

THEORY
OF THE
CLIFF MAY - CHRIS CHOATE
STRUCTURAL SYSTEM

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Architectural planning - from one aspect - may be defined as a process of relating volumes in space.

One method of definition of these volumes and their relationship is measurement..

Volume may be defined by measurement in three rectilinear directions from a point.

Measurement - a space-time relationship - becomes distance when time is not a factor.

Distance to be described must be accepted as the sum of arbitrarily selected basic units characteristic of a particular dimensioning system.

A module may be considered as being one of these arbitrarily determined basic units.

A module may be translated into terms of any other dimensioning system.

A module as a unit of distance has been accepted in planning so that a system could be developed using additive volumes (parts) of unit size.

The post and beam principle of construction was chosen since it is a method of using the minimum amount of material in the most logical manner, viz. statistically. It lends itself magnificently to the most modern methods of engineering in contrast to the "rule of thumb" of conventional residential construction. It also provides a structure free of interior bearing partitions.

The modular system used in planning CLIFF MAY HOMES is developed on a single plane. The module selected as one direction of volume unit is 64". It was used because it is a multiple four times that of one of the most basic units used in construction work - 16".

Following the same line of thought, the vertical dimension was taken as $87\frac{1}{2}$ " being arrived at by using five 16" units plus depth of beam necessary to span two modules which seemed to give a height which would work out best with materials and still develop a house that was low in silhouette. The third distance for the volume of the basic system unit is $3\frac{5}{8}$ " based on the dimension of standard lumber sizes. The post and beam principle and the developed volume unit were combined to establish a practical construction system of 4 x 4 posts at 64" and 4 x 8 beams as component members of the structural volume. This may be modified by extended modular spacing of posts and deeper beams.

In using the modular system, one primary premise must be made which is that no two parts can physically occupy the same position. This follows the use of additive volumes and is mandatory in any system which is static in its conception.

To comply with this, a series of three structural framing systems (of unit wall volumes) was devised each of which would be separate and not impose upon the physical space occupied by another. The primary structural system used was that of parallel, longitudinal bearing walls - three in number - two at the outside extremities of the house and one in the center at a higher level which provided the ridge. These were spaced two modules apart. A secondary system is that of tie beams. This is a transverse system composed of tie beams supported at each end by load bearing posts all of which function between the three primary systems and are consequently two modules in length. A tertiary system which frames at right angles to secondary systems and between them is composed of 4 x 4 beams supported at each end by load bearing posts.

This system is modular of variable length. Each of these systems is treated as post and beam. The combination of these three systems defines what is known as the "structural volume" of dimensions determined by the thickness of each system, its height and its length.

The three basic longitudinal bearing systems support a fourth system - that of the roof. The roof is treated as a structural volume in accordance with our fundamental principles. The roof volume system is now composed of framing members spaced at quarter module points - 16" o.c. (It is not panelized because of our inability to the present time to develop a panel that would be easy to handle and economical to fabricate. This is a problem which we have constantly in mind and one which we will necessarily solve.)

Inasmuch as the house is an enclosed volume, it is necessary to clothe this system of post and beams and roof members with a skin membrane. Skins have been determined as being of two types - exterior and interior - and are treated as variables. They are those membranes which provide the exterior and interior to the structural volume, the ceiling and roof and the floors. Skins may be functional from a structural standpoint, but are always treated as being applied to the structural volume.

Certain minor framing is necessary in the structural volume between the vertical posts and the beams at the top and the platform at the bottom in order to brace the system and to attach skins.

A structure as a whole composed of pieces is an aggregate of those pieces. Within any aggregate there may be groups. A group within an aggregate is that in which its unit parts have common characteristics. The grouping accepted for the exterior wall panel was that of the minor framing pieces bounded on each side of a panel by half posts modularly spaced - and the exterior skin. Said minor pieces also being arranged to receive the interior skin by job application. Vertical marginal half posts of adjacent panels form full posts. When an exterior panel is used adjacent to an opening it is complemented by a 2 x 4 at its vertical margin - which 2 x 4 combined with the half post in the panel form a whole load bearing post.

This provided a basic modular exterior panel part of modest dimension that could easily be handled by two men. It also gave great flexibility in planning so that many arrangements of floor plans could be developed.

The use of these panels in architectural planning developed exterior walls and openings. Openings were covered by sash which are considered as exterior skin. The acceptance of a sash as skin or a pair of doors as skin over-laying the structure provides a basically sound method of weatherproofing.

Posts are theoretically 3-5/8" x 3-5/8". The combination of the 2 x 4 post incorporated in the panel and its complementary 2 x 4 added to it makes a post of 3 1/4" which is 3/8" less than the basic post. This offers no complication when two panel half-posts are placed together, or when the complementary half-posts are added at a free opening. The use of sash and doors applied as skin allow a gain and loss in the series of panels which is accommodated at an opening. However, when something of a fixed dimension is placed in that opening, such as doors or a pair of screened doors, it is necessary to shim the complementary half-post so that the whole post becomes 3-5/8" and the void space is a net 5'0-3/8". (We recognize the fact that theoretically

the placement of a pair of screened doors in a void which is normally part of the structural volume is not correct and we plan in the future to revise this condition.)

The door panels used as partitions are presently considered as skins - whether stationary or operating. They are treated so in the new houses which we are planning. Wardrobes and cabinets are treated as free masses within the house volume although sides or ends of them may articulate with the structure as skin.

We feel that the development of a system is a matter of evolution and the longer we work and the more we learn - the more the system will progress. This attitude assures the Cliff May -Chris Choate System of being dynamic. One thing we have found to be mandatory is that in our thinking each of the systems - primary, secondary, tertiary, roof and skins - must always be clearly defined and separated.

If this discussion on the theory has proved helpful, we will, in the future, cover such subjects as:

1. A practical analysis of the system
2. Field and erection methods
3. Mechanics of organizing a dealer program
4. Mill methods (one to which we hope you all will contribute)

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