



## TECHNICAL WORKING GROUP ON CONSOLIDATION OF EMERGENCY SHELTER

## **Shelter's elements, materials and joint reviewed:**

- General structure, vertical elements, general dimensions
- Roof structure, trusses and framing.
- Bracing.
- Tying/pegging.
- Structure's ground fixing. Termites' problems.
- Plastic sheeting fixing.
- Ground floor treatment. Pallets, sans backfilling, sand bags etc.
- Details, other

# **SUMMARY OF THE POINT TO BE REVIEWED**

	Scenario 1. Self Help	Scenario 2. Self Help + technical assistances	Scenario 3. Construction team
<b>Responsibility for design and construction</b>	Beneficiaries, Various designs	Beneficiaries, primary. Technical assistance advising + demonstration pilot shelters	NGO, contractors, fixed design.
<b>Timeline for construction (800 shelters)</b>	3 to 4 weeks	3 to 5 weeks. 160 -250 shelters per week.	8 weeks minimum 100 shelters max per weeks
<b>Quality</b>	Various but usually very low	Low to medium according willingness of beneficiaries to received advises	High to very high
<b>Materials (on top of what was previously distributed)</b>	Re use of existing materials  A top up kit (2 extra bamboo bundles, 30 extra ropes, 1 extra plastic sheet, 100 2.5" nails, pegs)	Re use of existing materials A top up kit (2 extra bamboo bundles, 30 m extra ropes, 1 extra plastic sheet, 100 2.5" nails, pegs).  Light adaptation feasible according technical assistances using referral.	Basic E shelter from pipeline (2 plastic sheet, 6 poles, 2 bamboo bundles, 30 m ropes, pegs)  A top up kit (3 extra bamboo bundles, 30 extra ropes, 1 extra plastic sheet, 100 2.5" nails).
<b>Tools</b>	Not provided up to the beneficiaries	Set of basic tools temporary available with technical advisors	Fully equipped tools, possibility to prepared elements in a mini workshop. (Splitting bamboo etc.)
<b>Team</b>	IOM site planer	IOM site planner. 2 teams of 4 technical supervisor (skilled labor) Team manager	IOM site planner 10 teams of 4 labors each. 2 team managers.
<b>Cost</b>		25 000 SSP labors 8 000 SSP tools  32 000 SSP to 35 000 SSP + 800 top up kit	126 000 SSP labors (minimum) 8 000 SSP tools 134 000 to 140 000 SSP minimum + 800 E shelter kit + 800 top up kit

*BOR PoC example, august 2014*

# STRATEGY VERSUS DESIGN

Average family size in South Sudan (to be adapted according the case) : 6.3 equivalent to 22 m<sup>2</sup>

.... Whatever the cultural aspect of the permanent dwelling tukul dissociated functions (kitchen, bathing, sleeping) and structure are usually less than 16 m<sup>2</sup>.



Wall structure, NRC Minkaman, 2014



Door Frame reinforced, CRS design 2014

### Questions:

- Upper horizontal frame rigidity ?
- Durability of bamboo as primary structural elements?
- Adopting 16 m<sup>2</sup> as minimum standards
- Minimum height of the structure ?

## GENERAL STRUCTURE, VERTICAL ELEMENTS, GENERAL DIMENSIONS



*Scissor trusses, CRS design 2014*



*Curved grass, Concern design 2014*



*Curved grass, NRC design 2014*



*Double pitch, NRC design 2014*



*Single pitch, NRC design 2014*



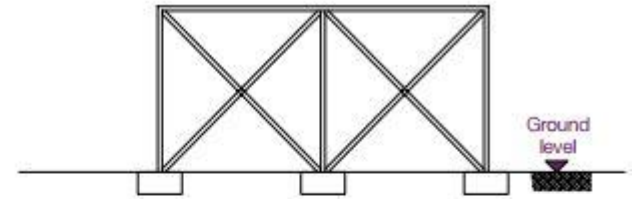
*Curved bamboo, NRC design 2014*

# ROOF STRUCTURE, TRUSSES AND FRAMING

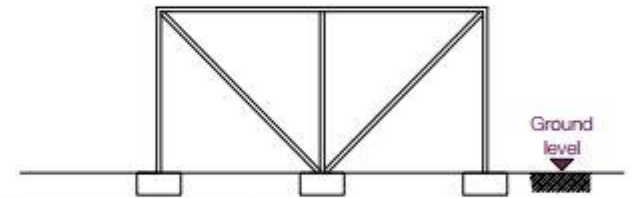
Bracing the structure increase its resistance



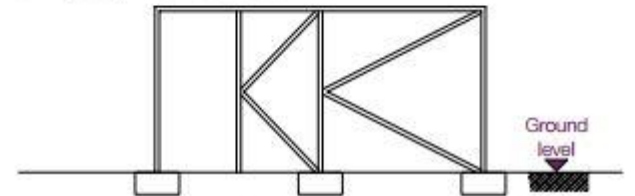
- Reinforced connection between pole and beam
- Wall angle bracing (vertical frame)
- Wall full X bracing (vertical frame)
- Roof full bracing (horizontal upper frame)



Cross Bracing: Can be wire, steel, timber or bamboo (in tension only)



V Bracing: Can be wire, steel, timber or bamboo



K Bracing: Can be steel, timber or bamboo (that adequately resists buckling)

## BRACING THE STRUCTURE



*Pegging/Tying, Concern design 2014*



*Wall base & fixing, NRC design 2014*

## **TYING/PEGGING/FIXING/WALL BASE**

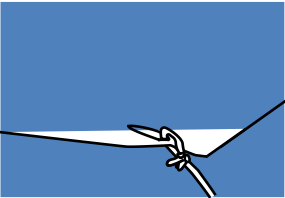
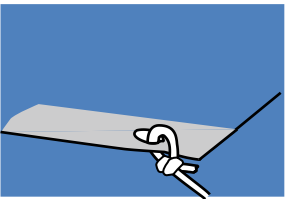
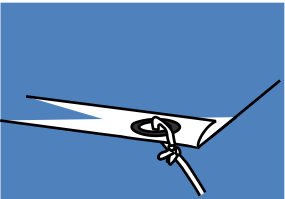

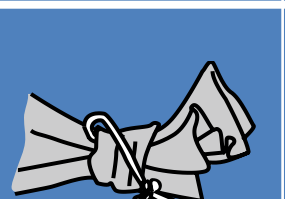


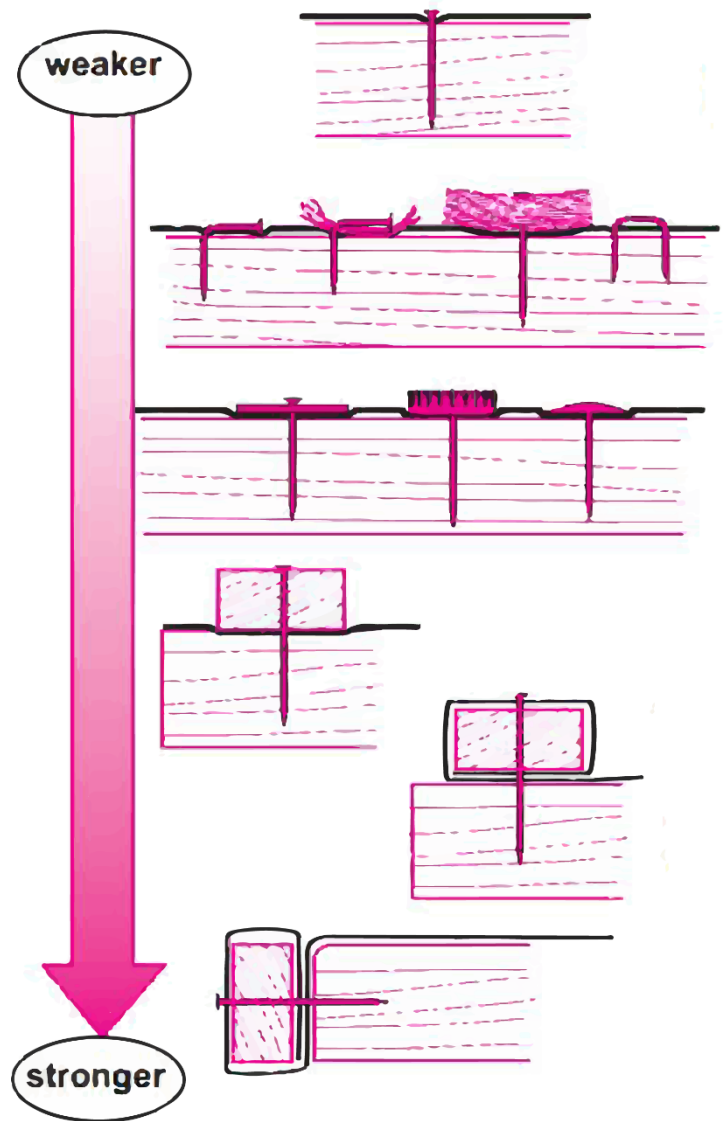
*Digging hole, CRS design 2014*

## Termites:

- Burn oil not well performing
- Chemical

**STRUCTURE'S GROUND FIXING. TERMITES'  
PROBLEMS**

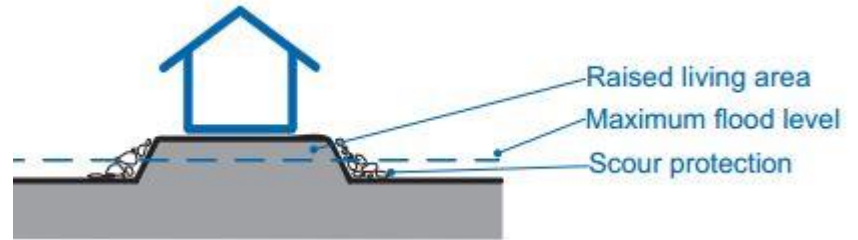
	✘ no reinforcement
	✓ rope through eyelet
	✓ ✓ rope through reinforcement band
	✓ ✓ place stone inside
	✓ ✓ make knot with rope inside



# PLASTIC SHEETING FIXATION



*Sand backfilling , Concern design 2014*





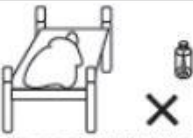
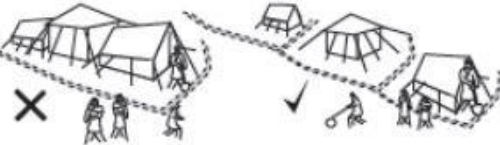



**GROUND FLOOR TREATMENT. PALLETS,  
SAND BACKFILLING, SAND BAGS ETC.**

# Repairing small hole using glue and plastic sheeting patches.

## Fire prevention

### Fire safety

#### PREVENTION

 <p>- NO open fires or bare flames inside tents</p>	 <p>- candles must be placed in lamps or in jars</p>	
 <p>- never leave a candle lit while sleeping or when leaving the tent</p>	 <p>- tents walls must be a minimum of 16ft. apart.</p>	
 <p>- stoves must not touch tent walls - chimneys should go through a solid wall or through a fire-proof plate.</p>	 <p>- do not smoke inside tents</p>	 <p>- electric light bulbs must be at least 6 inches from the tent canvas</p>

#### PREPAREDNESS

 <p>set up community fire committees, for training and fire fighting.</p>	 <p>- make fire stations with buckets, sand, fire beaters and fire extinguishers</p>
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