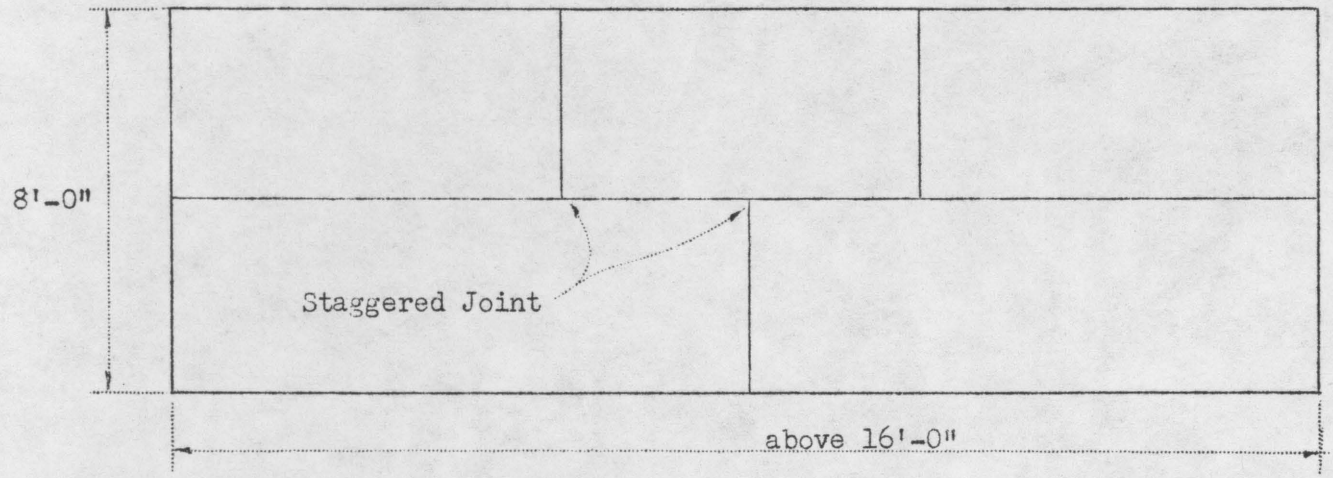
Lateral support is provided to horizontal panel partition walls by intersections with other partitions or exterior walls, or by corners. For stub walls or divider partitions that do not have lateral support at one end, use a 2 x 4 stud 8'-0" long spiked to the end of the partition. This piece ties the top and bottom panels together, and prevents buckling.



PANELS FOR PARTITIONS 12'-0" TO 16'-0"

For solid interior partitions 12 to 16 feet long, two horizontal panels should be used in combination with one vertical 4' x 8' panel. The vertical panel must be 4 feet wide; the horizontal panel can vary in length from 8 to 12 feet, depending upon the length of the interior wall.





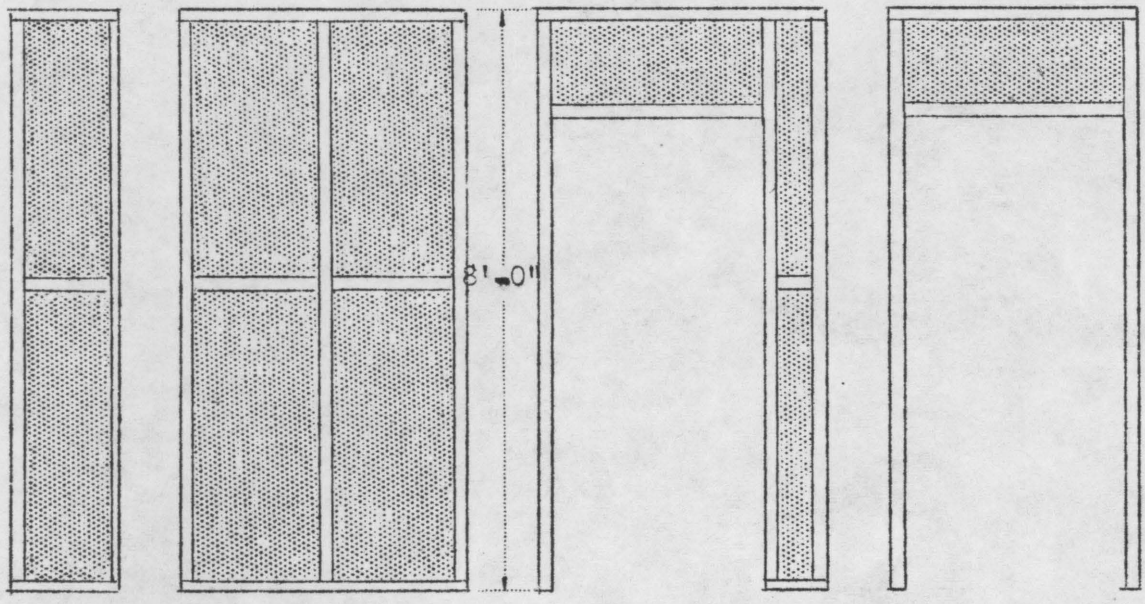
Seldom will an interior partition be longer than 16 feet, but in the event it is, it should consist of several horizontal panels of varying lengths so that the joints can be staggered.

PANELS FOR PARTITIONS LESS THAN 4'-0" IN LENGTH

For walls less than 4 feet in length, the vertical type panel is most adaptable. This vertical panel would be 8 feet in height and any width up to 4'-0". These panels are illustrated below.

A vertical door panel less than 4'-0" in width is a vertical panel with the desired rough door opening cut out. The door panel illustrated below is 8'-0" high. The inside width of the panel frame is the rough door opening required. The header is located at the desired height. Wallboard is applied to the section between the header and the top of the panel.

These vertical door panels are to be used as a separate unit such as might be found at the end of corridors, in bathroom closets or linen closets. They should not be used in connection with other horizontal or vertical type panels for a continuous wall. Since wallboard is applied to the door panel and applied separately to the adjacent panels, there exists a wallboard joint at each edge of the doorhead panel. This wallboard joint is in the most critical location and it is felt objectionable because of the possibility of a crack developing. This type of door panel is not recommended for use in connection with a series of other panels unless a perpendicular wall intersects at the connection between the door panel and adjacent panel, thus covering the joint between the panels.



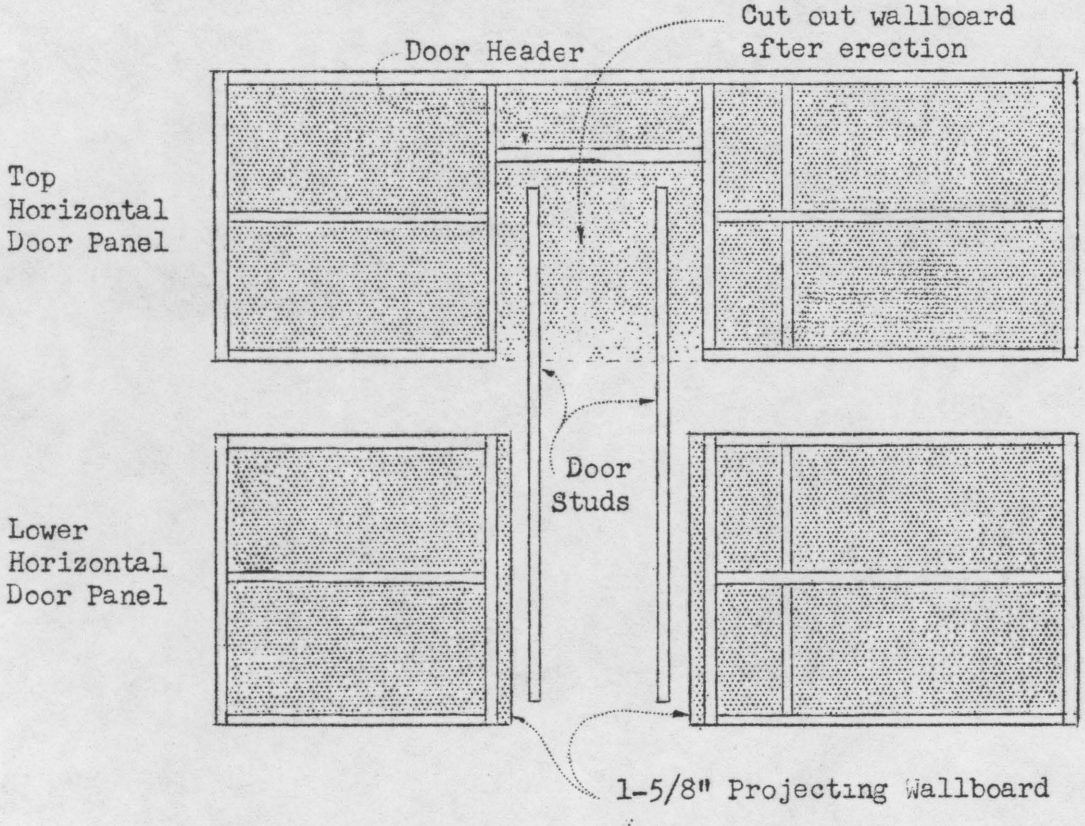
VERTICAL SOLID PANELS

VERTICAL DOOR PANELS

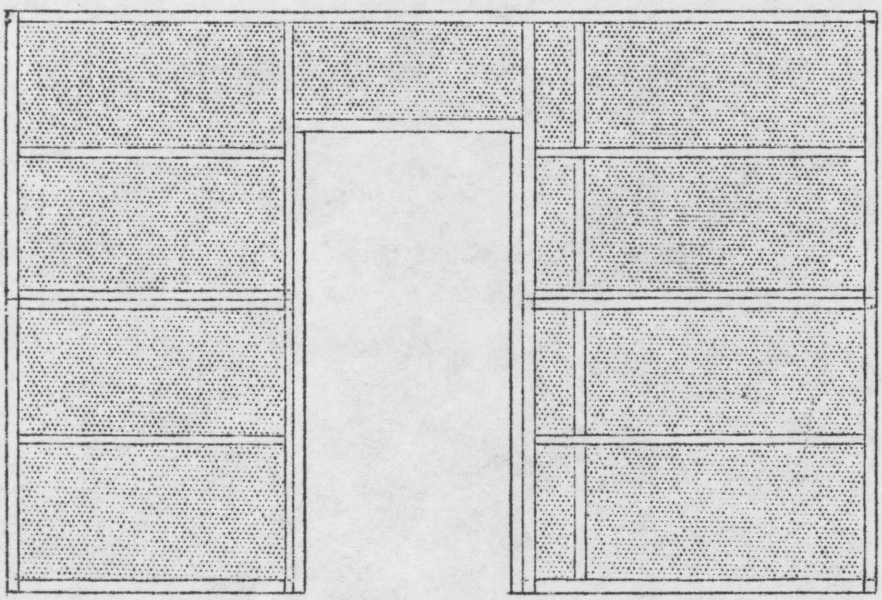
HORIZONTAL DOOR PANELS

For walls more than 4 feet in length requiring door openings, a horizontal door panel is used. The drawings below show the elements that comprise the entire wall. The following page shows these elements assembled to form a partition wall. The top horizontal panel contains the door opening (3-1/4" wider than the required rough opening), and located at any desired position. The length of the two lower panels correspond to the length of the two bottom edges of the top panel. Two 2" x 4"'s are nailed to the edge of the top and bottom panels in the door opening to form door bucks and to tie the two panels together.

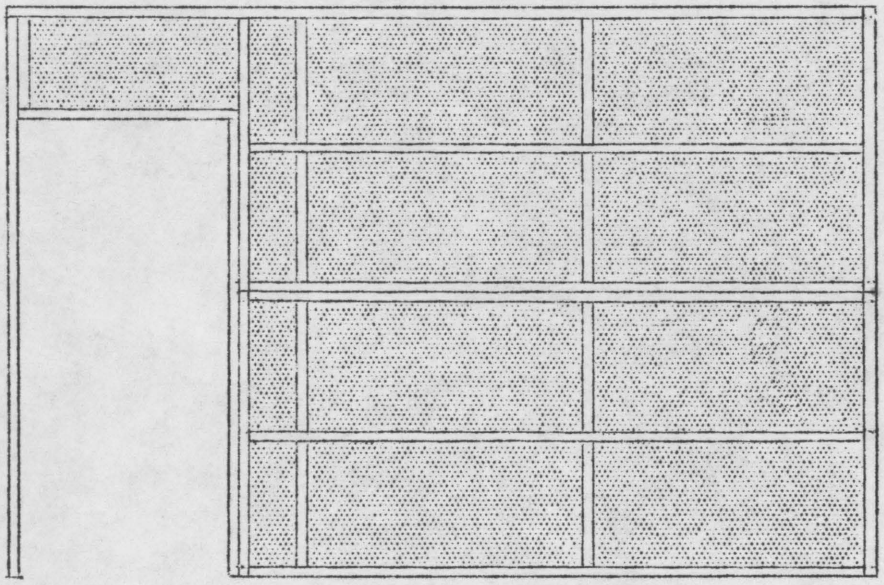
While the top door panel is in the jig, wallboard is applied to the panel in one solid sheet, covering the entire door opening. This provides stiffness for the panel during handling and erection. After the door panel is in place and the door stud attached, the wallboard can be cut out. The lower horizontal panels for this type wall will have wallboard projecting 1-5/8" on one end to cover the 2" x 4" door stud. A scrap piece of 2" x 4" can be nailed next to this projecting wallboard to protect it during handling and erection.



Another variation occurs when a door opening is located in a corner of a room, thus locating the door at the end of the wall. In this case, the opening is cut at the end of the top panel and the door stud is placed as before, except that the door stud is 8 feet in length and is attached to the end of the panel at the door head. See next page for illustration.



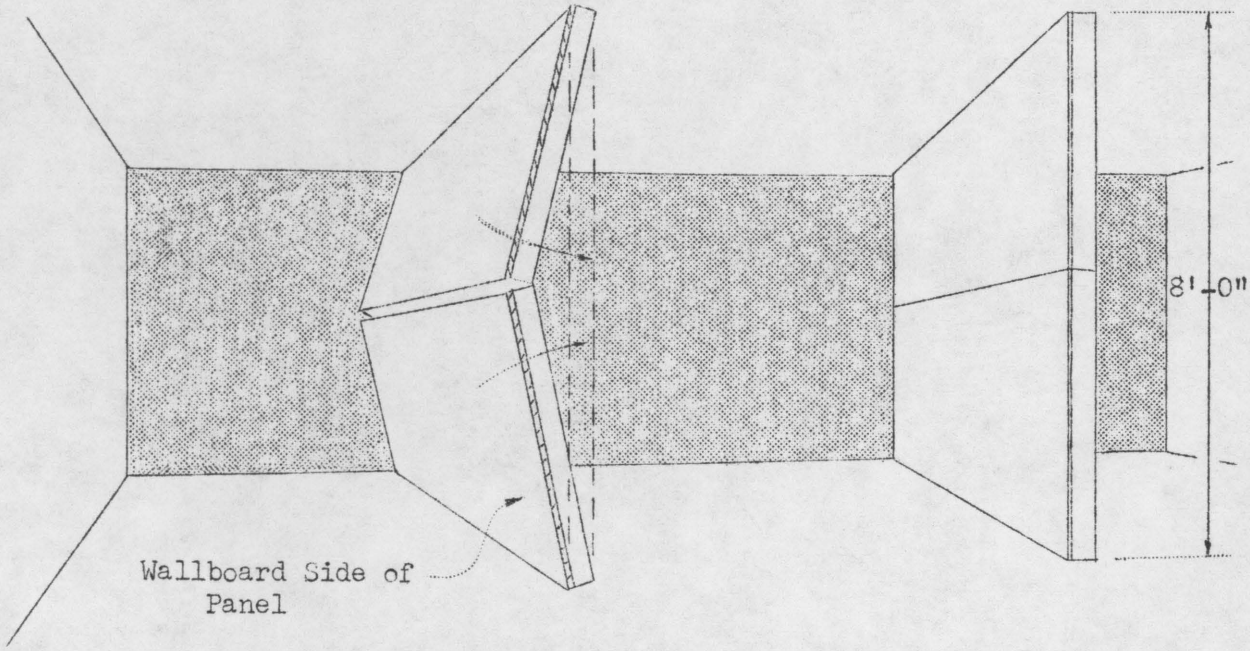
Door At Any Desired Location



Door Located At The End Of A Wall

ERECTION OF HORIZONTAL PANELS

The suggested erection procedure follows. Put the lower panel into place and tack it to the floor. Lift the top panel to the proper location at the ceiling (as shown in the sketch below) and jack-knife the two panels together to a plumbed position. Nail panels together; nail bottom panels to floor; nail the top panel to the ceiling; and nail both panels to the side walls. It has been found that pre-nailing panels simplifies the erection. Pre-nailing means, to start nails at the above mentioned places, before the erection starts. During erection, the carpenter has only to drive the nail leaving one hand free to steady the panels. The usual studs or nailers between vertical studs in the exterior wall framing will be required. Nailers between the ceiling joists will also be required if the partition runs parallel to the ceiling joists. No nailers, however, are needed for panels intersecting other interior partition panels. This is described later in the section "Wall Intersections and Corner Details".

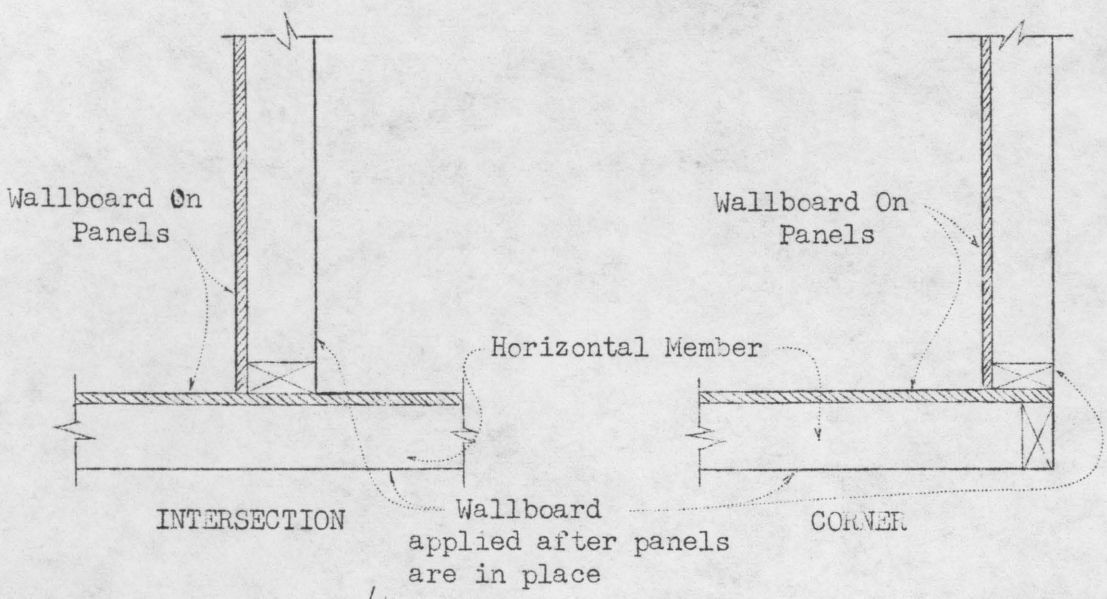


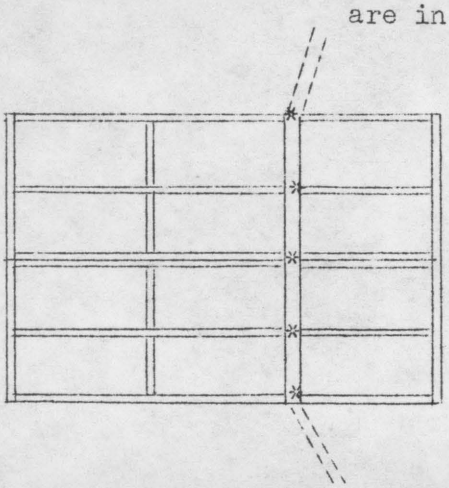
Ceiling heights must be at least 8'-0". With a floor to ceiling dimension of exactly 8'-0"--two 48" high horizontal panels easily jack-knife together for a snug fit. For floor to ceiling heights over 8 feet (say 8'-0½") it will be necessary to use shims (such as ½" plywood strips) to get a snug fit between floor, ceiling, and panel.

Wallboard is applied to one side of the panel during assembly in the jig. Attention should be given to special panels to assure that the wallboard is applied to the proper side.

During the erection of the panels in the house, it is important to follow the recommended corner and partition-intersection details. In the case of one wall intersecting another, the edge of the intersecting wall should go against the wallboard side of the intersected wall. In the same manner on corner details the partition adjoining another should have the edge of the adjoining partition butt up against the wallboard of the other panels. This detail eliminates the need for nailers to provide a nailing surface for the application of wallboard to the back side of the panels. After erection, the corner will have wallboard on the inside surface of both walls, as shown in the detail below.

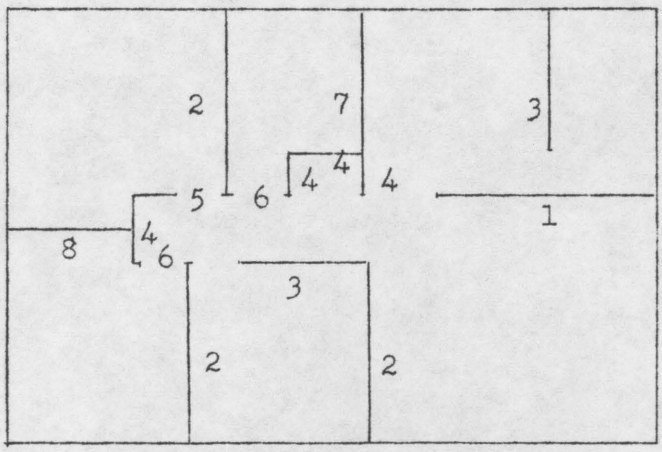
In the case of both wall intersections and corners, no extra studs or nailers are required to provide a nailing surface for either the adjoining panel or for further application of wallboard. The interior horizontal member of the panel provides a nailing surface spaced 24 inches on center. It is possible to panelize an entire house without the use of any extra nailers, such as are usually required for wall intersections.



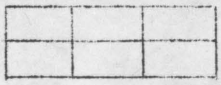
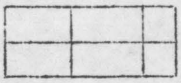
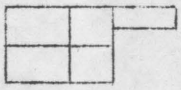
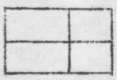
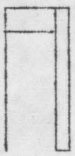
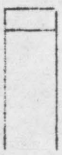


*Nail vertical member of adjoining panel to horizontal members of adjoined panels.

TYPICAL FLOOR PLAN
24' x 36'



A total of 19 panels are required to panelize the interior partitions of this plan (excluding wall 7 and 8), requiring 117 lineal feet of 2 x 4 framing. The type of panel for each wall is shown below.

WALL	PANEL TYPE	Total No. Required
1		2
2		6
3		2
		2
4		4
5		1
6		2
7	Special 6" plumbing wall	
8	2" closet wall	