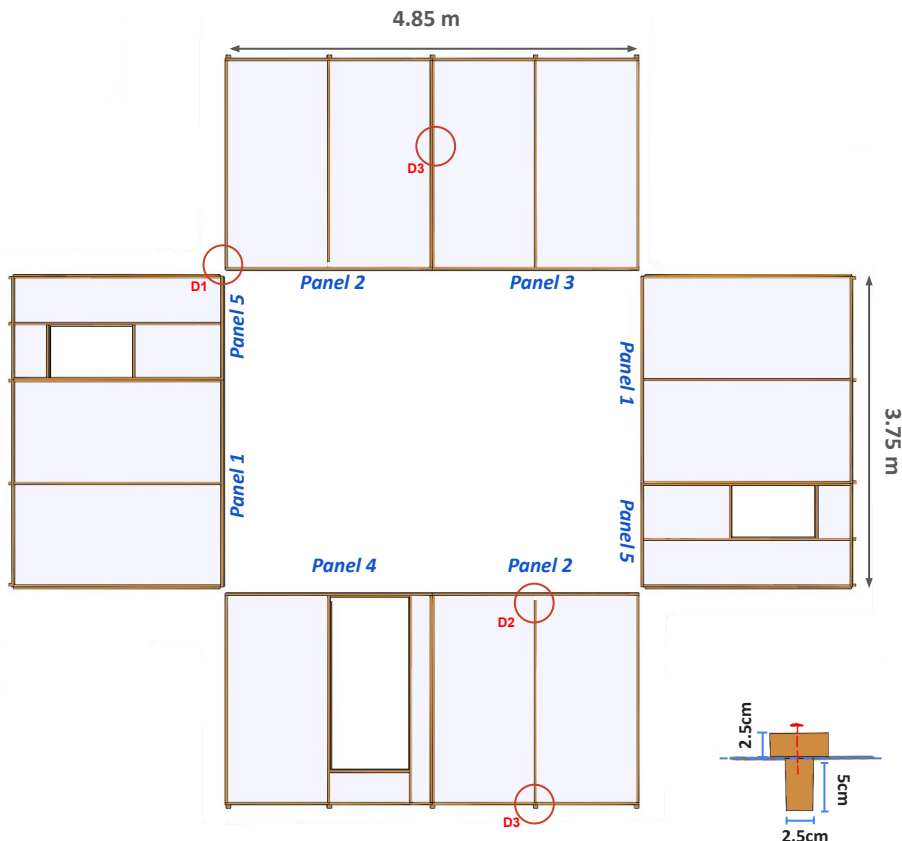
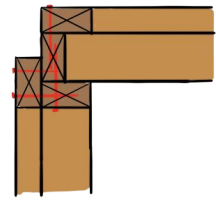


Panel details

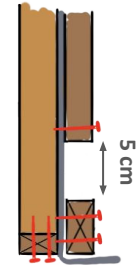


D1



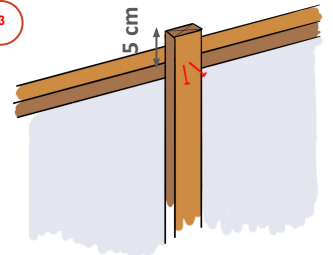
Nailing the panels together at the corners.

D2



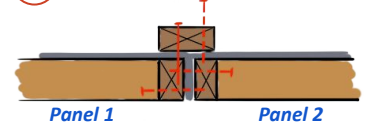
Leave a 5cm gap at the bottom so that the cover strip sticks up 5cm above the frame, to fix the roof truss.

D3



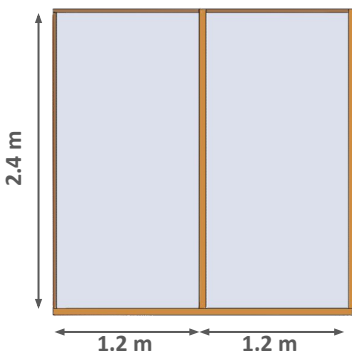
The cover batten attaches the panels together and, on the front and back walls, extends to position and fix the truss.

D4

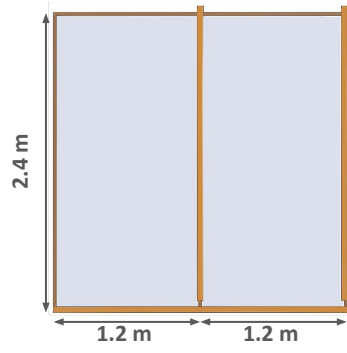


Nailing 2 panels together.

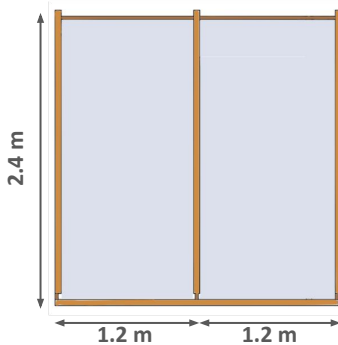
Panel details - Exterior facades, the frame is constructed as T section



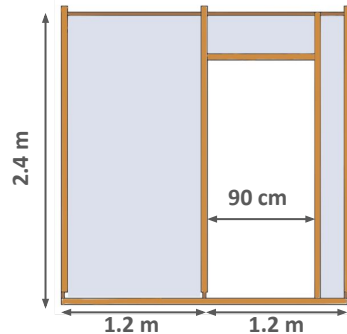
Panel 1: 9 timbers



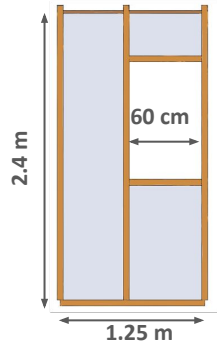
Panel 2: 9 timbers



Panel 3: 10 timbers

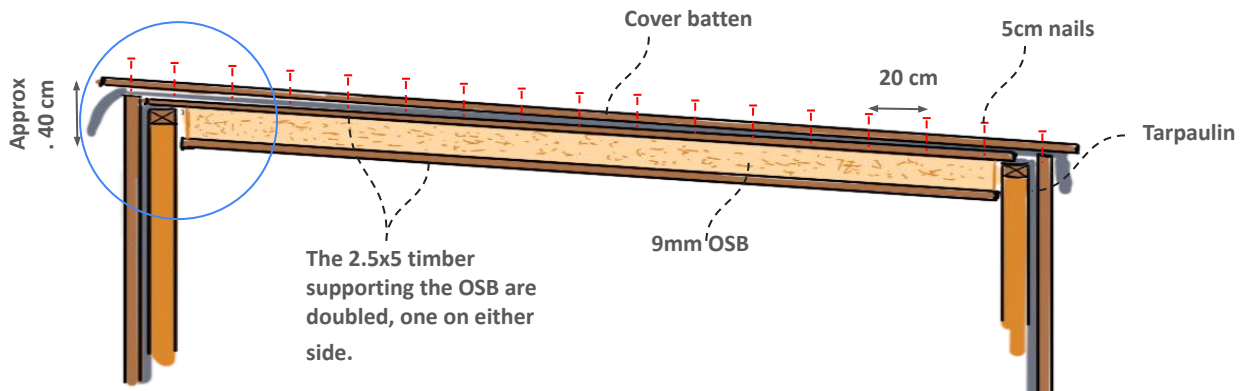
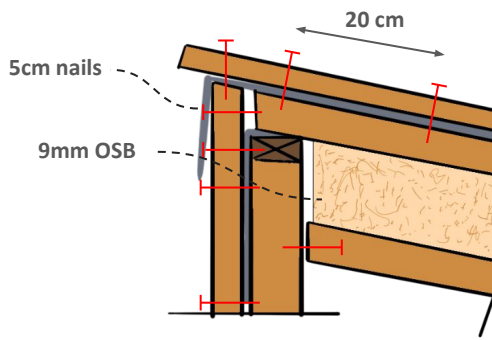


Panel 4 - Door : 10 timbers

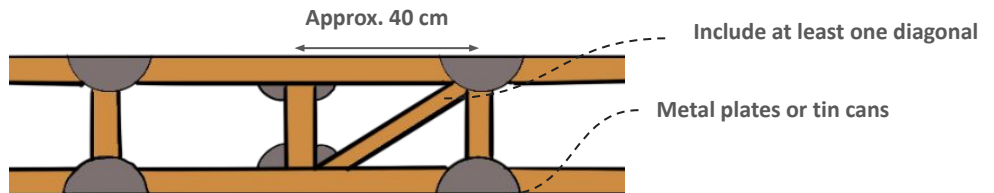


Panel 5 - Window:12 timbers

Mono-Pitched Roof: Trusses

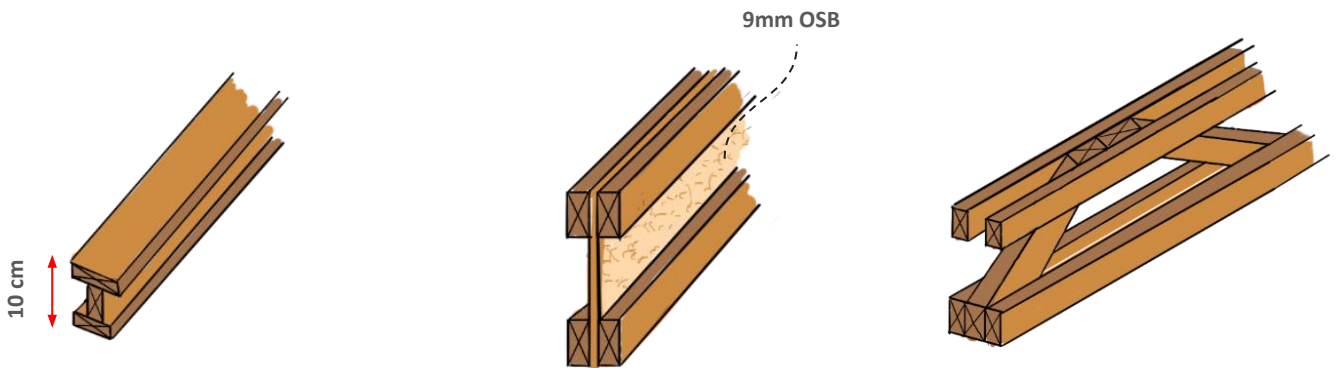


Option 1: 9 or 11mm OSB, or plywood,



Option 2: Metal plates or tin cans

Beams



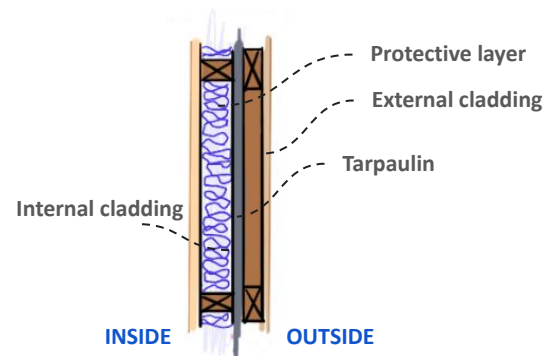
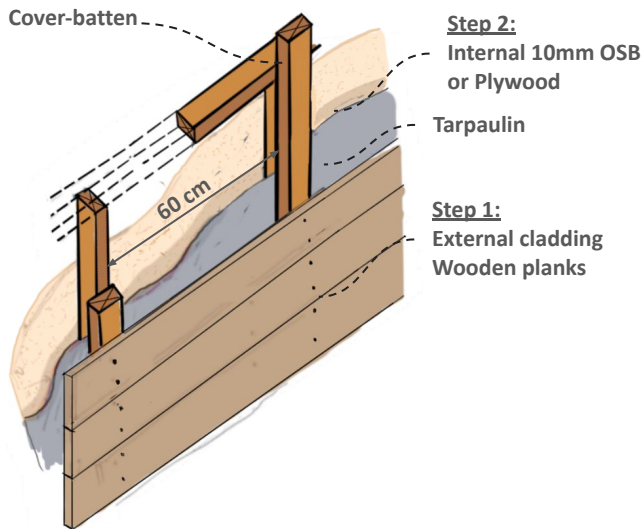
With timber only

Fix 9mm OSB between 4 horizontal timbers

Fix an "open web" timber beam between 4 horizontal timbers

Shelter Upgrade and Improvements

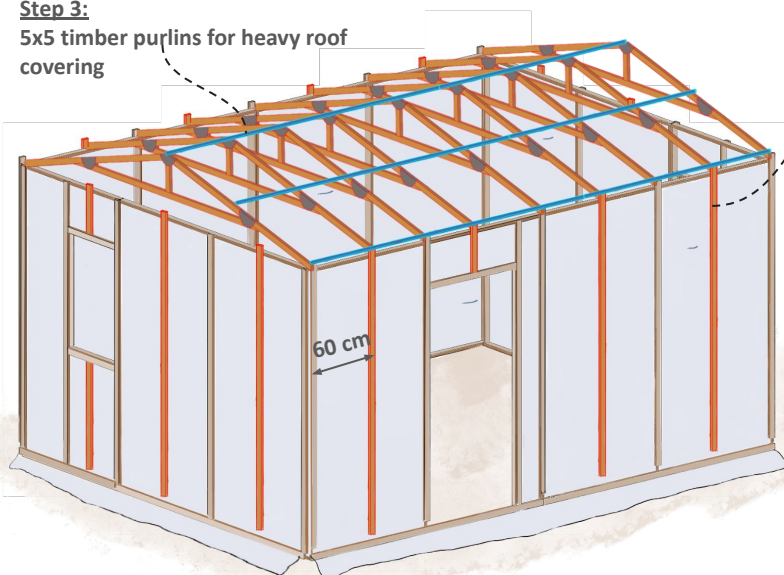
As materials become available, the walls can be improved with internal and external cladding.



9 or 11mm OSB, or plywood, on the inside and wooden planks on the outside - or any other available materials

Plastic, cardboard, plastic bottles, or other suitable materials can be placed between the wall layers to create a protective barrier that helps reduce moisture penetration and prevents water-related damage to the timber.

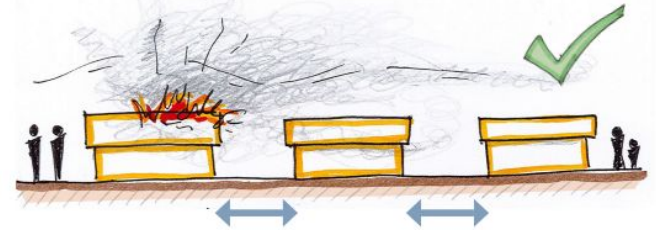
Step 3:
5x5 timber purlins for heavy roof covering



Put in more vertical studs (studs plus cover-battens) so that the spacing is 60cm and not 120cm. The trusses could be at 60cm spacing too and this would help to strengthen the roof for heavier roof covering.

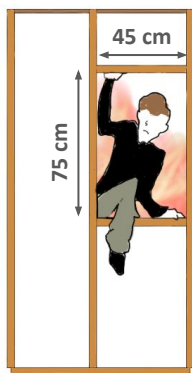
The roof can also be upgraded, but only with light weight material. For any heavier material, including Corrugated Steel (CGI), the trusses or beams would need to be stronger to support extra weight.

Safety: Fire and Extreme Heat

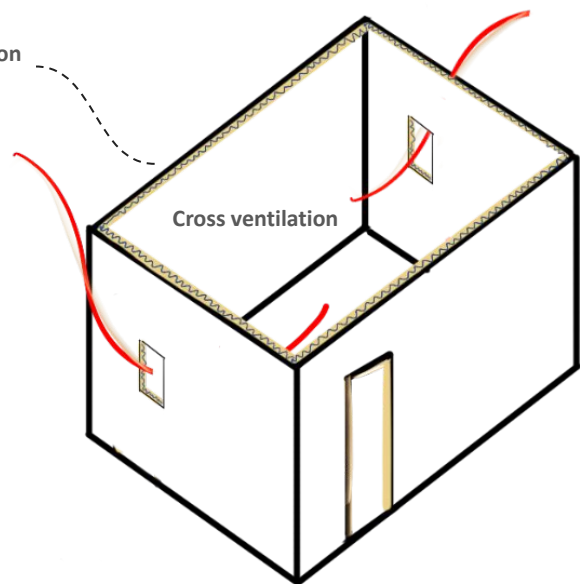


Reference: Shelter Cluster website, Basic Guidance on Shelter Upgrading, Cox's Bazar Crisis

Keep a distance of at least 2 to 3m between buildings to reduce the risk of fire spreading.



5cm insulation



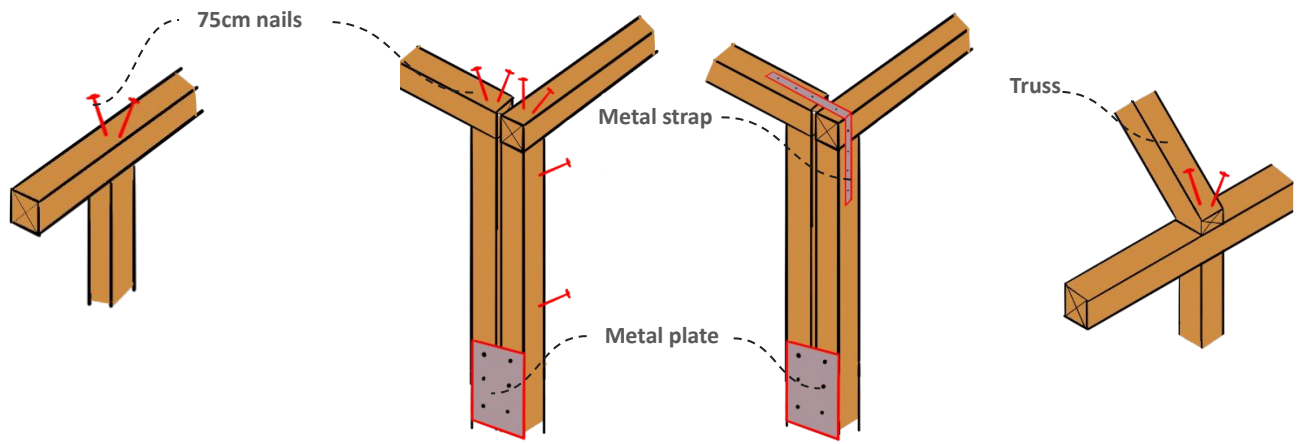
Make window openings at least 45 cm wide and 75 cm in height for escape in the case of fire.

Adding a minimum of 5cm of insulation to the walls and roof will also reduce the risk of very high temperatures in summer.

HELPFUL TIP

To ensure good cross-ventilation, windows should be at least 40x40 cm on opposite sides.

5x5 Timber: Good Practice

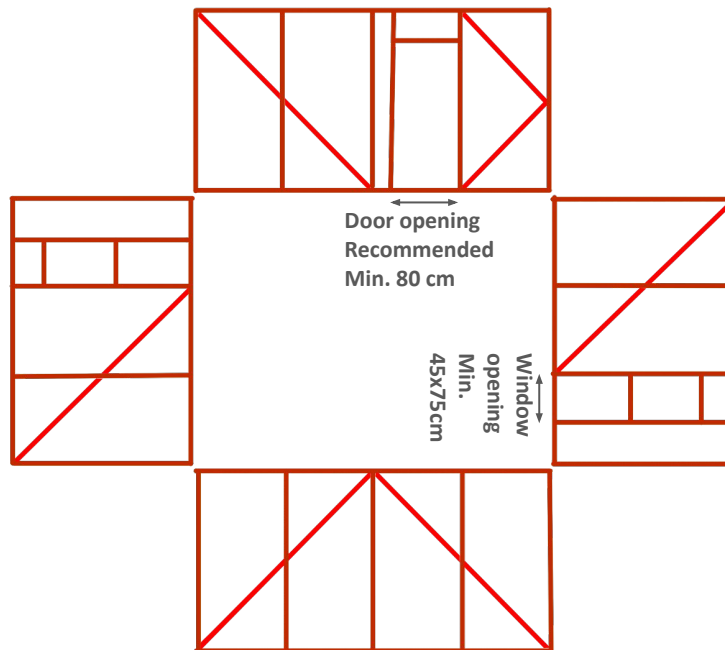


“Skew nailing” hammer in the nails at a slight angle

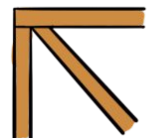
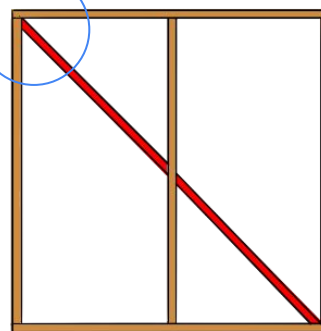
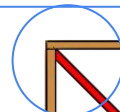
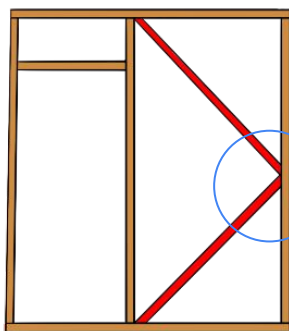
Fix the cornes securely. Metal plates from used tin cans can be used.

Connect the trusses or beams securely.

5X5 timber schematic layout showing alternative bracing



5x5 timber structures must be braced on **all four walls, the corners, and the roof trusses**

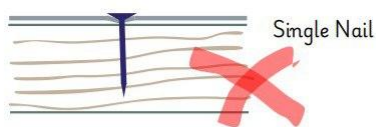


K-bracing used for door panel. The point of the K bracing must be into a corner.

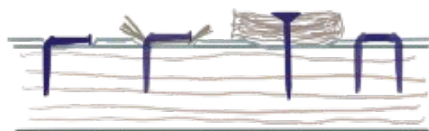
Node to node for other panels

5x5 Timber: Good Practice

WEAKER

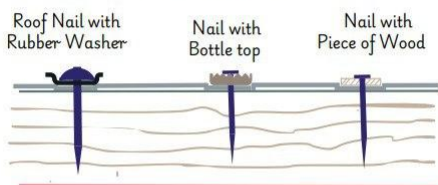


Standard nails will easily pull through plastic sheeting as they have small heads



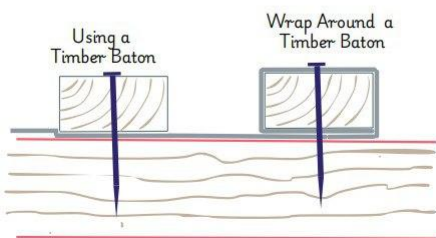
Standards nails can be improved by bending them or nailing them through folded plastic sheet or rope. U-shaped fencing pins can also be used.

Spread the Load



Standards nails can be improved using washers or bottle caps (sharp side away from plastic) to spread the load. Alternatively domed head nails can be used.

STRONGER



Using timber battening is very good for spreading the load.

Plastic sheeting should be folded over on itself at connection points.

Plastic sheeting is best fixed so as to spread the load along the (smoothed) edge of the supporting structure.

Reference:

1. Shelter Cluster website, Hurricane Beryl 2024 - Regional Response, Fixing tarpaulin
2. OXFAM Technical Brief – Plastic sheeting use and procurement in humanitarian relief

HELPFUL TIP

Once good-quality plastic sheeting is procured, it's essential to fix it in a way that spreads the load, prevents flapping, avoids friction points, and limits heat buildup. To avoid tearing, fixings should be distributed over a wide area.