

## second generation shelter intro

building upon the **Oxfam GB** family shelter, the initial development of the second generation family shelter was undertaken by **Shelter Centre** and the **Engineers Without Borders** (EWB) volunteers over the summer of 2004.

# second generation shelter **aims**

the **aims** of the second generation family shelter were:

- to increase covered living area to meet **Sphere** standards for a family of **six** in a hot climate
- to meet the new **UN/OCHA** tent standards
- to introduce a liner
- to increase control over internal climate/ventilation
- to support later **winterisation**
- to increase frame strength
- increase appropriateness of use as a **kit**, while minimizing part numbers and maximizing reparability
- achieve a design weight of **40 - 60kg**

## second generation shelter specs

**shelter height:** 2.2m (2.0m inside standing height)

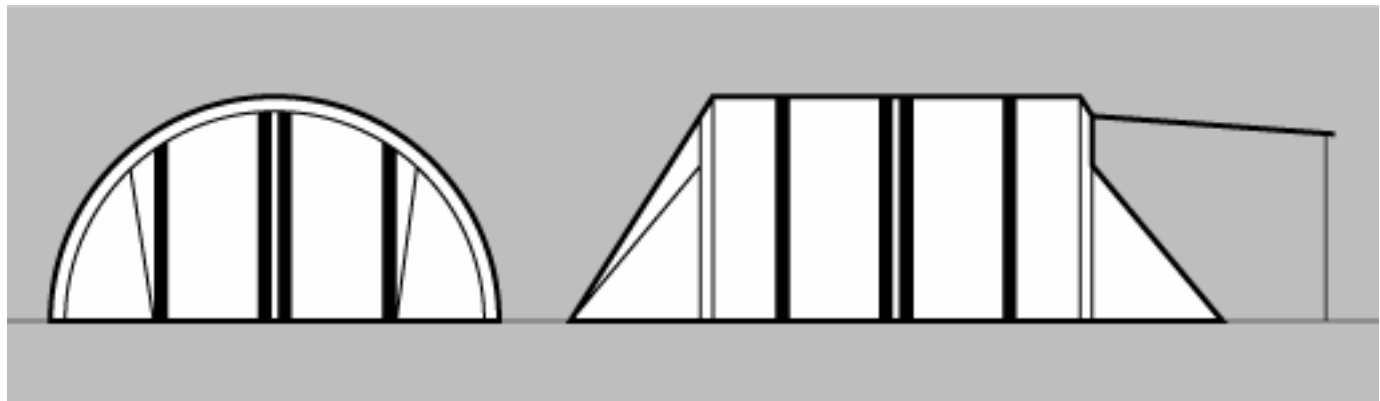
**shelter width:** 4.4m

**shelter length:** 6.4m

**usable covered area:** 27m<sup>2</sup>, 25.6m<sup>2</sup> with liner

**usable volume (% of floor space with height of 1.8m):** 47%, 33% w/liner (OCHA standard 33%)

**weight:** 25kg (frame) + 16kg (liner and fly) = 41kg



# second generation shelter **brief**

**team 1, frame:** key for the team were that the frame be readily repairable using basic tools.

achieving the targeted total design weight of **40 - 60kg**

**team 2, covering:** simplicity of the features was of paramount importance to reduce wear and tear on components.

incorporating standard plastic sheeting into the fly and floor as well as ensuring waterproofness and proper ventilation

# second generation shelter previous



previous designs which informed the development of the shelter:

**Oxfam GB** family emergency shelter system

steel frame developed by **shelterproject** volunteer, Anna Pepper

**UNHCR** tent

**Reltex** tent

# second generation shelter **initial**



## **the hoop profile of the frame**

maximises usable volume while presenting minimal external surface area

## **frame material**

aluminium was chosen for it's strength-to-weight ratio over steel. MDPE was ruled out given the radius of the hoop

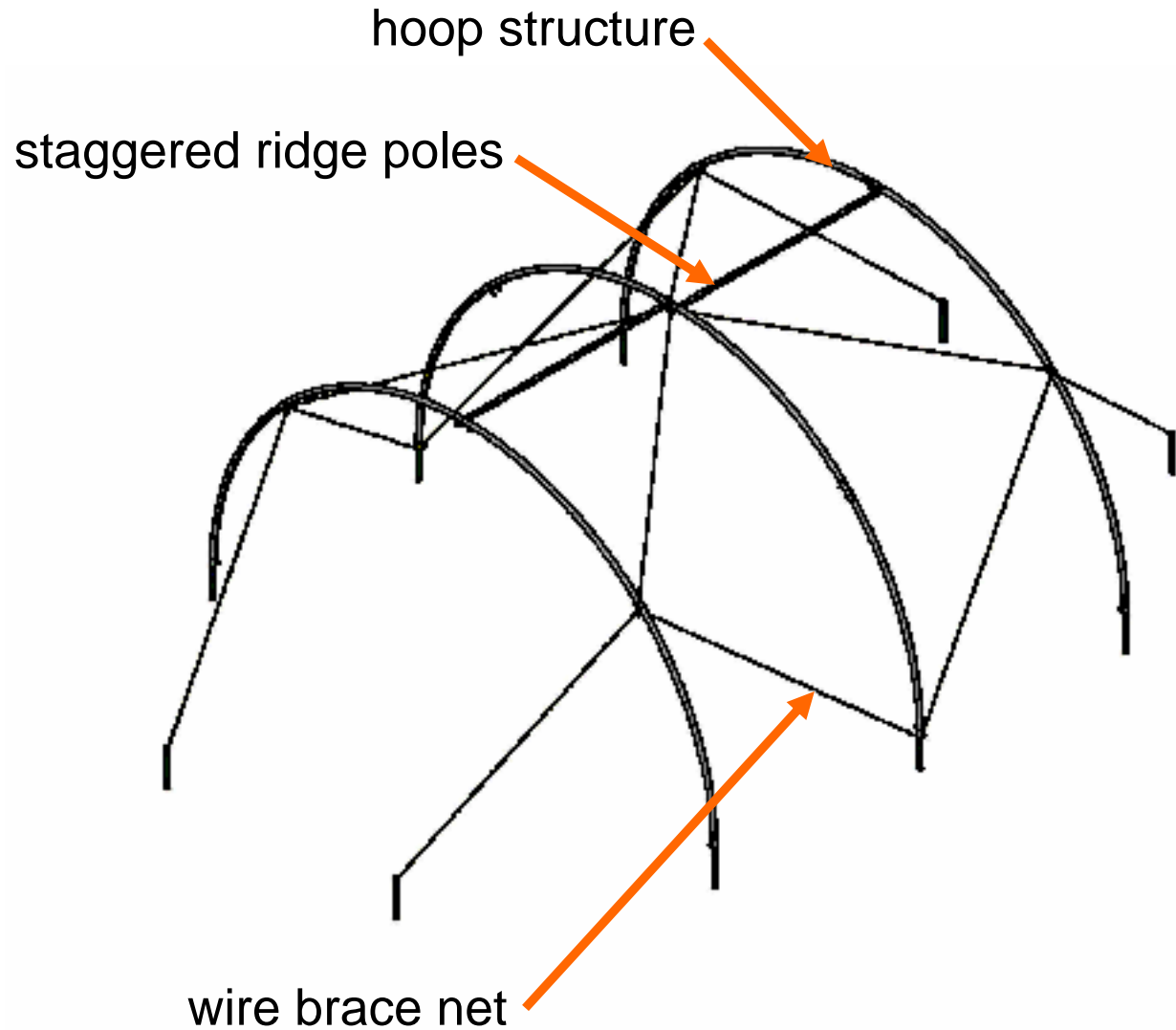


## **double wall shelter**

two layers were used to achieve waterproofness and breathability in turn providing an insulating space in between



# second generation shelter **frame**



# second generation shelter **covering**

the covering is a flame-retardant **two part** system comprised of a **waterproof fly** and a **breathable liner**

**single purpose** materials were chosen as many commercial waterproof / breathable materials require routine maintenance and have short field lives

materials:

**fly** plastic sheeting

**liner** uncoated rip-stop nylon, mosquito netting 210  
holes/square inch

**thread** weather/UV resistant nylon

air moisture is able to **pass through** the breathable nylon liner and condense on outer fly where it runs down to the ground

fly provides insulation and **protection** from elements





## second generation shelter fly

the **fly** is comprised of two sub assemblies: cut-to-length UNHCR sheeting and a door assembly for either end

the vestibule feature provides an **extra 13.44m<sup>2</sup>** covered space

vestibules are staked out to provide **tension** in the top sheet and vestibule volume

the fly is **trenched** into the ground for stability

Main door can be **transformed** into a sunshade or rolled up to allow for different ventilation configurations



# second generation shelter **liner I**



the **liner** is attached to the frame's **bracing net** to promote quick and easy set-up

complicated and costly fastening methods were abandoned for more **simple features**

the liner is **attached** to the frame through simple tie points

all doors are stowed away with simple tie points

**internal divider** allows for privacy and flexibility of the interior space

# second generation shelter **liner II**



**dual inner doors - one mesh and one nylon**

module door system allows for configurations in ventilation without compromising **privacy or air quality**

both doors can be tied up to allow for **maximum ventilation** and **easier access**

inner doors are overlapped by 20cm and are **easily** separated much like a beaded curtain

**pockets** along the bottom edge allow for weighting by sand or stones for stability in windy conditions

## second generation shelter **floor**



‘**bathtub**’ floor made of plastic sheeting has a 20cm side wall all around

all stitching is kept to the **upper rim** of the floor to avoid perforation at ground level

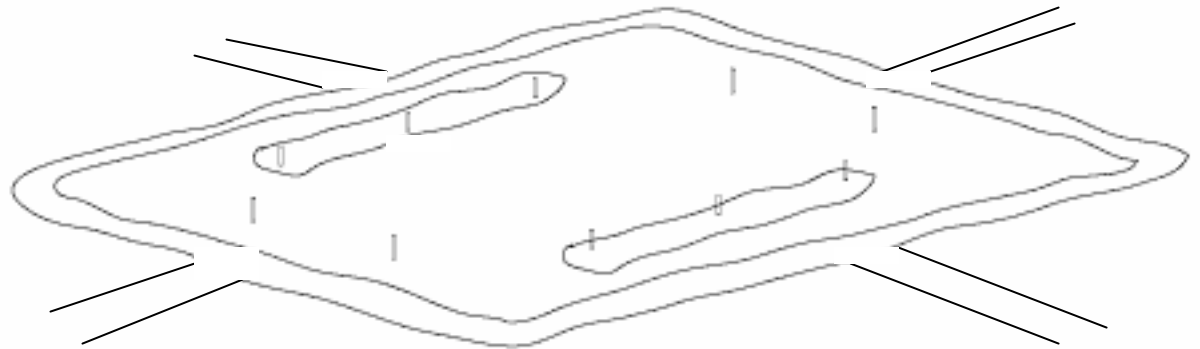
the floor has **trenching flaps** for extra security

the floor is stitched to the line using an interlocking hem and large zigzag stitching for **extra security**

nature of the plastic sheeting allows for easy **sweeping and cleaning**

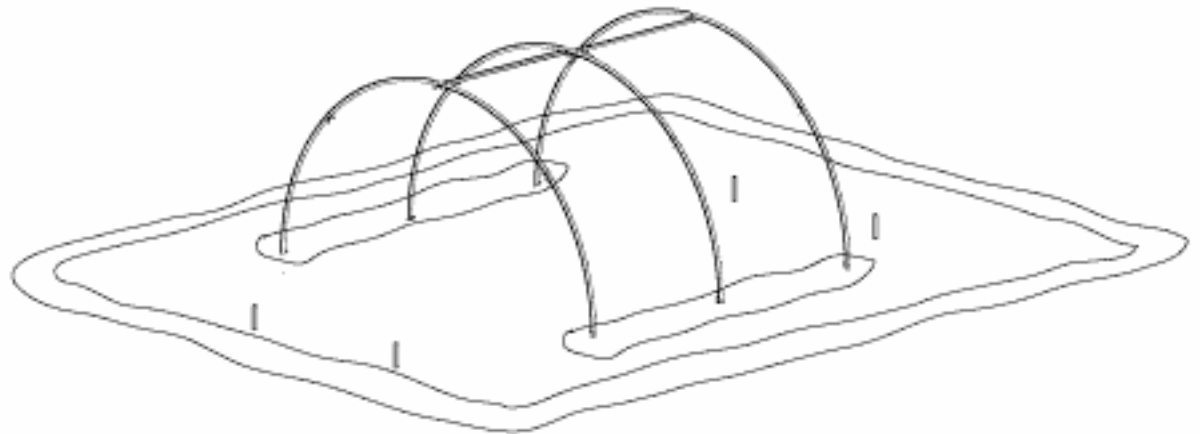
# second generation shelter **setup 1**

perimeter surrounding shelter is trenched to direct surface water into camp drainage system



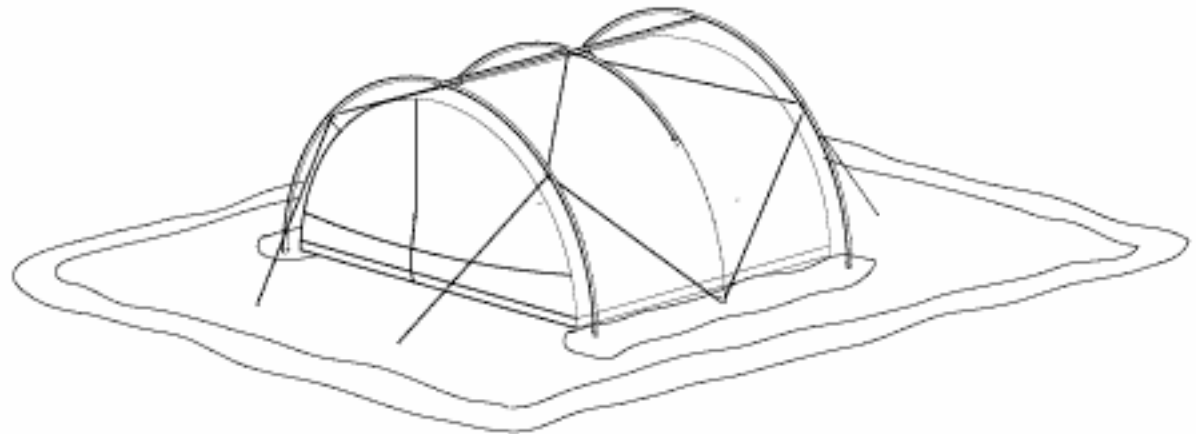
# second generation shelter **setup 2**

**frame** is erected onto anchor points



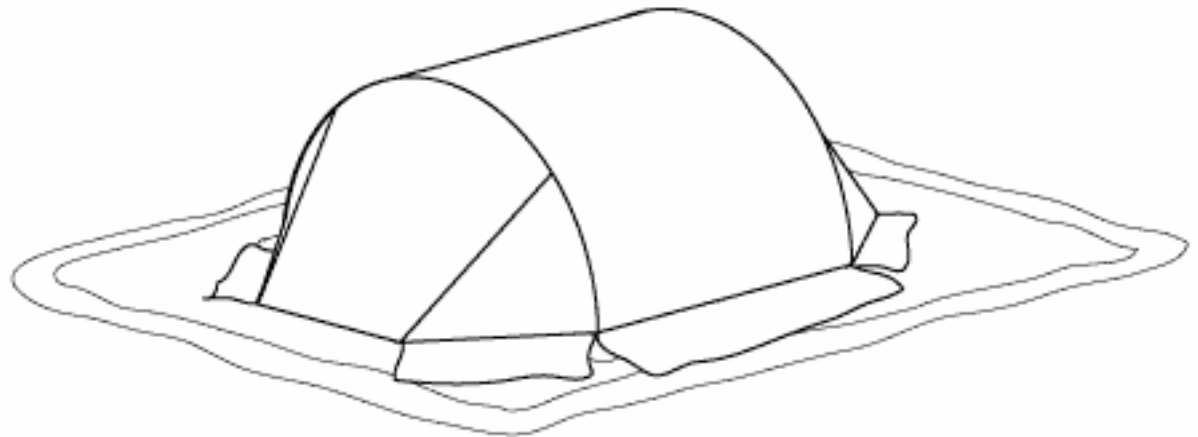
## second generation shelter **setup 3**

liner and bracing net are **secured to frame**, guy wires are staked out



## second generation shelter **setup 4**

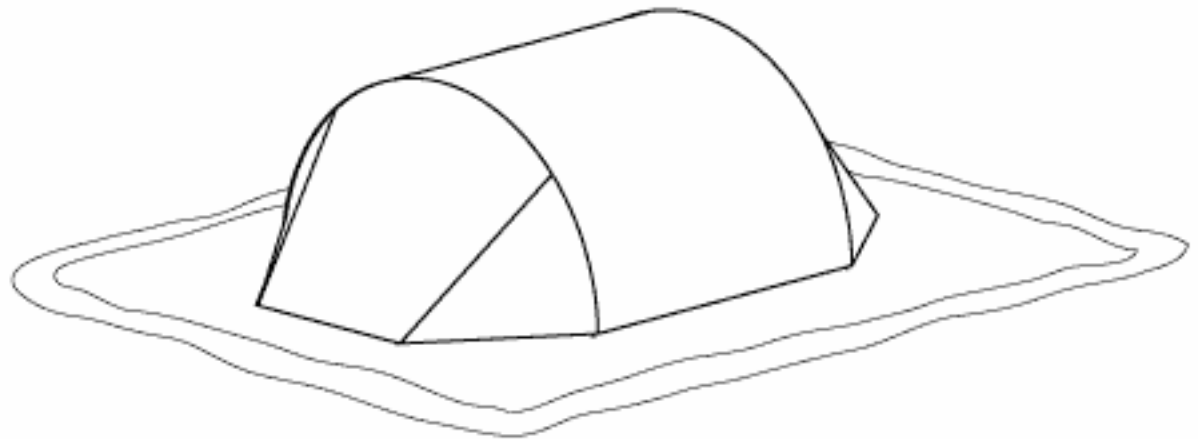
**fly** is placed over frame with trenching fillets put in place





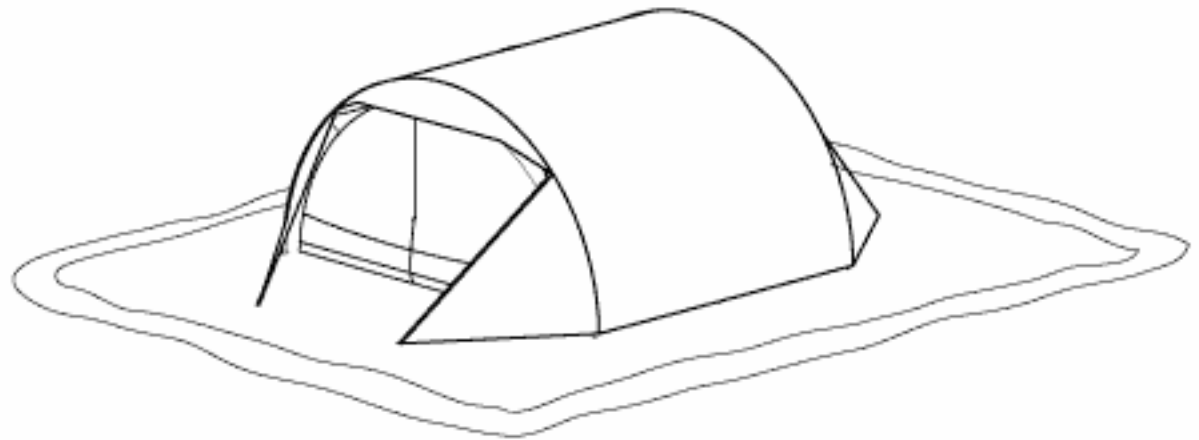
## second generation shelter **setup 5**

trenches are **backfilled** onto fillets to anchor shelter



# second generation shelter setup 6

shelter complete



# second generation shelter future I

refining and detailing of the second generation shelter commenced by **Shelter Centre** and the **EWB** summer volunteers

- resolving outer door fastening
- develop wire brace net

develop 3<sup>rd</sup> **generation** family shelter

- custom aluminium straight sections
- use 'off-the-role' plastic sheeting

# second generation shelter **future II**

## aims

develop a frame built out of **straight section** custom engineered parts

to publish the production specifications, enabling aluminium manufacturers worldwide to produce the frame parts

the frame will fulfil a **composite role**, providing the structural support and fixing mechanism for **plastic sheeting**

the frame will come in **kit form** but the plastic sheeting can be used off the roll, simply cut to length

# second generation shelter questions

**working group?**

contribute to direction of project

**information group?**

receive email updates about the progress of the project