

# EMERGENCY SHELTER KIT + (ESK+)

The Emergency Shelter Kit Plus (ESK+) is an enhanced version of the standard Emergency Shelter Kit (ESK), developed to provide households with a more durable shelter solution.

While the original ESK offers the essential components needed to rapidly establish a basic covered living space, the ESK+ introduces significant upgrades to the flooring, wall cladding and roofing system.

The ESK+ remains fully compatible with the core ESK design and construction method, while providing households with a upgraded shelter option when additional materials are available.

This document was developed by:



# Emergency Shelter Kit – Essential Components

## **TIMBER BATTEN 5x2.5cm** 110 PCS

Structural timber sections (5x 2.5cm x 2.4 m) rectangular shaped high quality free of knots- minimum density: 370 KG/cubic meter - untreated. C16 or C24 graded timber.



## **TIMBER BATTEN 5x5cm** 12 PCS

Structural timber sections (5x5 cm x 2.4 m) rectangular shaped high quality free of knots. Used for roof purlins.



## **NAILS 50mm** 3.5 KG

Hot galvanised iron, for wood, 5cm (2") Used for structural joints and fixing cover-battens.



## **ROOFING NAILS 65mm** 1.8 KG

65 mm Spring Head Nails – Galvanised Twisted Shank for Corrugated Sheeting & Roofing Fixings – Medium Duty Rust Protection



## **CORRUGATED GALVANIZED IRON (CGI) SHEET** 12 PCS

Galvanized with a thickness of 0.47mm. 90cm width and 2m length. Overlaps of at least 150mm.



## **GRAVEL** 1.73 M<sup>3</sup>

The flooring will include a gravel layer made of crushed stone or gravel. 100mm thick and well-compacted before applying the screed.



## **SAND** 0.64 M<sup>3</sup>

For flooring. Used for the cement screed.



## **TARPAULINS** 4 PCS

Tarpaulin sheet UNHCR/IFRC standard specs: standard size (4x6m); Woven high-density polyethylene (HDPE) fabric laminated on both sides with low-density polyethylene (LDPE) coating White color 2 used for structure, 1 for flooring, 1 for internal partition



## **WIRE NAILS 40mm** 1 KG

40 mm galvanised wire nails, suitable for fixing OSB panels to timber battens.



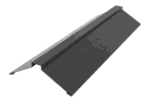
## **ROPE 6mm** 30 M

Polypropylene, diam. 6mm, minimum 3 strands, twisted



## **CGI RIDGE CAP** 2 PCS

3m length x 400mm. An overlap of at least 150 mm between adjacent ridge caps is required



## **OSB** 14 PCS

Used for internal cladding, 1.22x2.44m Each board should be 9mm thick, with dimensions of 1.22m by 2.44m and a density of approximately 600–650kg/m<sup>3</sup>. Panels should be fixed using galvanized nails or screws spaced at 300mm intervals



## **CEMENT**

For flooring, A cement screed applied over the gravel. 50mm thickness. The mix ratio should be 1:3 (cement to sand). Roughly 12x 25kg bags of cement.



# Emergency Shelter Kit – Essential Components

## SHOVEL

**1 PCS**

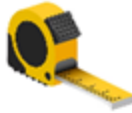
Head with sharpened tip in forged steel which is tempered and hardened. Supplied with a handle. Total length: 100 to 110 cm.(good quality)



## MEASURING TAPE

**1 PCS**

3 meters, graduated in centimetres.



## HINGES 75MM

**4 PAIRS**

Galvanized and rust resistant steel hinges suitable for timber window and door shutters. Hinges to be fixed with appropriate screws. (2 pairs for windows, 1 pair for door).



## CLAW HAMMER

**1 PCS**

Claw Hammer - Weight: 0.45 kg. Fiberglass/metal handle, unbreakable. Head in forged steel. Good quality.



## HAND SAW

**2 PCS**

All-Purpose. Blade length of 500mm and an overall length of approx. 640mm. 8 or 9 TPI (teeth per inch), hardpoint teeth from tempered and hardened steel. Unbreakable handle and good saw blade.



## SCALPEL\*

**1 PCS**

A cutting scalpel with blades, suitable for light and medium work. Easy to use



## SCREWS

**24 PCS**

Galvanized wood screws, 35mm length, for securing hinges to timber frames. Screws to match hinge type. NB: Hinges may come pre-packaged with their own screws



\*Note: It is recommended that items such as scalpel, for which approvals are uncertain should be palletized separately

# Emergency Shelter Kit – Maintenance Components

## DUCT TAPE

**2 ROLLS**

Adhesive/duct tape of 25-meter length, water resistance – Extra Heavy Duty, 50mm



## PLIERS

**1 PCS**

Combination pliers 150mm, 34mm jaw



## PLASTIC FILM

**50 M<sup>2</sup>**

Plastic film 0.3mm thick, up to 50 sqm per shelter. Minimum width 4m



## BAG

**1 PCS**

Heavy water-resistant cotton canvas. Strong webbing handles and heavy-duty nylon zip for distribution of the items 50kg



## ROPE 3mm

**30 M**

Polypropylene, diam. 3mm, minimum 3 strands, twisted



## NEEDLE

**1 PCS**

Stitching, curved, 127mm x 1.8mm, hole 1x7mm



## SANDBAGS

**21 PCS/LAYER**

Empty woven polypropylene (PP) or polyethylene fabric sacks, 50 cm x 80 cm, minimum 80 GSM. Holds approx. 25–30 kg of sand or soil



## TIE WIRE

**1 ROLL**

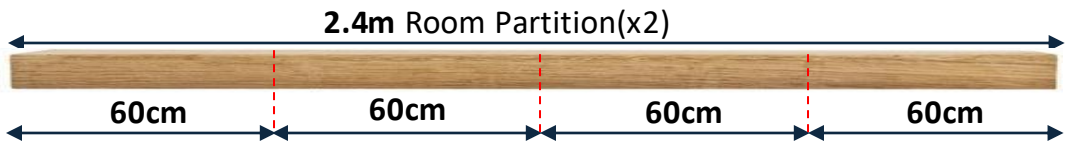
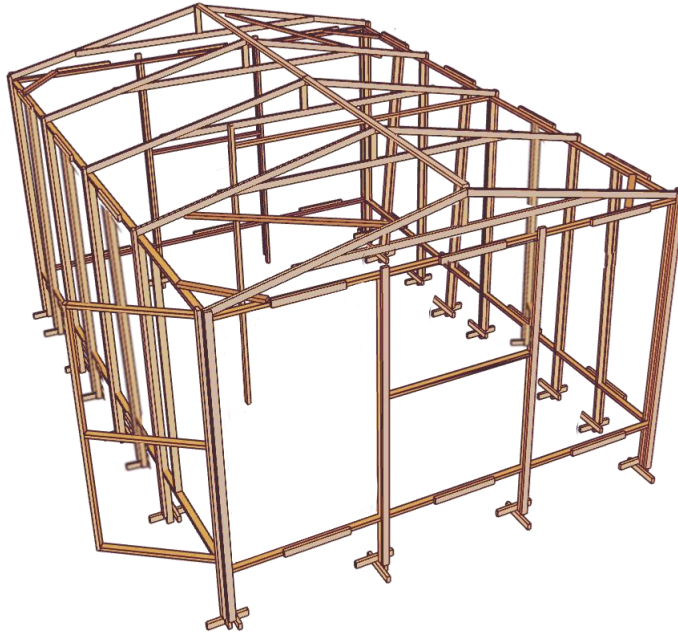
Galvanised, diam. 1.5 mm, roll



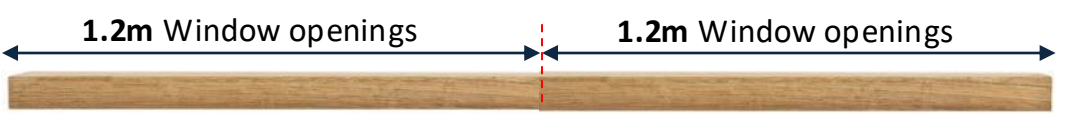
# ESSENTIAL MATERIAL REQUIREMENTS

Shelter component	Timber quantity	Tarpaulin quantity
Walls	Panels: 68, Door: 3, Windows: 4, Securing tarp: 4, Corner braces: 1	2
Roof	Truss x9: 27, Ridge: 2, truss braces 1	0
Floor	—	1
Partition	—	1
<b>TOTAL</b>	<b>110</b>	<b>4</b>

## Number of nails: 2KG

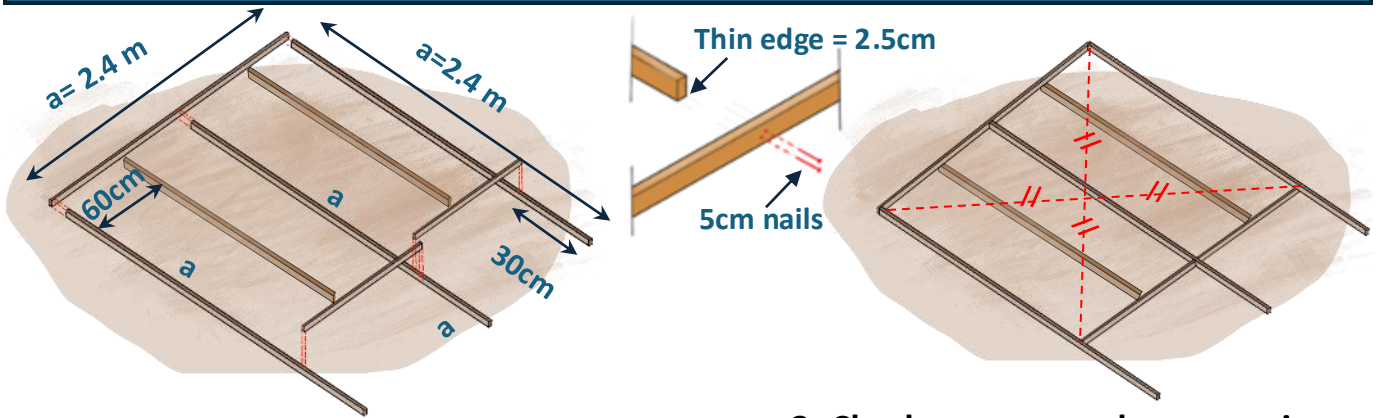


Corner bracing, Door, Center or Rafter, Anchoring



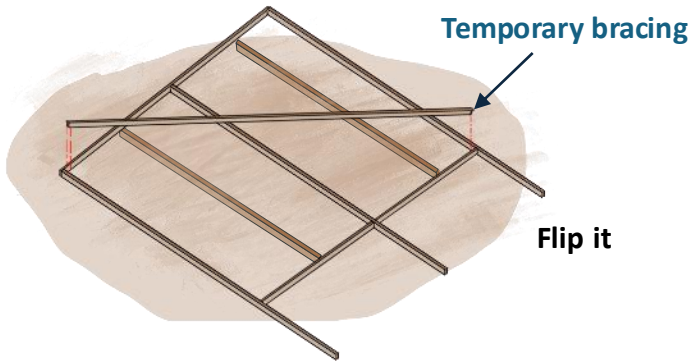
# How to Build Wall Panels

Before starting to build your shelter, always clear the area of debris, rocks, and plants, and flatten the ground to create a stable and safe base.



1. Lay out the pieces of timber, standing them up on the thin edge. Nail the timber together using 5cm nails.

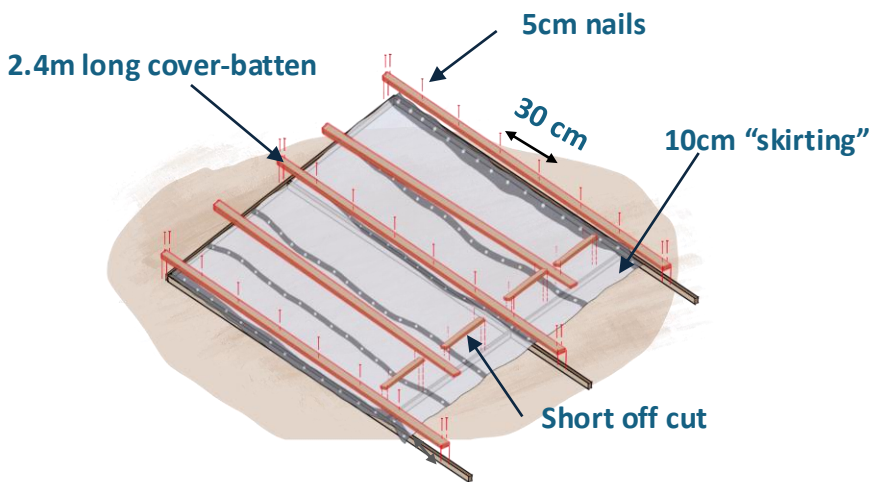
2. Check squareness by measuring both diagonals, measurements should be equal.



3. Add temporary bracing (of any size) to hold the panel square, then flip it to fix the tarpaulin.

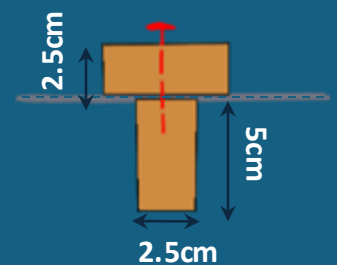


4. Lay tarpaulin over the frame, leaving 10cm below to prevent water entry and aid anchoring.



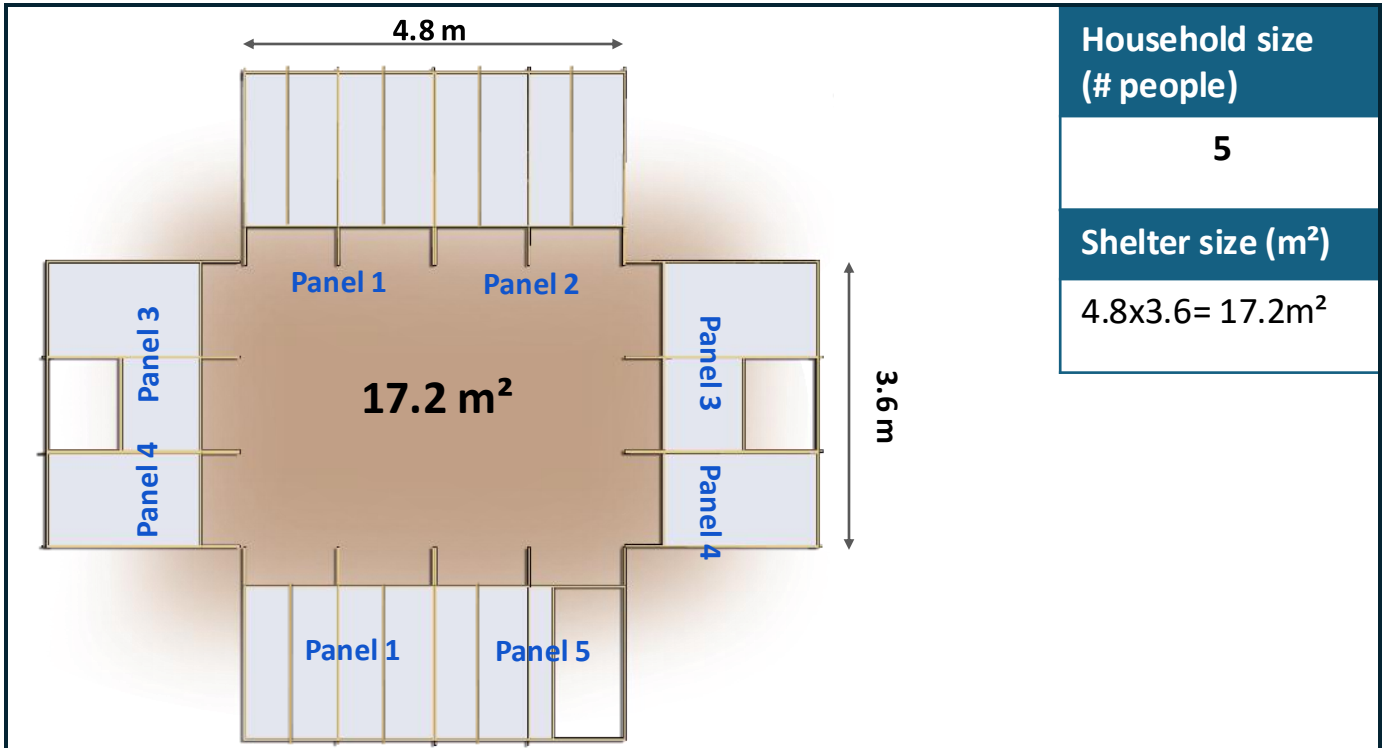
5. Fix tarpaulin with 5 cm nails through 2.4 m cover battens at 30 cm spacing, then add short horizontal battens over it.

The frame is constructed as a T-section which makes it strong.



The tarpaulin should be pulled tight to keep the structure square, but not so tight that it bends the timber.

# Wall Panels Details



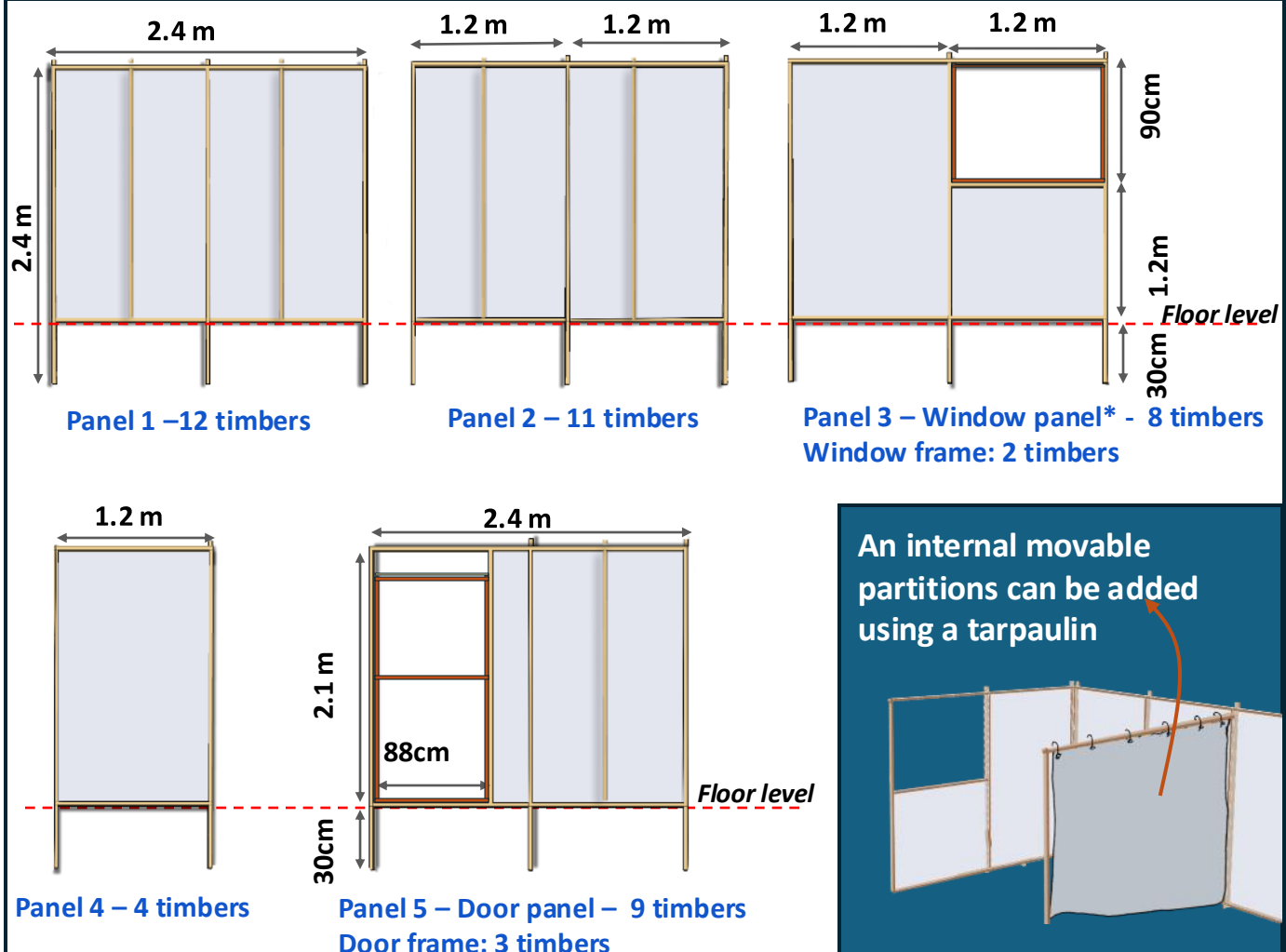
Household size  
(# people)

5

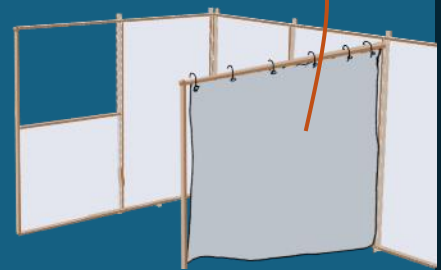
Shelter size (m<sup>2</sup>)

4.8x3.6= 17.2m<sup>2</sup>

Embed poles 30 cm deep, keep internal height at 2.1 m  
Install door and window shutters with hinges and screws.

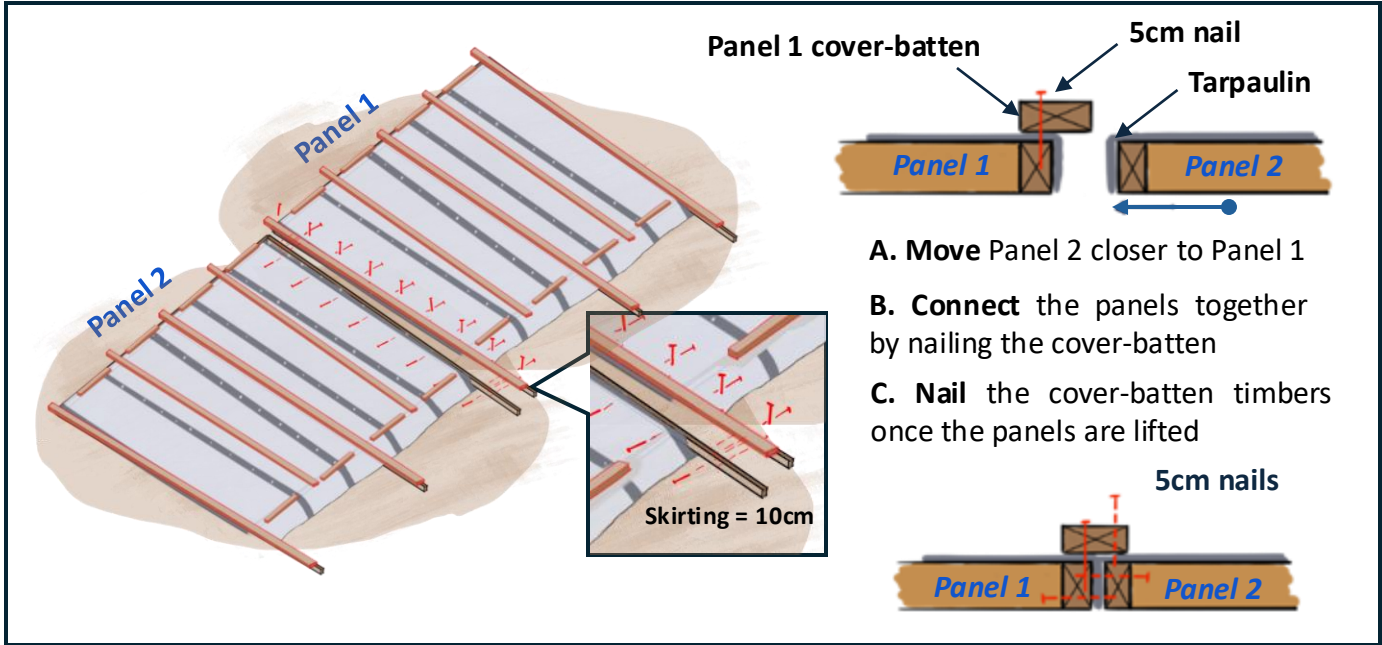


An internal movable  
partitions can be added  
using a tarpaulin



\* Households are advised to choose door and window sizes and position based on their privacy and security needs.

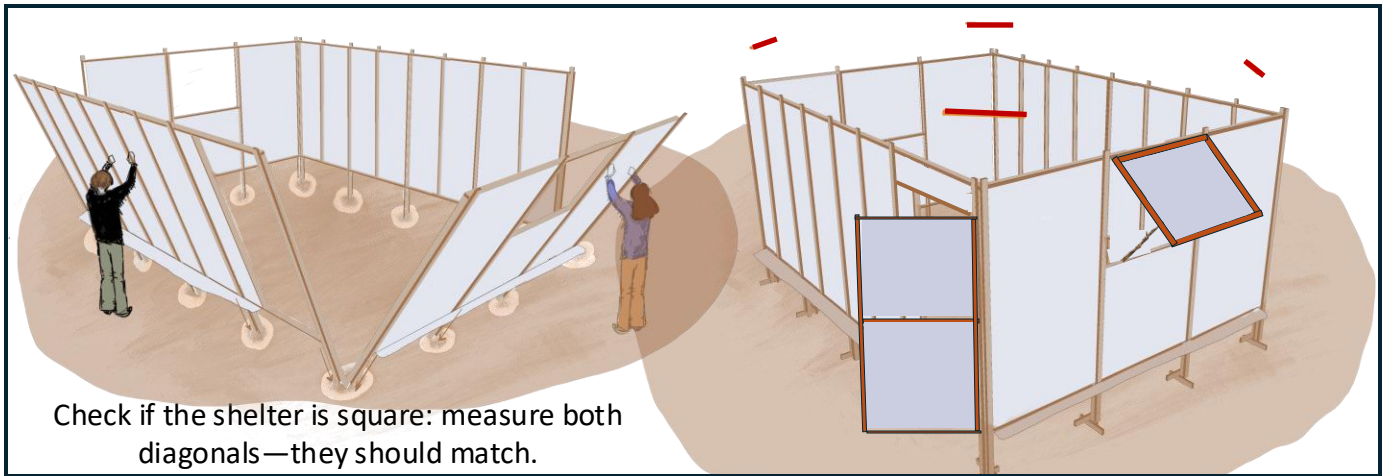
# Wall Panels



- A. **Move** Panel 2 closer to Panel 1
- B. **Connect** the panels together by nailing the cover-batten
- C. **Nail** the cover-batten timbers once the panels are lifted

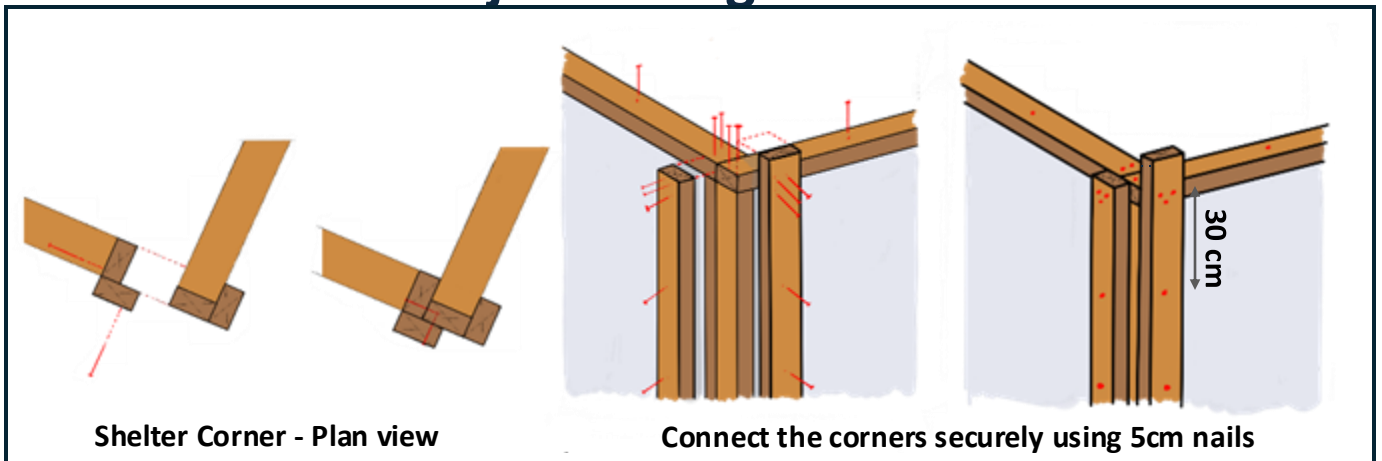
## Lift the panels together.

## Add corner bracing



**Add door and window frames\***: a side-hinged door and two top-hung windows that serve as a canopy for privacy, weather and sun protection.

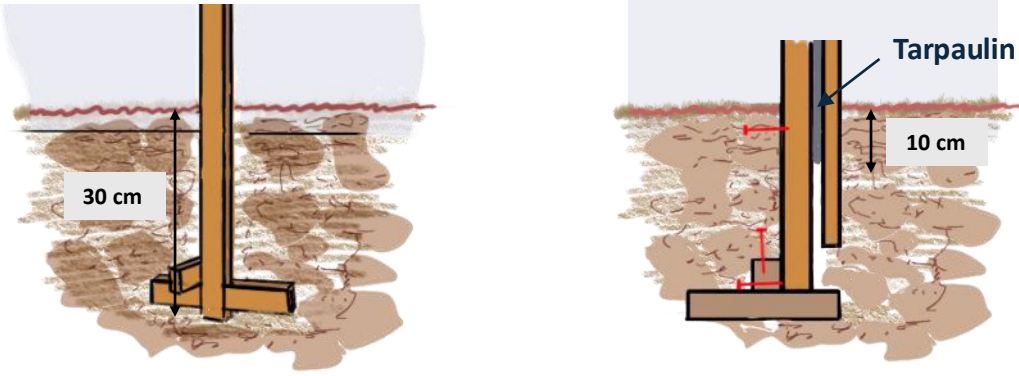
## How is the corner joined together?



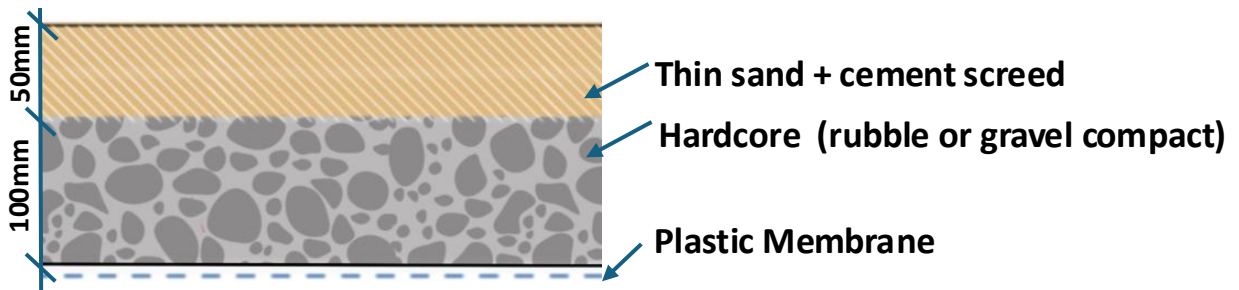
\* Households can add mesh for insect protection and privacy. A canopy can be installed over doors to reduce water ingress.

# Anchoring and Flooring

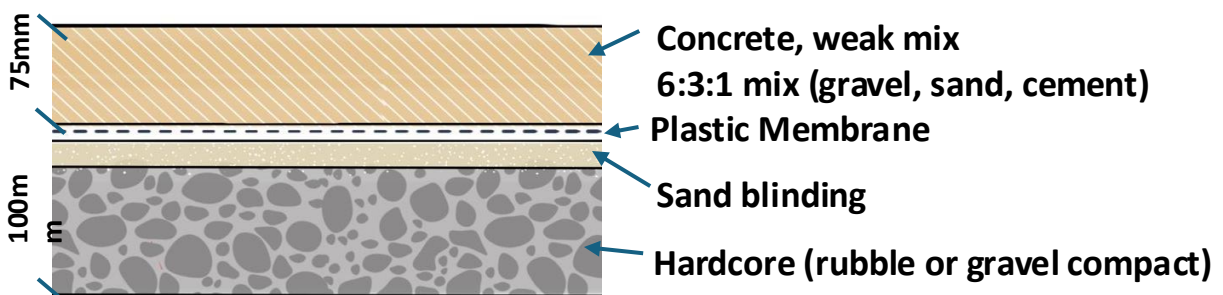
Embed poles 30 cm deep. Bury tarpaulin edges 10 cm into the ground.



<b>Cement Screed</b>	A cement screed will be applied over the gravel with a thickness of 50mm. The mix ratio should be 1:3 (cement to sand). For the given floor area, the screed volume will be about 0.86m <sup>3</sup>	12x25kg cement + 0.64 m <sup>3</sup> sand
<b>Hardcore (Gravel)</b>	The flooring will include a gravel layer made of crushed stone or gravel. The layer should be 100mm thick and well-compacted before applying the screed.	1.73 m <sup>3</sup>
<b>Plastic membrane</b>	Protects the floor from dampness (Damp proof membrane)	1



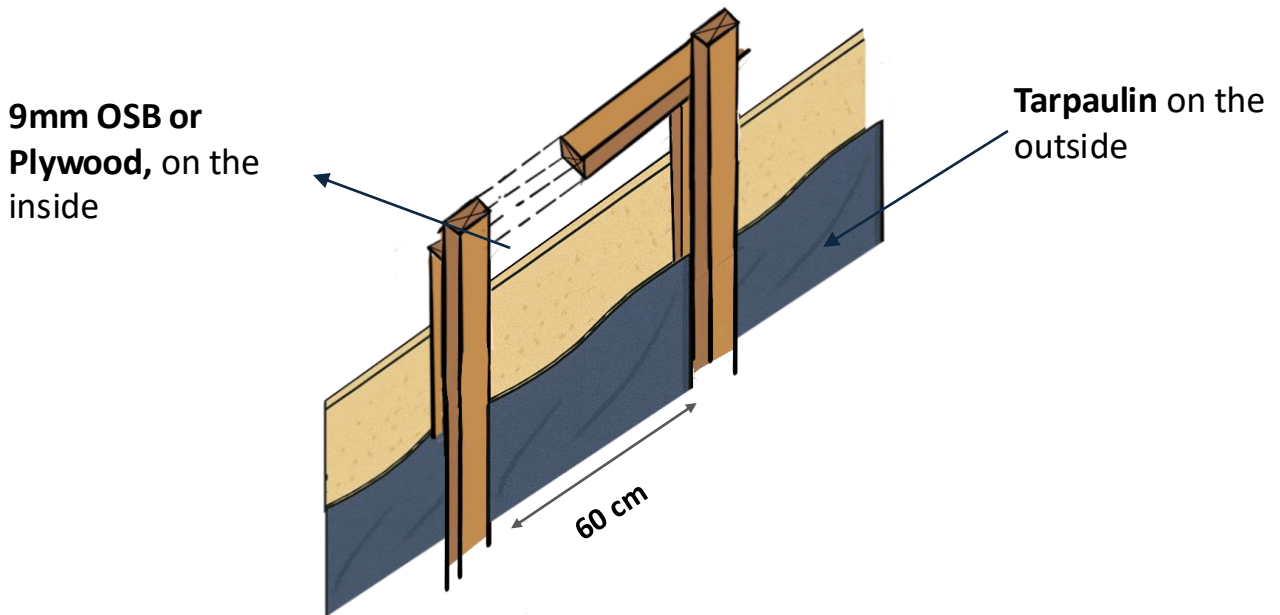
<b>Concrete mix</b>	Place concrete using a 6:3:1 ratio Gravel = 0.774 m <sup>3</sup> Sand 0.387 m <sup>3</sup> Cement bags : 8 bags	1.29 m <sup>3</sup> concrete mix
<b>Sand blinding</b>	10mm thickness to protect plastic sheet from sharp points	~ 0.2 m <sup>3</sup>



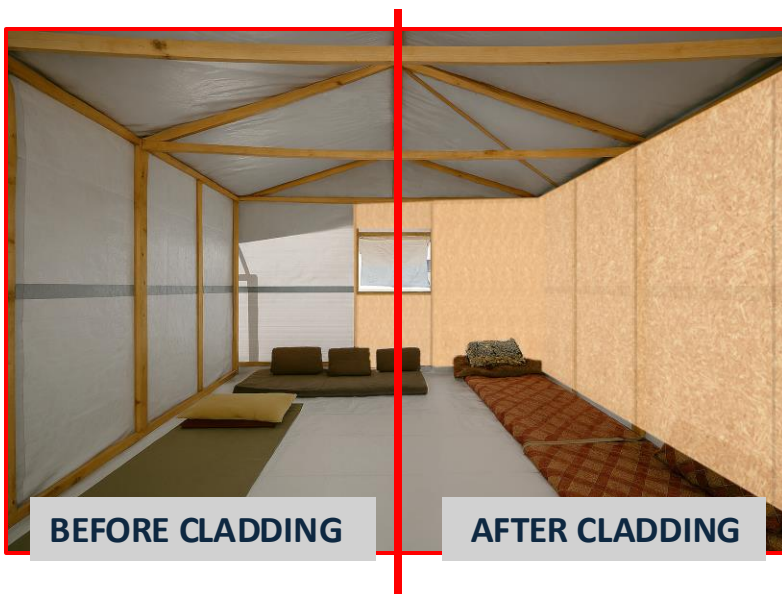
\*When materials are available, building a proper foundation improves the durability of the shelter.

# Walls –Cladding Options

<b>OSB or plywood</b>	Used for internal cladding, 1.22x2.44m Each board should be 9 mm thick, with dimensions of 1.22m by 2.44m and a density of approximately 600–650kg/m <sup>3</sup> . Panels should be fixed using galvanized nails or screws spaced at 300mm intervals	14 pieces
<b>Nail 40 mm</b>	Hot galvanised iron, used for fixing the internal cladding.	1.5 kg



**Use full OSB cladding whenever possible.** It gives the wall enough strength to support the trusses. **If materials are limited, you may use half-height OSB cladding.**



**Half-height or no OSB does not support the trusses.**

# Walls - Cladding Options

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

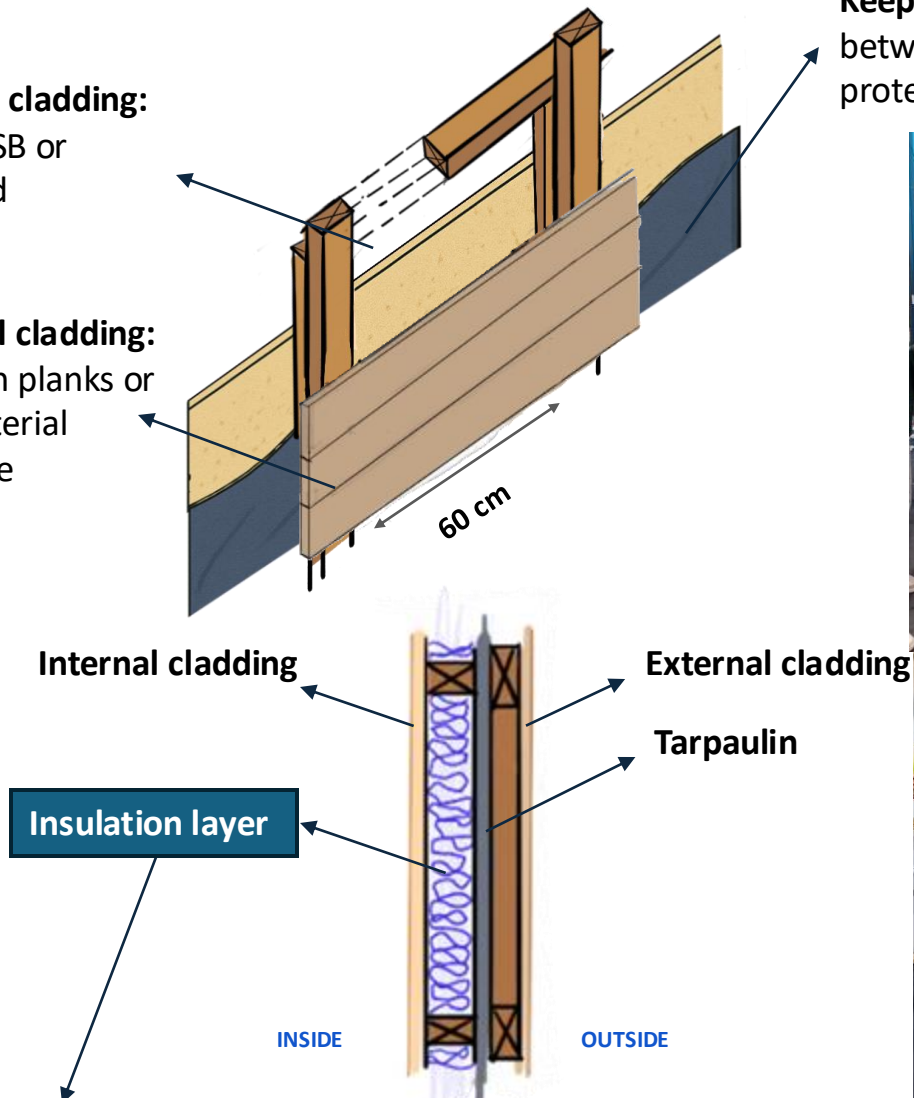
## Internal cladding:

9mm OSB or Plywood

## External cladding:

Wooden planks or any material available

Keep Tarpaulin in between and add a protective layer



When available, place an insulation material between the tarpaulin and the internal walls. This will protect against the heat and cold.

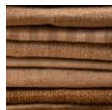
## Reused materials:



Cardboard



Plastic

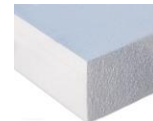


Fabric

## Imported materials:



Rockwool



Polystyrene foam board



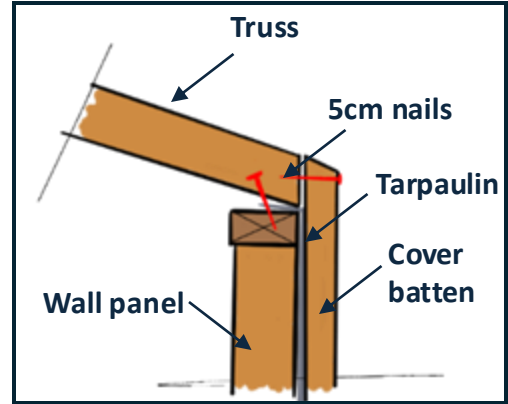
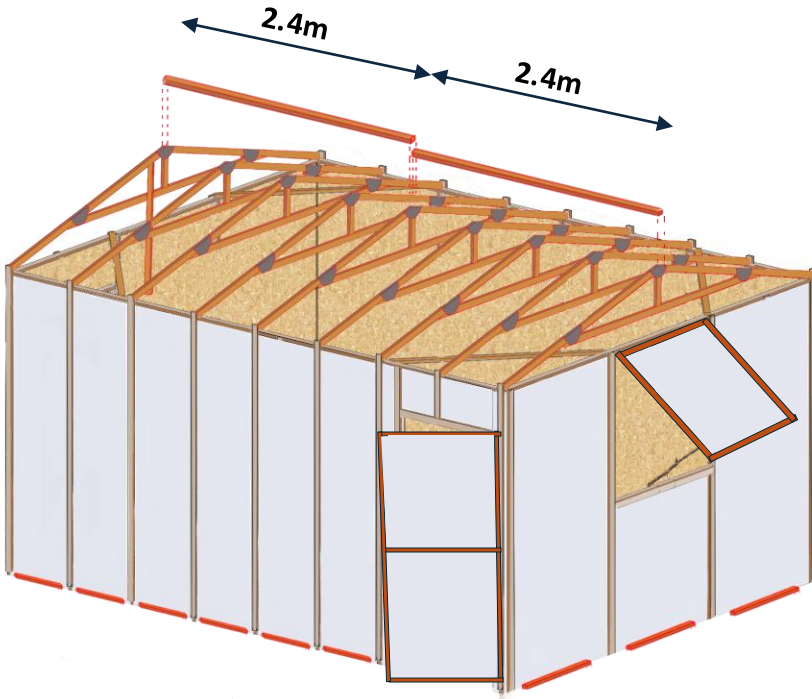
Celotex insulation board

**!! Don't reuse materials that contain asbestos !!**

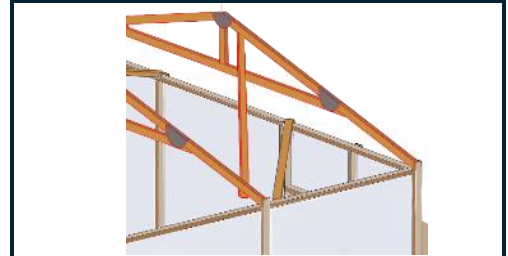
**Seek professional advice on handling hazardous materials**

# Pitched Roof

Use two 2.4 m lengths for the ridge beam. They connect the trusses and support the tarpaulin.



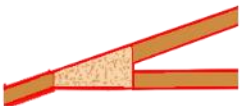
Timber connection detail - 01



Fix diagonal braces at both ends, attach them to the underside of the first two and last two trusses.

## Alternative 01:

OSB or plywood gusset plates for stronger joints



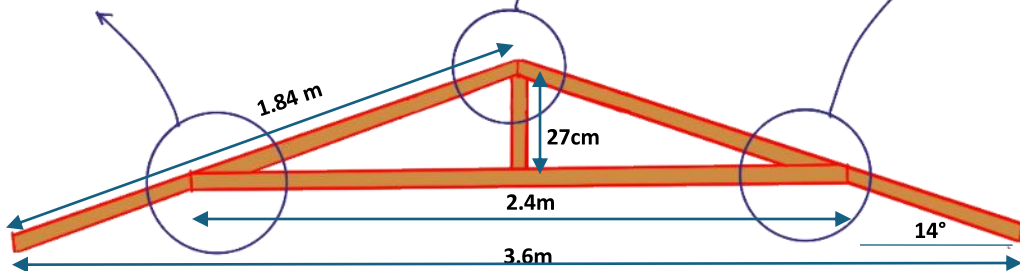
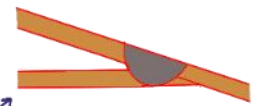
## Alternative 02:

Horizontal pieces of timber are doubled, one on either side.



## Alternative 03:

Used tin cans can make strong connections when OSB or plywood is unavailable



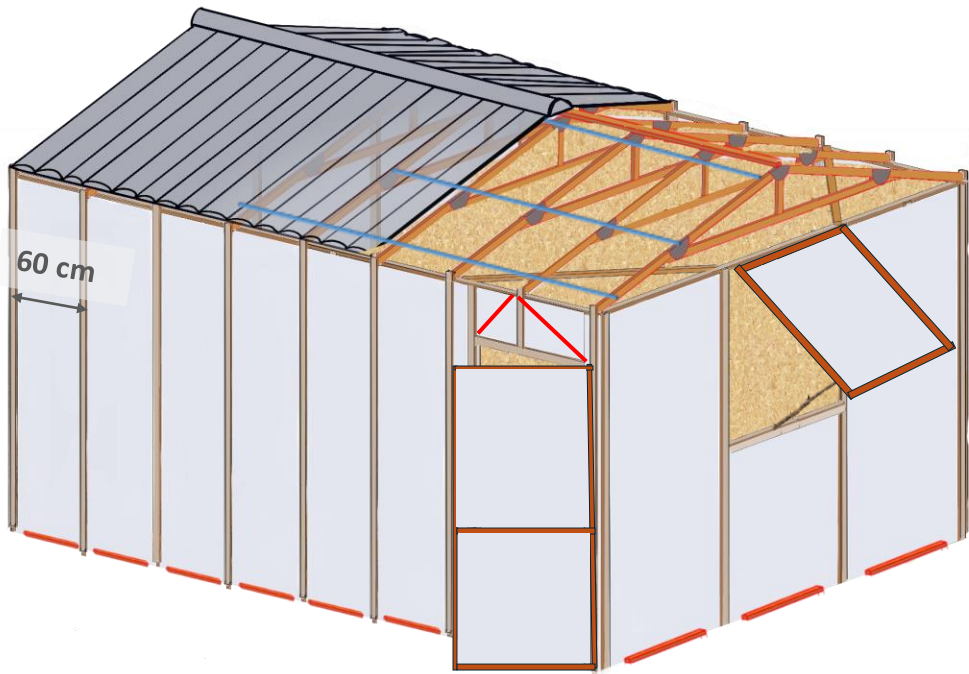
To ensure uniformity and save time, construct all trusses simultaneously by stacking them one on top of the other or using one as a template. This approach guarantees that each truss is identical and reduces the risk of errors during the assembly process.

# Roof Cover

<b>Timber</b>	Structural timber sections 5x 2.5cm, length 2.4 m	26 pieces
<b>Nails 50 mm</b>	Hot galvanised iron, for wood, 50mm (2") Used for structural joints and fixing cover-batten.	1 kg
<b>CGI sheet</b>	Galvanized with a thickness of 0.47mm (28 gauge). 90cm width and 2m length. Overlaps of at least two full corrugations (150mm).	12 sheets
<b>CGI Ridge cap</b>	3m length x 400mm. An overlap of at least 150 mm between adjacent ridge caps is required	2 pieces
<b>5x5cm timbers</b>	For purlins use 5x5 cm timber length of 2.4 meters.	12 pieces
<b>Roofing Nails</b>	65 mm Spring Head Nails – Galvanised Twisted Shank for Corrugated Sheeting & Roofing Fixings – Medium Duty Rust Protection	1.8 kg

## Add 5x5cm Timber Purlins before adding the CGI sheets.

- Install three purlins across the trusses:
  1. One at the top,
  2. One in the middle,
  3. One at the bottom

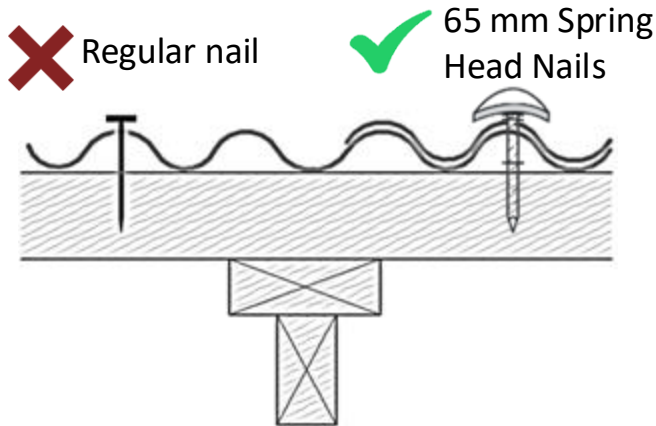
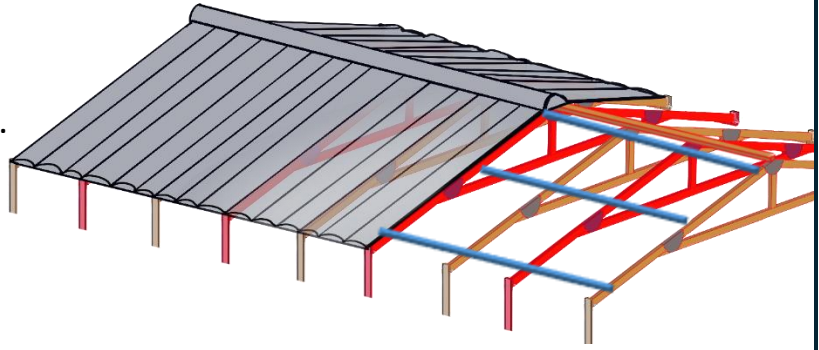


**A sloped canopy can be added above the door to prevent rainwater entry. If there is space, extend the canopy sideways to create a sheltered cooking space**

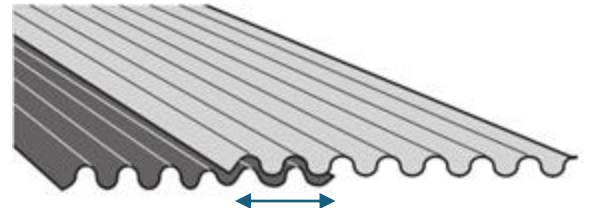
# A Good Shelter Needs a Good Roof – CGI Roof

## Cover the Roof with CGI Sheets

- Lay CGI sheets over the purlins.
- Overlap sheets by at least two full corrugations to prevent leaks.
- Fix sheets using roofing nails.
- Fix the ridge cap.

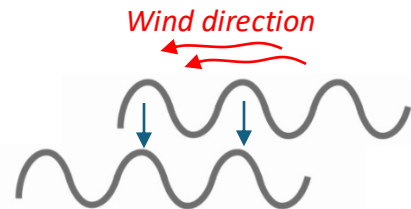
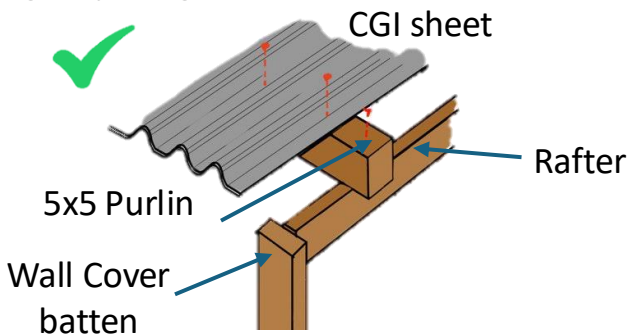


**Do not flatten corrugation when nailing, nail carefully!**  
**Always try to wear your protective gear!**

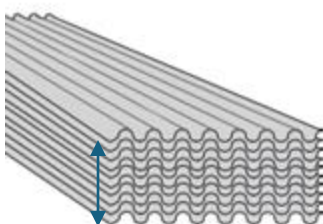


Have a minimum **overlap of at least 2 full corrugation between sheets**

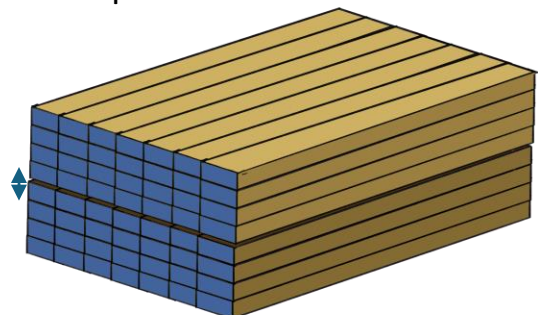
**Secure roofing materials firmly !**  
By using the appropriate fasteners at the right spacing



**Don't** stack CGI in piles higher than 120cm



**Stack timber safely** with 1 cm gaps between each layer to ensure ventilation. Apply paint to the ends of all timber pieces.



# EMERGENCY SHELTER KIT +



**With internal cladding only**



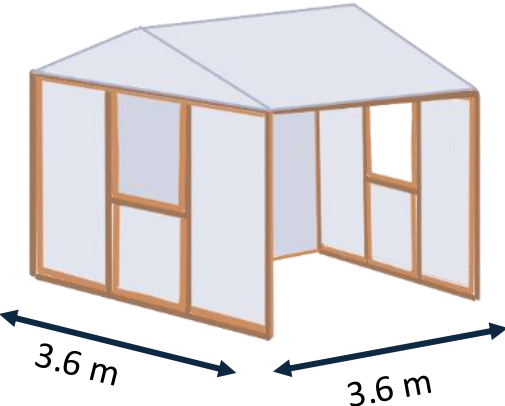
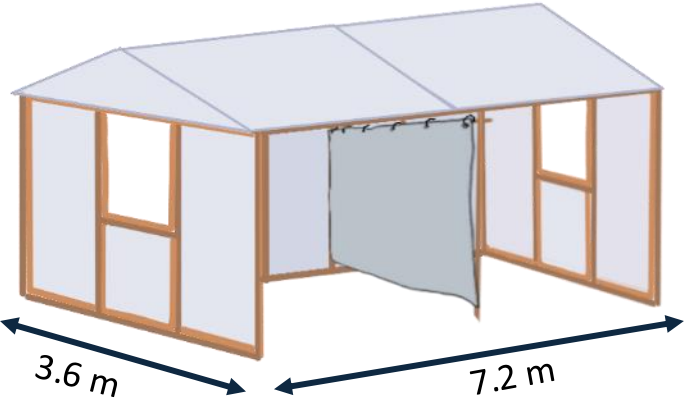


**If materials are available, add an external cladding**

## Modular Shelter Extensions for Adaptable Space Needs

The modular design of the shelter enables easy extension to accommodate households of varying size.

To avoid weakening the structure, **the shelter width should not exceed 3.6 m**, while the length can be adjusted as needed.

In the following section, we will explore adaptable models that allow for incremental extensions using the same panel system described on page 5.

	
<p><b>Household Size*</b></p>  <p>3-4 people</p>	 <p>6-7 people</p>
<p><b>Shelter size</b></p> <p>3.6x3.6= 13 m<sup>2</sup></p>	<p>7.2x3.6= 26 m<sup>2</sup></p>

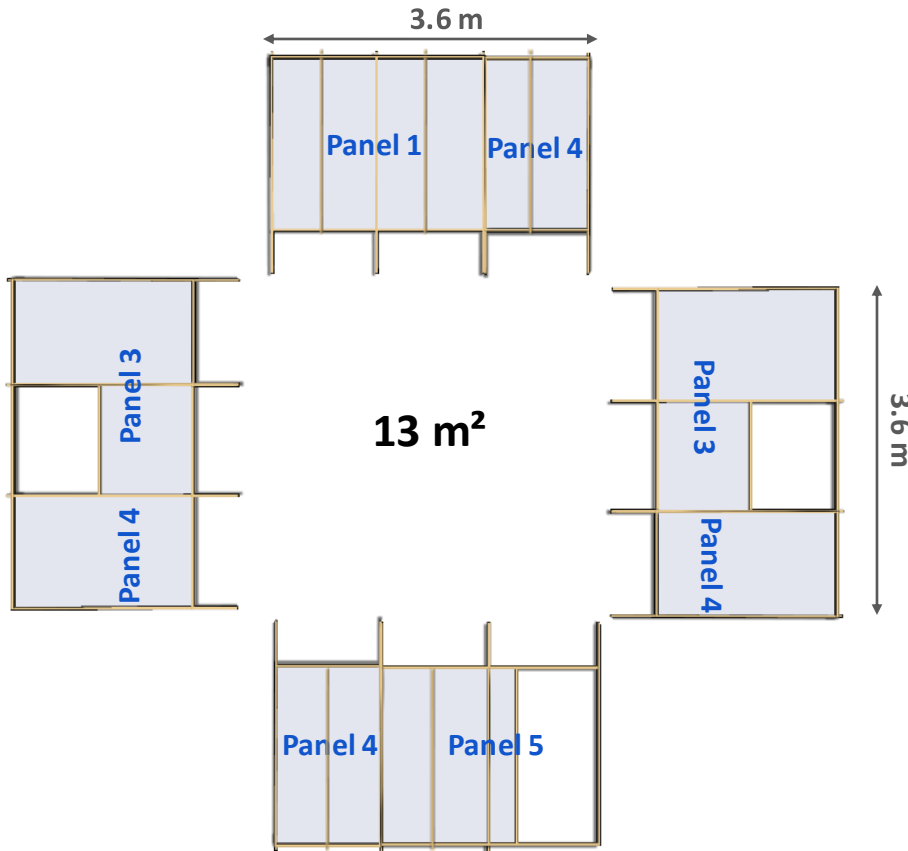
## HOUSEHOLD SIZE (# PEOPLE)

## SHELTER SIZE (M<sup>2</sup>)

3

3.6x3.6= 13 m<sup>2</sup>

4



### ESSENTIAL MATERIAL REQUIREMENTS

Shelter component	Timber quantity	Tarpaulin quantity
Walls	Panels: 67, Door: 3, Windows: 4, Securing wall tarp: 3, Corner braces: 1	2
Roof	Truss x7: 21, Ridge: 1.5, truss braces: 1,	-
Floor	—	1
Partition	—	1
<b>TOTAL</b>	<b>102</b>	<b>4</b>

**Number of nails: 2KG**

\* Households are advised to choose door and window sizes and position based on their privacy and security needs.

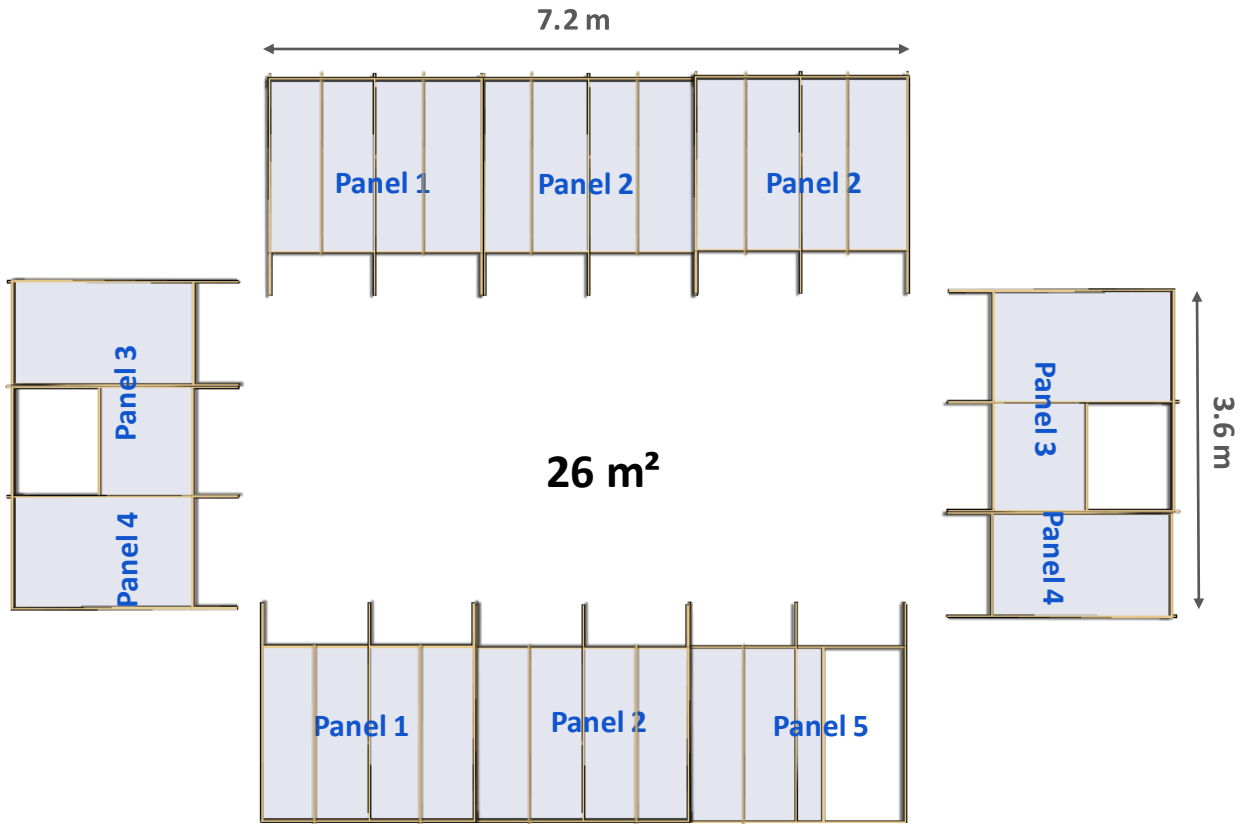
## HOUSEHOLD SIZE (# PEOPLE)

## SHELTER SIZE (M<sup>2</sup>)

6

7.2x3.6= 26 m<sup>2</sup>

7



### ESSENTIAL MATERIAL REQUIREMENTS

#### Shelter component

#### Timber quantity

#### Tarpaulin quantity

Walls	Panels: 90, Door: 3, Windows: 4, Securing wall tarp: 6, Corner braces: 1	2
Roof	Trussx12 36, Ridge: 3, truss braces: 1	-
Floor	—	2
Partition	—	1
<b>TOTAL</b>	<b>144</b>	<b>5</b>

**Number of nails: 2.5KG**

\* Households are advised to choose door and window sizes and position based on their privacy and security needs.