

## **ISSB SAMPLE SHELTER CONSTRUCTION IN IFO SAVE HAVEN**

NRC together with DRC was tasked to carry out construction of sample ISSB shelter in save haven in IFO. The purpose of the exercise was to determine cost and sustainability of ISSB shelters in dadaab as a way of addressing environmental concerns raised by host community. NRC specifically was tasked with providing budget to meet the cost of materials and labor and DRC to take a lead role in supervision of the construction. The process involved;

1. Determining the quantity of inter locking bricks required
2. Procurement of the bricks and roofing materials
3. Storage of the bricks on the site
4. Setting out of foundation and construction of walling
5. Cost

### **1. Quantity of Bricks required**

Determination of number of bricks required was done in consultation with DRC and a specialist who had experience in ISSB construction. The total number of bricks per unit was calculated to 1700 and 25% extra to take care of breakage. The total number of bricks procured was 4400 of two different sizes to address different issues (corners and Joints) i.e. 220x115x280mm and 140x115x280mm for the two structures.



The two sizes of blocks used at the corners

### **2. Procurement of bricks**

The whole procurement process started in 22<sup>nd</sup> June 2010 with a Request for quotation was sent out to four different suppliers and they replied back with their prices and time to deliver. Three of the four vendors contacted didn't have readymade bricks and they gave one month delivery time. The fourth supplier had done some bricks for his own use and offered to deliver in two weeks from the time of signing the contract document.

### 3. Storage of Bricks on site

The contractor delivered materials and they were all offloaded in IFO safe haven where the sample houses were constructed. There was approximately 10% breakage during transportation from Garissa and offloading.

### 4. Setting out and construction

Due to the fact that this was a new skill in the area NRC together with DRC decided to hire an expert outside Dadaab who was to guide other skilled and unskilled labor to accomplish the task. The expert was hired together with 3 other skilled labor and 4 unskilled laborers. The construction took one week for the two structures up to the lintel. Two courses of double brick wall was laid below ground level and bonded with soil paste. Walling was done by interlocking of bricks using different sizes to ensure that straight joints are not created. To strengthen the structure, binding wire was used at the four corners of the structure after every alternate course.

After completion of the structure to lintel level the ISSB expert mentioned that the gable ends were supposed to be constructed using cement or any other bonding element as the structure did not have lintel to hold it together. He had this idea that anything above lintel level when the lintel is not casted will make the structure weak especially windy times and might cause the wall to collapse which was valid argument. We finally thought it good to continue interlocking the bricks at gable ends and plaster internally immediately to hold down the bricks together. Roofing was carried out same as the other mud brick shelters.

Binding wire was also used to hold down the wall plate and roof trusses. . The actual bricks used in each sample shelter were 1702.



Foundation works



Soil paste used to bond the foundation bricks



Wall construction by interlocking of bricks

### Cost

The total cost of the sample shelter taking into account labor and materials bought added up to **Kshs. 144,057** this being the actual cost incurred excluding the cost extra 25% bricks bought to take care of breakage. The cost breakdown is as follows;

					Rate KSh/USD: 78
-	<b>QTY</b>	<b>UNIT</b>	<b>UNIT COST (KSh)</b>	<b>TOTAL COST (KSh)</b>	<b>TOTAL COST (USD)</b>
<b><u>MATERIALS</u></b>					
<b>Roofing</b>					
Iron sheets Dumu Zas (2,5m length)	20	pcs	550	11,000	141.03
Timber Cypress (2x2m)	110	m	99	10,890	139.62
Nails 4"	4	kg	93	372	4.77
Roofing nails	5	kg	140	700	8.97
GI Ridges (1,8m length)	4	pcs	150	600	7.69
Binding wire	5	kg	100	500	6.41
Wood preservative	8	liters	40	320	4.10
<b>Total Roof Material Cost</b>				<b>24,382</b>	<b>312.59</b>
<b>Door</b>					
Timber Cypress 2 x 2	10	m	99	990	12.69
Plain sheet 2,4x1,2m	1	pcs	650	650	8.33
Nails 3"	1	kg	93	93	1.19
Nails 1"	1	kg	82	41	0.53
Butt hinges 4"	3	pcs	30	90	1.15
Padbolt 6"	1	pcs	58	58	0.74
Tower bolt	1	pcs	32	32	0.41
<b>Total Door Material cost</b>				<b>1,954</b>	<b>25.05</b>
<b>Window</b>					
Timber Cypress 2 x 2	13	m	99	1,287	16.50
Plain sheet 2,4x1,2m	1	pcs	650	650	8.33
Nails 3"	0.20	kgs	93	19	0.24
Butt hinges 4"	4	pcs	30	120	1.54
Nails 1"	0.1	kgs	82	8	0.11

<b>Total Window Material Cost</b>				<b>1,954</b>	<b>25.05</b>
<b>ISSB for Walling</b>					
Bricks (220x115x280mm)	1550	pcs	55	85,250	1,092.95
Bricks (140x115x280mm)	150	pcs	45	6,750	86.54
<b>Total cost of Bricks for walling</b>				<b>92,000</b>	<b>1,179.49</b>
<b>TOTAL MATERIAL COST</b>				<b>120,290.00</b>	<b>1,542.18</b>
<b><u>DIRECT LABOUR COST</u></b>					
Labor for fixing of 2 windows				250	3.21
Labor cost for walling				14400	184.62
Labor cost for roofing and fixing of door				1,500	19.23
Labor cost for fixing gable ends				1600	20.51
Labor cost for Plastering				1200	15.38
Cost of Offloading bricks				4567	58.55
Cost of Compacting Floors				250	3.21
<b>TOTAL LABOR COST</b>				<b>23,767.00</b>	<b>304.7</b>
		-	-	-	
-		-	-	-	
<b>Total cost of materials and labor</b>			-	<b>144,057.00</b>	<b>1846.88</b>

### ***Challenges***

1. The ISSB used (220mm thick ) have a small groove making it difficult to interlock. This makes the structure weak and with slight push then the wall can collapse.
2. Procurement of the bricks took time ( looking for suppliers with readymade bricks)
3. High breakage rate during transportation
4. Weak structure after lintel level hence need for use of cement or some bonding material. ISSB structure has to be joined together at lintel level. In this case there was no provision for lintel and it made it difficult to fix the gable. By fixing lintel also, it makes fixing of window easier and to the recommended height for better aeration. Currently it was very difficult to fit windows and we ended up having window opening at a higher level than recommended.