



PREFABRICATED TIMBER HUT

The need for a prefabricated structure of reasonable durability and living comfort which can be easily dismantled, transported and re-erected at different sites has been felt by the rapidly developing construction projects in India. Such a need has been recently aggravated by the emergency conditions for providing hospitals and shelters for the army in difficult accessible regions. During the latter part of the world war II a war-time structure was evolved which has been tried out by the Central Building Research Institute for the development of a suitable prefabricated hut (Fig. 1) supported on collapsible structural frame of timber (Fig. 2).



Fig. 1 Completed prefabricated hut

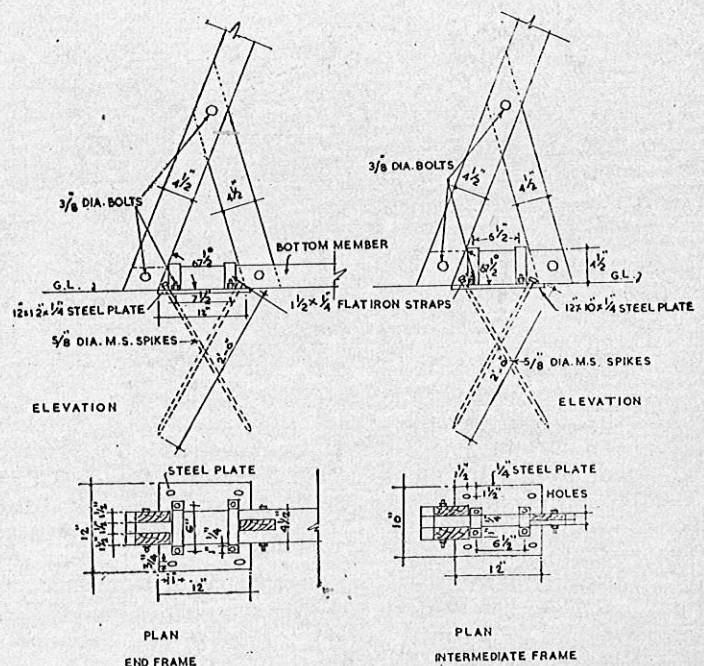


Fig. 2 Structural frame of timber

The hut has a span of approximately 21 ft. and a height varying from 7 ft. 3 in. at eaves to 10 ft. at the ridge. The frames, which are collapsible are provided at 8 ft. centres, giving a bay area of about 170 sft. Any number of bays can be provided to suit the requirements. The hut may be used for offices, stores, living accommodation for single men, hospitals and shelters required in an emergency. It also offers an attractive choice for site accommodation required in construction projects, school buildings, panchayat-ghars and the like.

Materials

The frame can be made of either hard or suitable soft wood. All timber members should be preferably seasoned or treated for preservation and immunity against attack by fungi and termites. If well preserved, the frame work should easily last 10-15 years. The design of the frame is independent of the cladding and for the latter any locally available material such as A.C. Sheets, tiles, aluminium sheets, thatch, bamboo lath and plaster, reeds and plaster, can be made use of. The standard hut erected at the Institute on an experimental basis consists of C.G.I. sheet roof and external cladding and plywood as ceiling and lining. For cold climates, one or two inches thick insulation such as Polystyrene boards or mineral wool can be placed in between the external cladding and inner lining.



SPIKED FOUNDATION
Fig. 3 Spiked foundation

of a 4 bay hut is 53 ft x 42 ft. It leaves a clearance of 10 ft. around. It is desirable to orient the hut with its axis in an east-west direction or as close to it as possible. A party of two carpenters, two fitters and four unskilled workmen can erect a hut of four bays in about 3 days on a prepared foundation. It is essential to set out the spacing of the frames with a steel tape, as the purlins are cut to dead lengths and holes drilled in them to facilitate ready fixing. When the hut is erected on a prepared concrete base the bolts may be set in while concreting is in progress or boxes can be left in the concrete and the bolts grouted in afterwards. The latter method permits adjustments and is therefore, preferable. If erected direct on ground it is necessary to have steel bearing plates beneath the base of the frames in order to spread the loads to the ground.

The end frame (Fig. 4) is opened out and made ready by fastening the joints, fixing the door posts, horizontal rails, etc. It is supported by crossed ballies till the adjacent frame is also erected and connected by purlins, to avoid distortion of the frame. Alternatively all frames may be supported in position by crossed ballies, especially in areas subject to high winds. As the end frame is being erected by one batch of men, the remaining men can prepare the next frame for erection. When all the frame work and components have been assembled and connections tightened up the frame work is corrected for line and square.

When C.G.I. sheets are used in roof they should be fixed with cranked bolts or 'L' hooks. In locations where wind velocities are high, it is essential to provide flat iron wind ties at eaves and ridges. The doors and windows should be fixed before the wall cladding so as to ensure a proper fit of the cladding. It is preferable to commence the cladding at the two ends. The end cladding should commence from the frame to the door. The cladding sheets should be inserted in the ground in a prepared trench about 3 to 6 inches deep, which may be covered to prevent ingress of water etc. The embedded portion of the sheet should be given two coats of bituminous paint. This would prevent insects creeping into the hut. The surrounding ground should be dressed to a slope to drain off the rain water or alternatively the trench may have a suitable drain off.

The fixing of the lining should commence from the bottom and move towards the ceiling. The lining materials may either be fixed on the purlins or to the frame. In the latter case the ribs are covered giving a smooth interior but the space inside the hut is slightly reduced.

Partitions, if required, can be readily provided. It is preferable to partition along the width to utilise the intermediate frame for fixing boards or blocks. Water borne sanitation as well as shelves, fly screens and black-out boards, can be provided where necessary. The hut can also be easily electrified.

Dismantling and packing

The dismantling of the hut should be done in the following order — internal partitions and services, electric wiring, internal lining, timber flooring (if any),

outer cladding, roofing and frame work. The same number of workmen as required for erecting are suitable for dismantling as well. Some light oil should be applied to bolts and nuts which have been in position for some time. They should then be opened out by box spanners. Bolts and nuts should be placed in boxes, as they are removed, according to sizes. The containers should be clearly marked with the descriptions.

The removal of the lining sheets should commence from the ridge followed by those in ceiling and sides. The windows and doors should be removed before the frame work is dismantled. The last two frames should be supported before removing the purlins, cladding rails, etc.

After removal, all identical components should be stacked together. Before packing all components should have their identification numbers clearly marked on them. Small components of different sizes such as, straps, cleats, bolts etc. should be bagged separately according to sizes.

Transport

For a four bay hut, the total weight of the frame, including doors, windows and G.I. sheets in cladding and roofs, is about 2.5 tons. The approximate volume occupied by these materials when packed is about 150 cft. which can be readily accommodated in one 3 ton truck. The internal lining and ceiling weighs about one ton and occupies about 40 cft. which can be transported by another one ton truck. The entire material for a four bay hut could therefore be carried in two trucks, one three tonner and the other one tonner, or could be carried in a single 5 ton public carrier.

Cost

The cost of the hut depends on the cost of materials, labour and also transportation cost of the frames if they are fabricated at a central depot. End bays are costlier than intermediate bays, which makes a hut having more bays cheaper. Based on the prevailing market rates at Roorkee the approximate cost per sq. ft. of floor area for a 4 bay hut works out as follows :

(a) Wooden frame (deodar)	Rs. 2.40
(b) Concrete floor	Rs. 0.60
(c) Roof Covering (C.G.I.)	Rs. 0.84
(d) Side cladding (C.G.I.)	Rs. 0.91
(e) Joinery (Doors & Windows)	Rs. 0.50
(f) Plywood lining	Rs. 1.18
(g) Plywood ceiling	Rs. 0.75
(h) Painting	Rs. 0.22

Total	Rs. 7.40
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