PRACTICAL ANALYSIS

OF THE

CLIFF MAY - CHRIS CHOATE

STRUCTURAL SYSTEM

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Any architectural structural system may be defined as a method of constructing a volume of a given dimension and shape with smaller parts. A system is simplified by the use of additive parts of as large a dimension as can be conveniently handled in the field. (This is one of the basic arguments supporting prefabrication.)

Such a system to be useful must be so conceived that its planning, manufacturing and assembly is done in certain standardized manners. When this is done and both the designer and the erector use a standardized vocabulary, the art of communication is heightened and the transference of ideas (in the form of drawings) is simplified. The result of this is the saving of time and money in construction. This is possible in the Cliff May - Chris Choate Structural System because it has been formulated as one of standard additive component parts assembled in standard combinations as illustrated in "Standard Erection Details."

The total system is post and beam, composed of four basic framing systems. (This supposes, of course, that the platform is not a part of the system but is a starting point already existing upon which the house parts are constructed.) All four systems are additive to each other in standardized manners. These four systems have been defined in the "Theory of the Cliff May - Chris Choate Structural System" as being:

I. The Primary longitudinal bearing system
II. The Secondary transverse framing system
III. The Tertiary framing system
IV. The roof framing system
(See Standard Erection Details - Sheet #1.1)

Each of these is a combination of fabricated parts and cut parts all additive in standardized manners. Each of the first three is composed of a beam supported by posts modularly spaced, or, considered in another way, the three wall systems become combinations of wall panels and openings when:

1. Wall panels are mill fabricated combinations of pieces, contain half posts at their vertical margins and incorporate exterior skins, and

2. Openings are similar to panels in being composed of half posts at each vertical margin and skins, but are field assembled, and

3. A. Adjacent openings have articulating half posts combined into unit 4" x 4" posts, or

   B. Articulating half posts of adjoining panels, or

   C. Articulating half posts of adjoining panels and openings; are field nailed thus creating posts.

Thus, the method becomes one of standardized procedure in constructing an aggregate of combinations (complete structure), of combinations (four systems) of combinations (modular assemblies).

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COMBINATIONS:

The total system as outlined in the "Theory" is additive with the modular length (64") accepted as the basic unit of distance on a single horizontal plane. There may, however, be combinations within that unit. A combination within one of the three wall systems is considered as any grouping of more than one standard part, which equals a module of length. This is in harmony with the total system since it is a furtherance of the additive principle. The modular whole is the sum of its parts. (See S.E.D. - Sheets #2.1, #4.1 and #4.2)

To achieve a system which functions well, it is necessary in planning to consider a modular combination as having a fixed or definite position in the house plan. A fixed relationship between the position of modular parts and the modular grid must be maintained. (See S.E.D. - Sheet #1.1)

Maintaining this fixed relationship forces the development, particularly in the interior, of:

1. Half module panels (#102)

2. Units reduced by:

   A. One-half wall thickness (#103) and,

   B. Full wall thickness (#110)

   (See S.E.D. - Sheets #4.1 and #4.2)

Reduced exterior panels are #4, #5, #6 and #7. Combinations may consist, for example, of half wall thickness plus panel #103 plus panel #102. (See S.E.D. - Sheet #4.1)

Combinations may be of wall panels or wall panels and openings on either exterior or interior wall systems.

Half posts used in openings are #202-F.

I - PRIMARY LONGITUDINAL WALL SYSTEMS (See S.E.D. - Sheet #1.1)

Longitudinal wall bearing systems, three in number, are the two exterior eave walls and the ridge. Ridge is between, parallel to and equally spaced from each eave wall by a distance of two modules. (See S.E.D. - Sheet #1.1) All are supported on the basic floor (sub-floor or sleepers) which later receives floor skin.

Exterior eave wall systems are each composed of 4" x 8" beam supported by modular combinations - 6'-8" high. These combinations as before mentioned incorporate posts as unit 4" x 4" or posts formed by the joining of vertical 2" x 4" of adjacent panels or the vertical 2" x 4" of a panel with that of an opening.

All exterior panels are of #10 Series.

The length of a wall in this classification is always its modular length plus 2" at each end. This 2" space is filled by a 2" x 4" vertical blocked 3/8" from adjoining panel to form a corner post 3-5/8" x 3-5/8". Each eave wall system contains a minimum of two braced panels (#1). Beams are always spliced over posts. (See S.E.D. - Sheet #6.1)

The ridge system equi-distance (two modules) from each eave wall is composed of 4" x 14" ridge beam supported by 4" x 4" posts 8'-2½" high modularly spaced as shown on drawings. Ridge beams are spliced over posts which usually articulate with secondary tie beam systems. (See S.E.D. - Sheet #1.1)

II - SECONDARY TRANSVERSE WALL SYSTEMS (See S.E.D. - Sheet #1.1)

Secondary transverse framing systems are divided into two types - exterior - which form gable end walls and - interior - which form tie beam and interior transverse wall systems. Each system occupies that space between an eave wall and a ridge and are consequently two modules long.

The gable end wall systems lay in same plane as end post of eave walls and end post supporting ridge beam. Each is composed of 4" x 4" beam supported, as before defined, by posts 6'-8" high which are incorporated in wall combinations. Tympana are treated as typical opening combinations. Beam must be supported at each end by a 2" x 4" half post which may be a portion of a wall combination. Exterior panels are of the #10 Series. Two of these systems in a common vertical plane form an end wall. In each end wall, but in either secondary system or both, are two braced panels (#1). (See S.E.D. - Sheet #6.2)

Interior secondary transverse tie beam and transverse interior wall systems are each composed of 4" x 4" beams supported as before defined, by posts 6'-8" high which are incorporated in panels or openings. Interior panels are of the #100 Series. Beams must be supported at each end by a panel or a 2" x 4" half post. (See S.E.D. - Sheet #6.3) Operating skins (doors or combinations have such)* are applied to face of structure in same manner as exterior sash and doors. These may be positioned vertically as determined by thickness of floor skin (finish floor). (See S.E.D. - Sheet #5.1)

Each system occupies that space between eave wall and ridge post and may be longitudinally spaced in any modular position shown on drawings.

Transverse wall systems incorporating two braced interior panels (#108) must be incorporated in every house in excess of eight modules long. No more than eight longitudinal modules may separate transverse wall bracing systems.

Transverse tie beam systems as such are incorporated in transverse wall systems shall be spaced not more than five modules apart - longitudinally.

III - TERTIARY WALL SYSTEMS (See S.E.D. - Sheet #1.1)

Tertiary (longitudinal) wall systems, framing at right angles to secondary systems, are composed of 4" x 4" (or two 2" x 4") beams and 6'-8" posts as part of panels (#100 Series) or openings and must be supported at each end by a panel or a 2" x 4" half post. (See S.E.D. - Sheets #4.1 and #4.2) They may be of any modular length depending on separation of secondary systems between which they are positioned. Operating skins are applied in manner similar to those in secondary systems.

IV - ROOF FRAMING SYSTEM (See S.E.D. - Sheet #1.1)

The roof framing system is a composition of 2" x 6" rafters (#411) spaced 16" on

* On all houses released after September 1, 1955. Houses designed previously have doors that fit into wall opening.

centers, blocked between, so spaced that every fourth one always occurs over centers of posts, viz., modular points.

End rafters always flush out with ends of beams at gable overhangs. This demands cutting of adjacent blocking. (See S.E.D. - Sheet #6.1) Rafters are automatically spaced by eave vent blocks (#431) which are placed between rafters and set in from exterior face of 4" x 8" eave beams so that top of blocking and rafters are flush. Spacing at ridge is accomplished by 2" x 4" blocking (#432). Built-up rafters (#441) are used directly over gable end tie beams to receive applied skin (gable sash) (See S.E.D. - Sheet #6.2) and directly over any parallel partition or tie beam whose applied skins (drywall) may be continued to ceiling. (See S.E.D. - Sheet #6.3)

SKINS

Exterior wall skins may be incorporated either as a portion of a panel or field applied in fixed manner as sash or operating as doors. (See S.E.D. - Sheets #3.2 and #3.3)

Skins, whether mill or job applied, are always applied to the face of the structure which supports them.

All exterior wall skins, mill or job applied, lap both platform below and beam above, 2" and are nailed into them through panel boards or sheathing to tie the two together vertically.

Exterior wall skins, whether included as a portion of panel or field applied, are considered as being 1-3/4" thick. This 1-3/4" may be sash of that thickness or composed of board and applied batt; sheathing and board combinations; or sheathing and plaster combination.

Roof skin which is composed of 3/8" plywood panels (#407, #407-E) laid at right angles to framing, flush to roof extremities defined by rafters, acts as diaphram and transfers all seismic and wind stresses to exterior walls and resisting braced panels therein. Exterior plywood is always placed over eaves. (See S.E.D. - Sheet #6.3)

Interior skins, wall and ceiling are $\frac{1}{2}$" Gypsum board, job applied in such a manner that all posts, half posts, 4" x 8" eave beams, 4" x 14" ridge and gable end 4" x 4" tie beams are exposed for their major portion, being covered only enough to conceal joints between them and adjoining members. Usually $\frac{1}{4}$" is adequate.* All edges and corners to be protected by metal edging and bead.

Interior skins may be 1-3/8" operating doors applied to face of framing structure, vertical position depending on type of floor skin.

Interior floor skin may be of any material and any thickness from 1/8" to 3/4".

EXTERIOR TRIM

Exterior wall trim consists of watertables (#501, #502, #522 and #545), sills (#501 and #545) and batts where used.

* Refer to "How to Drywall a CLIFF MAY HOME"

Watertable is placed on top edge of all exterior skin and nailed to beam. (See S.E.D. - Sheets #6.1, #6.2 and #6.3)

Batts are used on vertical marginal joints where sash or doors join adjacent skin. (See S.E.D. - Sheets #3.2 and #3.3)

Panel joints and house corners are always batted except where exterior skin is shake or job applied plaster.

Vertical boards between which open cracks show are batted. (See S.E.D. - Sheet #6.1)

Shake side walls are field laced at panel joints and have corner boards.

Plastered walls have plastered corners.

Roof trim consists of fascia boards. These may be 1" x 9" (#513, #514-LR and #581) for built-in gutters or 1" x 6½" (#513B, #514B-LR and #581B) for shingle roofs or built-up roofs using gravel stops. These are applied to rafters - bottom edges showing ½" below rafter and are cut of such length that square cut ends will center on a rafter and bevel cut will run wild. Rake fascias (#516-LR or #516B-LR, #527-LR or #527B-LR) match rafters for length and show ½" below. Show same texture (rough or finish) of fascia as will match side wall material. (See S.E.D. - Sheets #6.2 and #6.3)

INTERIOR TRIM

Interior trim consists of door stops (#517, #520, #532 and #577); thresholds (#510 and #568); floor filler pieces (#503; window stools (#506); wardrobe shelving and poles; cabinet work; base (#558) and finish hardware.

Door stops are placed in appropriate positions. Use stop #532 on top and two sides of exterior doors. Stop #577 is placed on two sides of interior doors* (See S.E.D. - Sheet #5.1) Stop #520 is used on top and two sides of interior doors except where a side is replaced by #517**.

Place thresholds or floor filler pieces between posts in full sash openings according to detail drawings. (See S.E.D. - Sheets #3.2 and #3.3) Window stools should be placed in half or three-quarter windows in panel space between uprights tight against sash. (See S.E.D. - Sheet #3.1)

Wardrobe shelving and poles delivered in random length* is cut on job, placed according to architectural drawings and consists of 1" x 12" board shelf supported on three sides by 1" x 4" cleats nailed to walls for exact length of shelf. Pole articulates with cleats in rosettes furnished in finish hardware package. Place shelf 5'-6" above floor.

Door type wardrobes and wardrobe bundles** are not systemitized and should be installed as shown on erection drawings.

Cabinet work should be placed in position shown on architectural drawings.

* On houses designed after September 15, 1955
** On all houses issued before September 15, 1955

Base, delivered random, should be placed on wall at floor and should run only for same distance as interior drywall skin. All ends should be square cut. Do not return.

METAL CONNECTIONS*

Metal clip angles (4" x 4" x 3-1/2" x 1/4") with two 3/8" lag screws each leg are placed on top of 4" x 4" tie and articulate with 4" x 8" eave beam. These are covered by 2" x 4" part (#206) in gable end walls.

Tie beams (4" x 4") in secondary systems are fastened across ridge posts with 1-1/2" x 18" - 20 gauge strap.

When eave beam splice is made over unit 4" x 4" post in bearing system a vertical tie of sheet metal is made between foundation and post and post and beam; one at bottom being 1" x 18" - 16 gauge 12" in concrete. Connection at top is made with 3" x 8" - 20 gauge strap.

All beam splices must be reinforced with 1-1/2" x 18" - 20 gauge metal strap across joint on top of member.

Every third set of opposing rafters must be strapped across ridge with 1-1/2" x 18" - 20 gauge strap.

Two end rafters on each half of each overhang must be fastened to eave beam with "Teco" connectors.

Every unit 4" x 4" post occuring at a house corner must be anchored to concrete with 1" x 18" - 16 gauge strap 12" in concrete and at top to eave beam with "Teco" connector.

PARTS

Parts in the Cliff May - Chris Choate Structural System are numbered in the following manner:

10 Series - Exterior Panels
100 Series - Interior Panels
200 Series - Vertical Members
300 Series - Horizontal Members
400 Series - Roof and Soffit Members
500 Series - Trim
600 Series - Sash and Doors
700 Series - Cabinet Work

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* Refer to nailing schedule in "Engineering Analysis."