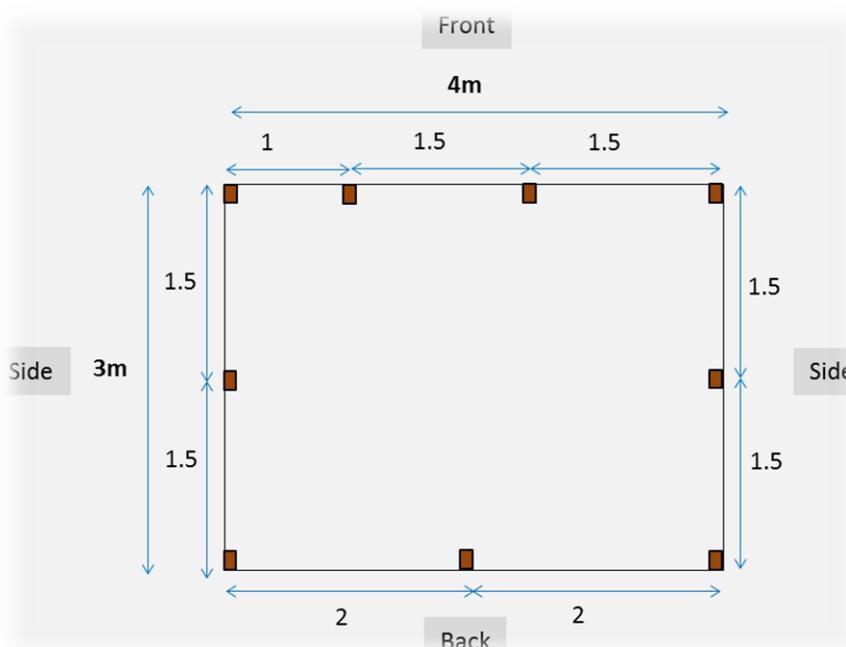


# IOM MALAWI EMERGENCY SHELTER CONSTRUCTION GUIDELINES

## 1.0. Shelter Measurements

- Length 4 meters
- Width 3 meters
- Back height internally (from above ground) 1.8m
- Front height internally (from above ground) 2.4m
- The floor area is 4m x 3m =12m<sup>2</sup>.
- Depth of holes for all timbers are 0.6m



*Plan View of Vertical Post Positions (measurements in meters)*

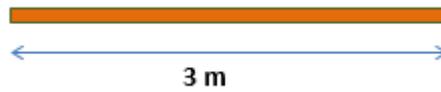
## 2.0. Materials required

| Item                    | Description  | Unit | Unit Size              | Quantity required |
|-------------------------|--|------|------------------------|-------------------|
| Timber                  |  | No   | 2" x 3" 18ft/5.4m long | 12                |
| Tarps                   | 3 tarpaulins, 1 for the roof and 2 for the super structure. Tarps should be 4m x 5m  | No   | 4m x 5m                | 3                 |
| Nails                   | 60 wire nails for fixing timbers<br>60 roofing nails for fixing tarp to timbers  | No   | wire & roof            | 120               |
| Wood Treatment          | Treat timber ends being buried underground with old engine oil mixed with diesel fuel or treat the portions to be buried with solignum |      |                        |                   |
| Additional Instructions | Fixing Plastic Sheeting Guide  |      |                        |                   |

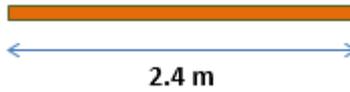
### 3.0. Timber Quantities per Shelter- Cutting List

#### 3.1. 4 x 5.4m timbers (For Upper structure):

4 x 3 m for the front legs



From the remaining offcuts, use  
3 x 2.4m for the back legs



*Leaving 1 pcs 2.4m long*

#### 3.2. 3 x 5.4m timbers (For Roofing):

3 x 4m timbers for roofing



*Leaving 3pcs 1.4 m long*

#### 3.3. 4 x 5.4m timbers For Roofing:

4 x 3m timbers for roofing



*Leaving 4pcs 2.4m long*

#### 3.4. 1 x 5.4m timbers (For middle Upper structure):

2 x 2.7m timbers



*Note: The exact height is determined  
on site by the height of the structure*

#### 3.5. Bracing timbers

*From the left over pieces:*

*1pc x 2.4 m long*

*3 pcs x 1.4 m long*

*4pcs x 2.4 m long*

Organise the left over pieces as timbers for bracing the upper corners internally at 45 degrees including the roof:

13 x 1.2 m



#### 4.0. Methodology

If the site is the original site prior to displacement, first check if the materials can be used in a more economic manner by performing temporary repairs on the house.

If the site is a new site – where a house was not previously built:

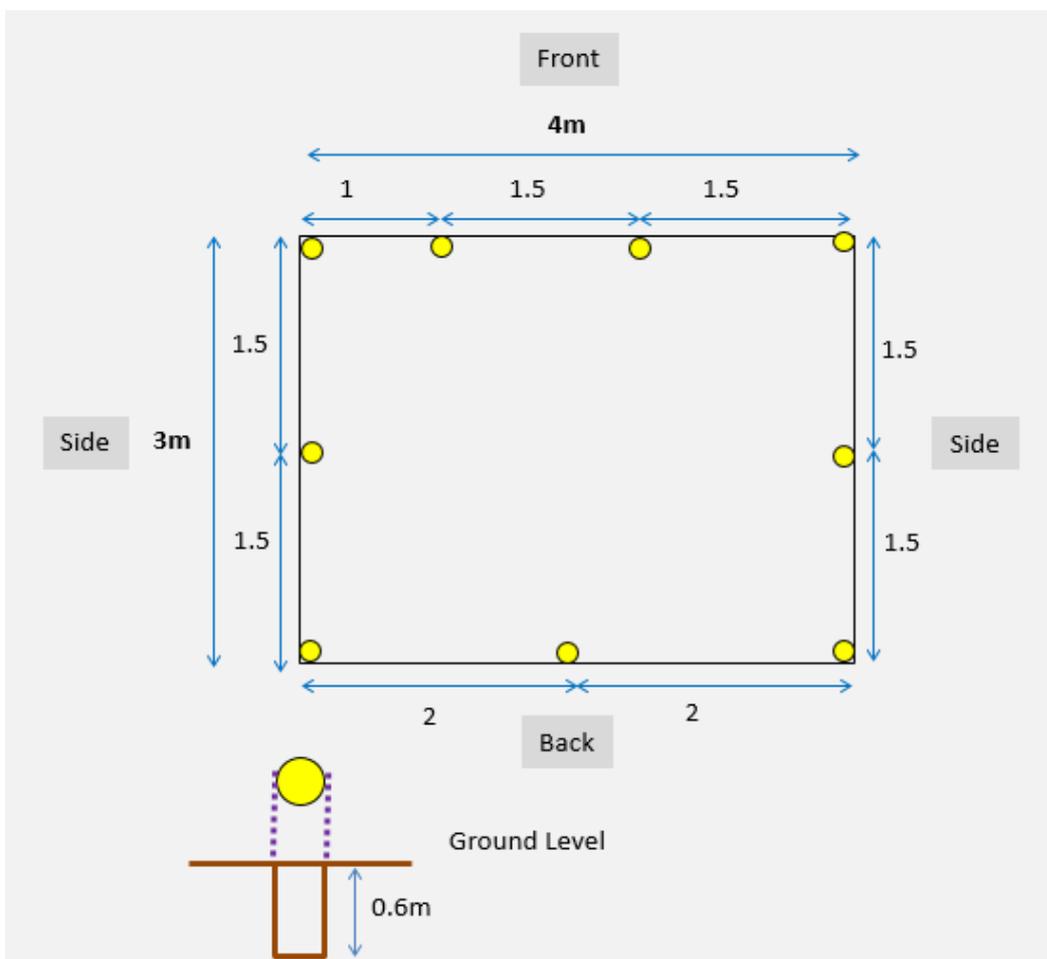
##### Step 1 – Select the Site

- Do not select a site that is in a dip where water will collect
- Ensure that the general slope of the site is around 5% or so. Any steeper and site drainage should first be established before the erection of temporary shelters.
- Ensure that the site for construction is flat and free from large protruding stones.
- Make sure it is possible to dig a drainage channel on the up-slope side of the shelter.
- Determine the direction of the prevailing wind/weather and ensure that the shelter is oriented so that neither the front nor the rear of the structure faces towards the direction of the prevailing wind/weather.

##### Step 2 – Setting out

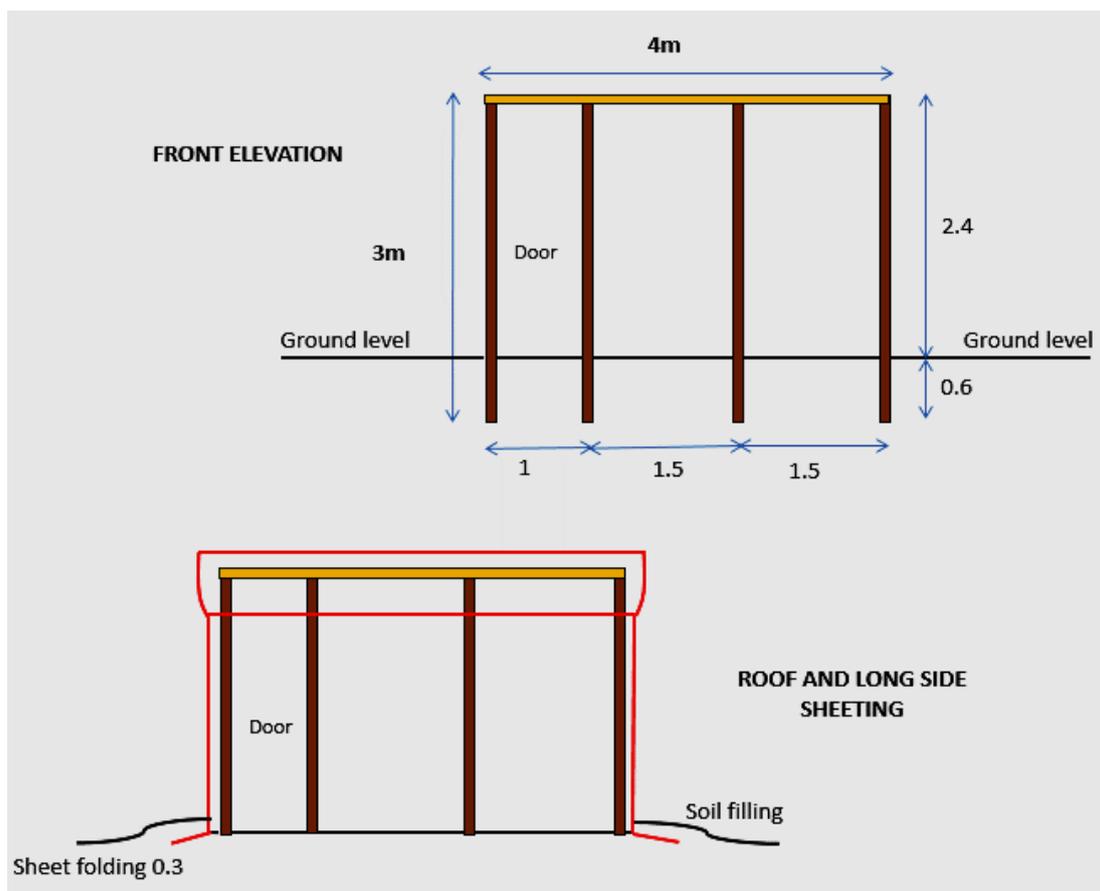
Mark out the floor measurements of 4x3m on the ground at right angles. To make sure that the layout is 'square' measure the diagonals – they should be the same.

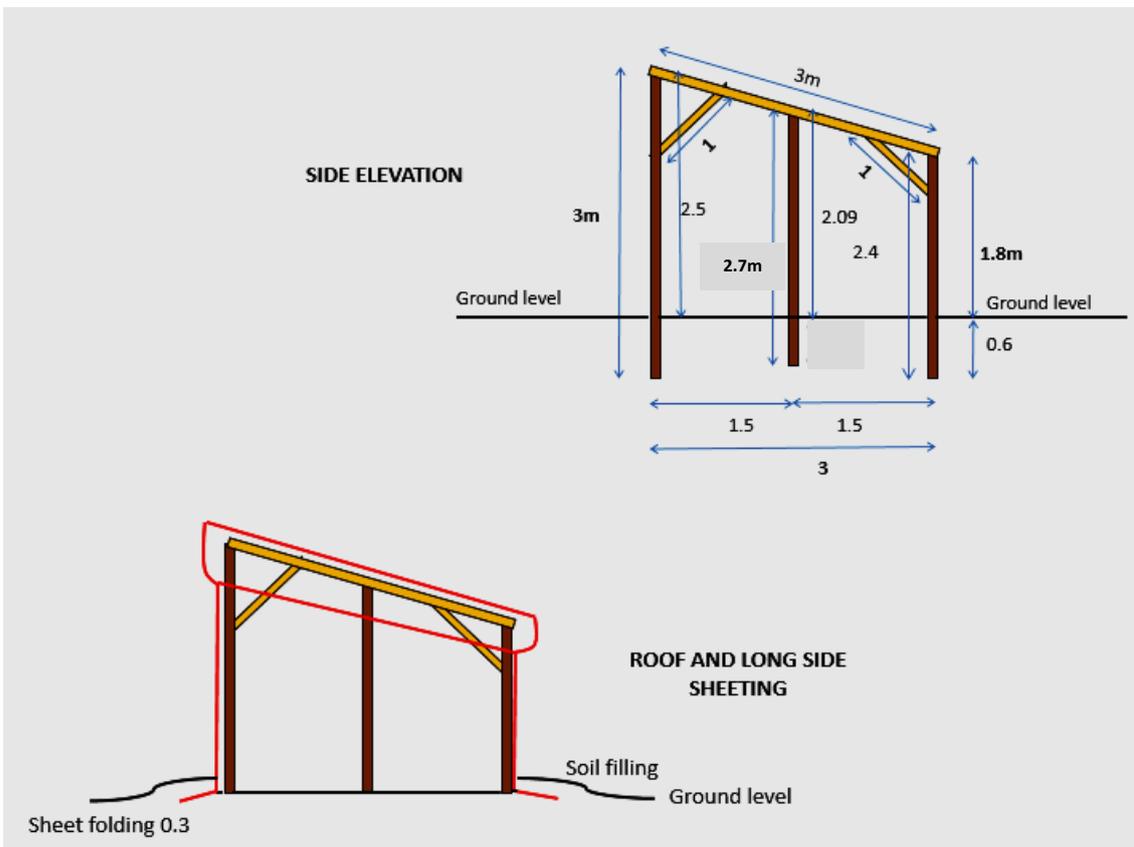
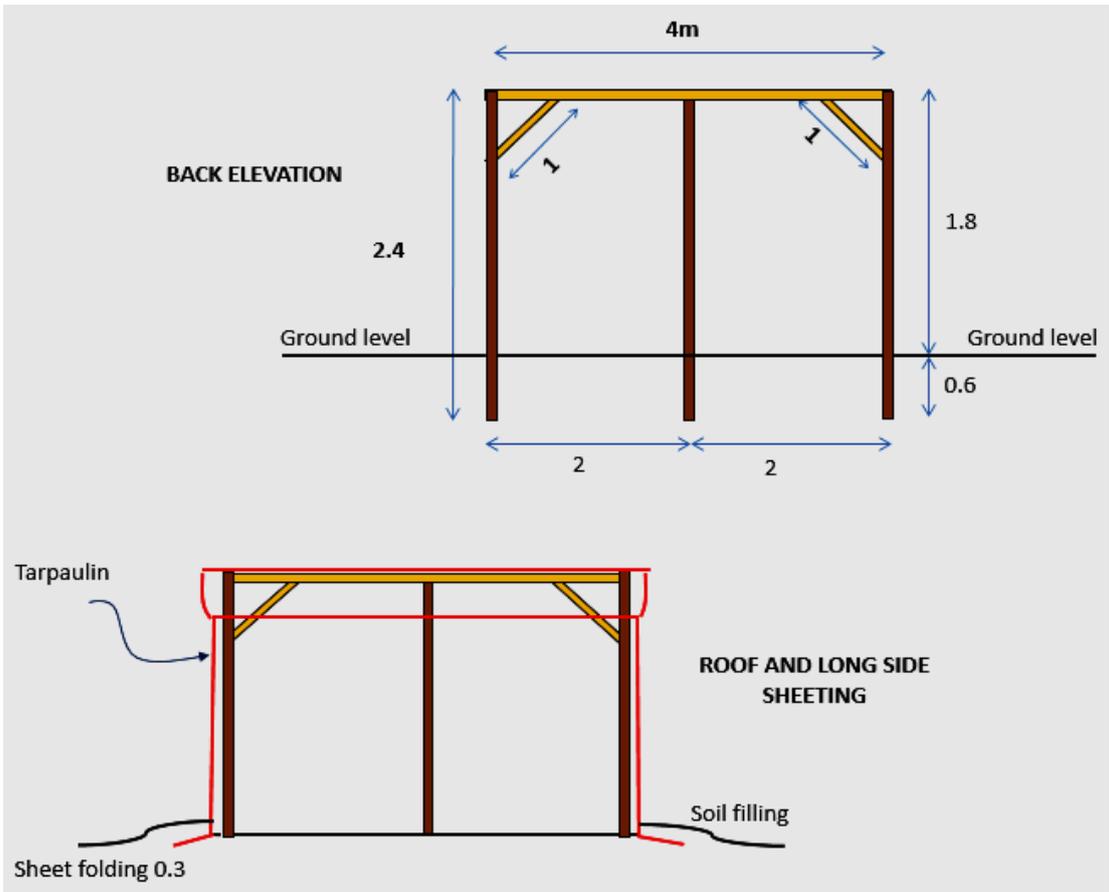
- Make 9 holes of 0.6m in depth - 3 holes at the back, 4 in front and 2 holes in the middle on both sides of the width sides of the shelter

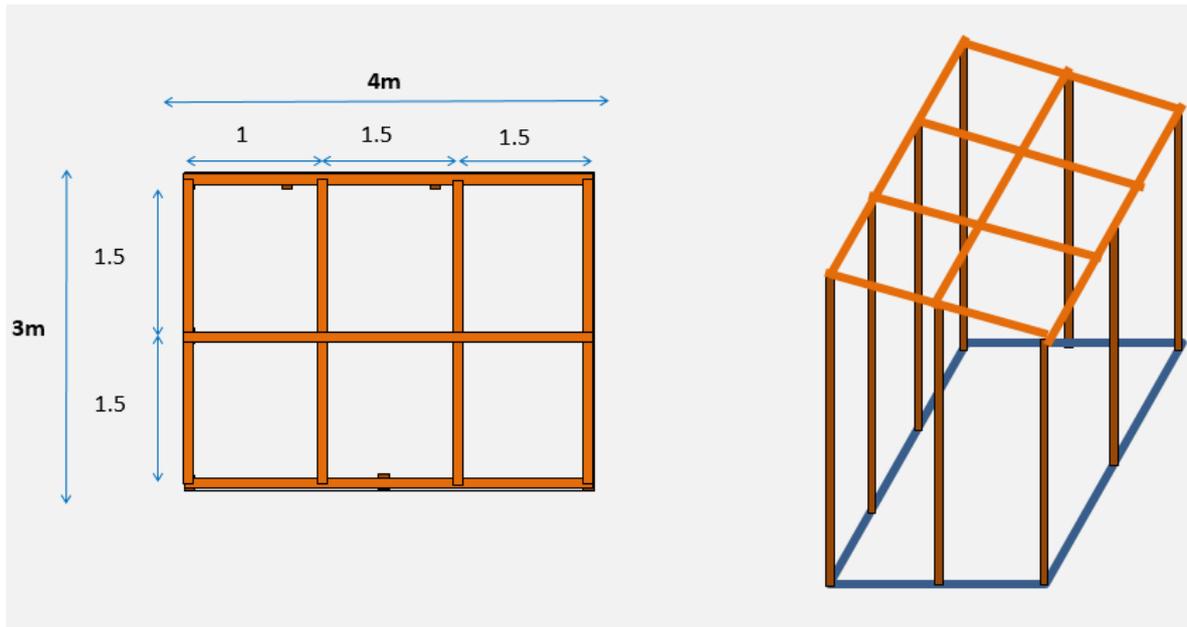


### Step 3- Erecting the Frame

- On a flat surface connect the 3 x 2.4m timber at the back to a 4m roof piece with the roof piece oriented so that the tallest side will be vertical when the frame is erected.
- Similarly connect 4 x 3m timbers for the front to a 4m roof piece oriented so that the tallest edge will be vertical when erected.
- Drop the frames in the holes
- Determine the height of the two middle legs after dropping the frames; and cut the required height.
- Connect 2 x 2.7m (determined height) timbers for the middle to a 4m roof piece oriented so that the tallest edge will be vertical when erected.
- Ensuring that the legs are vertical, connect the 4 cross pieces running front to rear to the 3 x 4m pieces as per the diagram, one on each of the 2 far sides and 2 at equi-distance in the middle
- Add the middle side legs to the frame
- Level up the legs with small stones dropped in the holes and backfill, finally compacting/ramming the backfill into the holes and leaving a mound of rammed earth around the legs.
- nail the middle 4m length to the two intermediate 3m lengths
- A sloped roof should form at an angle of about 16 degrees.







#### **Step 4 - Bracing**

- Add the 12 bracing pieces to the Structure taking care to place them towards the upper part of the structure at advantageous angles between vertical and horizontal parts as per the diagram.

#### **Step 5 – Covering of superstructure**

- Cut 1 tarp in the middle to have 2 pieces that are 2x5m each. Following the fixing plastic sheeting guide to avoid damaging the tarpaulins: Fix 1 piece to the upright timbers starting with the width side close to the door and join with the second piece where the first ends. The second piece should end close to the front side corner. On the width sides there should be left a space of about 40cm between the top edge of the tarp and the roof which will be used for ventilation.
- Use one full tarp to cover a fraction of one width side and the front of the shelter. The tarp should left unfixed at one end at the corner to allow for a flapping door

#### **Step 6 - Roofing**

- Cover the roof with one full tarp which should overlap on all 4 sides to ensure that rain water runs straight from the roof to the ground. The overlaps on the width side should be able to flap to ensure ventilation. Fix the roof tarp at the sides rather than at the top to avoid leakage – again following the guidance provided for fixing tarps and plastic sheeting. If the roof tarp proves to be a problem due to flapping, fix using a nail through a separate piece of folded tarp to act as a washer (as per the fixing plastic sheeting guide).
- Fix a stick on the edge of the overlapping tarp on either of the width sides for easy flapping for ventilation. IDPs are required to source these sticks. Ensure that one the IDPs source the sticks that you fix the sticks to the flaps using the techniques shown in the fixing plastic sheeting guide.

#### **Stage 7 – Shelter Protection Measures**

- Make a ridge using soil around the shelter to fix the bottom edge of the tarp to the ground and to ensure that rain water does not flow through the shelter

- Use sand or other inorganic material to raise the floor base of the shelter to get rid of ground moisture.

### **Step 8**

Just in case the temporary shelter has to last longer than intended, ensure that the IDP family or other volunteers dig appropriate drainage channels to ensure that the shelter does not become inundated with water during the rainy season.

### **Step 9**

Ensure that the shelter is inspected and any snags are rectified and finally signed off as completed.