

Shelter Coordination Cell



EMERGENCY SHELTER IN SRI LANKA HANDBOOK OF OPTIONS



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Assistant Editor: **Yasotha Ponnampalam**
Solidar/SCC



Contributions From



Introduction

This handbook is intended as a quick reference and selection of options for agencies planning and/or implementing emergency shelter activities in Sri Lanka. The drawings and bills of quantities in this document are compiled from the various emergency shelter models provided by different agencies for the conflict affected population in Sri Lanka.

The designs are divided into single unit and multi-family unit shelters. Decision on the typology used is often determined by the availability of land, material resources and the anticipated duration of the displacement.

Most single unit shelters included here are more or less variations on cladding materials used for the roofing and walls. The concept of these designs is based on the traditional hut construction commonly used in the rural areas of Sri Lanka. The same design can be used as a response to both displaced and returnee populations.

Definition:

Emergency shelter - is a simple light frame structure designed for rapid installation, low cost and intended for a temporary period of accommodation only (3 - 9 months). An emergency shelter with a degree more permanance in material cladding and floor can be classified as a transitional shelter (12+ months). Some emergency shelter may be upgradable to transitional type to allow for longer term displacement or a smooth transition to early recovery in places of return eg. structural bracing and cemented pole foundations.

Common Standards

The designs are selected taking into consideration international sphere standards, equity in delivery of aid, and the market prices and availability of construction materials:

Covered area of shelter approximately = 200 sq. ft.

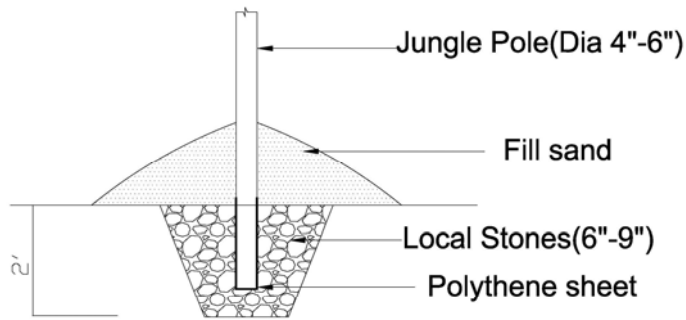
Height of shelter between 6ft – 8ft

Maximum cost of SINGLE family shelter (materials + labor + transport) = 300 USD

Technical Specifications

Foundations:

Depth of foundations should be a minimum of 1 ½' - 2'. The foundation to be backfilled with stones (6-9)". Sand/Soil to be filled around the timber/jungle poles. (See detail 1).



Detail 1

Roof Structures:

Cadjan¹ roof slope should be minimum 40° to avoid leakage of rainwater. GI sheets roof slope should be minimum 20°.

If there are plans to replace the Cadjan by GI sheets, the slope can be reduced to 20°. In this case it is advised to cover the Cadjan roof with a tarpaulin or any plastic sheet during the rainy season to prevent the roof from leaking.

Eaves should be minimum 2' horizontal length from wall. Special attention should be given to fixing the roof structure and the roof cladding in areas with strong wind.



Joint detail of timber pole, beams and rafters. (source: ICRC)



Joint detail of timber strut, ridge beam (source: ICRC)

¹ Cadjan: common name in Sri Lanka for woven coconut leaves used as roofing material.



Details of roof Timber structure (Source: JSAC)

Walls:

Local materials can be used to provide enclosure (mud walls, sun baked mud bricks, cadjan). In cases where GI sheets are available, they can be used at the base to provide more protection.

Floors:

Earth floors are built of several layers of compacted earth. It should be raised 6" above the ground level to avoid the rainwater infiltration.

Tips to enhance the lifespan of the shelter

Tip 1: For additional protection of the poles from humidity and termites, the base of the pole going into the foundation can be painted with motor oil and/or wrapped with polythene sheet.

Tip 2: Before assembling the roof structure, treat the roof timber with wood preservatives. (e.g. used engine oil).

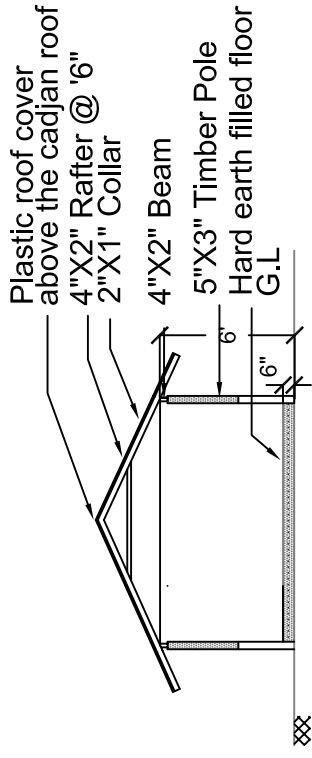
Tip 3: Durability of compacted earth floors can be improved with an additional layer of clay or gravel on top of the earth.

SINGLE UNIT SHELTERS



Cadjan & Plastic Sheet Gable Roof; Cadjan + Plastic Sheet Walls

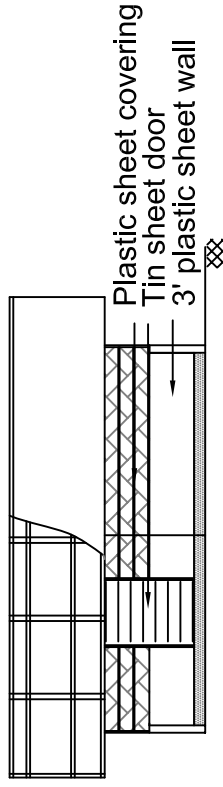
Emergency Shelter (17'x11')
Implemented By: JSAC(Jaffna)



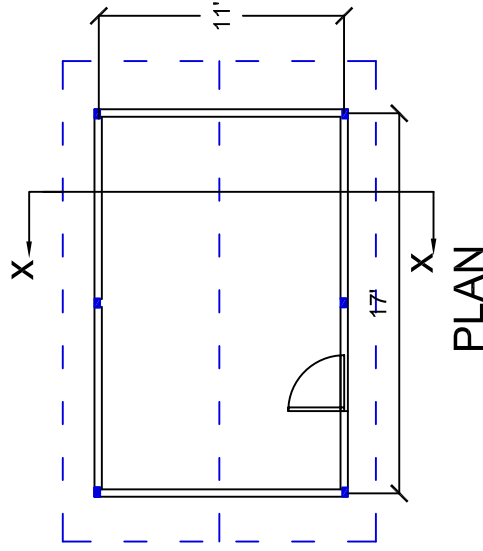
SECTION X-X

NOTE

- 1) For cadjan roof minimum roof angle is 40°
- 2) Minimum eave horizontal length is 2'.
- 3) Foundation depth is 2'.
- 4) Minimum height of the wall is 6'.
- 5) Minimum floor height 6" from the ground level.



FRONT ELEVATION



Shelter Coordination Cell

Single Unit Transitional Shelter

AREA : 187 Sq.ft.(17'x11')

LOCATION : : Jaffna

MATERIALS

STRUCTURE : Timber pole

ROOF : Cadjan +Plastic roof

WALL : Cadjan +Plastic wall

Implemented by :JSAC

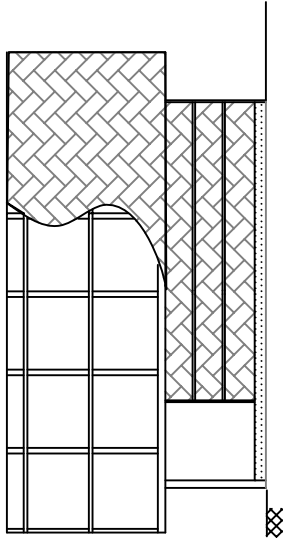
BILL OF QUANTITIES FOR SINGLE SHELTER UNIT (17'x11')**Materials** : (Cadjan +Plastic) roof+Timber pole+(cadjan+plastic) wall**Implemented by: JSAC****Location: Jaffna**

S.No	Description	Unit	Qty
	1.Labour		
	Skilled	Days	7.00
	Un skilled	Days	9.00
	2.Material		
1	Timber post 5"x3"x8'-0"	Nos	6.00
2	Palmyrah Piller Plate 4"x2"x10'-0"	Nos	4.00
3	Palmyrah Rafter 4"x2"x9'-0" @3'6"	Nos	10.00
4	Tiebeam 2"x2"x5'-0"	Nos	7.00
5	Reaper 2":x1"	Lft	360.00
6	Cadjan	Pairs	225.00
7	3 1/2"x3/8" MS Bolt&Nut	Nos	4.00
8	4 1/2"x1/4" MS Bolt&Nut	Nos	10.00
9	2 1/2"x1/4" MS Bolt&Nut	Nos	9.00
10	M.S Washer for 3/8" bolt	Nos	8.00
11	M.S Washer for 1/4" bolt	Nos	30.00
12	Wood preservative (Used engine oil/other)	Ltr	6.00
13	Wire nail 2" No-10	Kg	1.50
14	Wire nail 3" No-10	Kg	0.50
15	Coir rope for roof thatching	Kg	2.00
16	Coir rope for Side covering thatching	Kg	0.50
17	Ekkil	Kg	1.50
18	Iron Butt Hinges 4"x2"	Nos	2.00
19	Hasp &staple	Nos	1.00
20	Iron Drop bolt 3"	Nos	1.00
21	Screw 1"	Nos	16.00
22	Screw 3/4"	Nos	15.00
23	Roofing sheet(4mx3m)-plastic sheet)	Nos	2.00
24	Nylon rope	Nos	1.00
25	Plastric sheet(3'x60') for wall	Nos	1.00
26	Miscellaneous		Lump sum

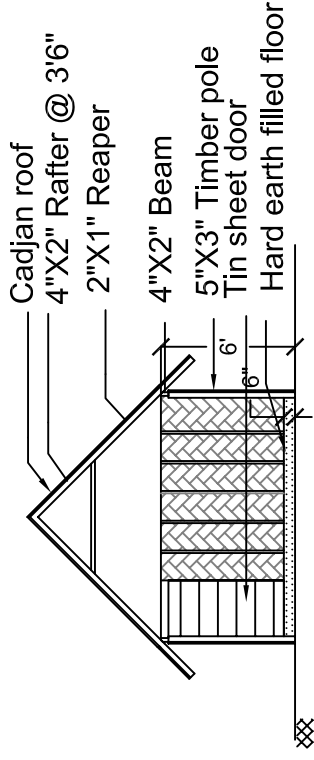


Cadjan Gable Roof ; Cadjan Walls

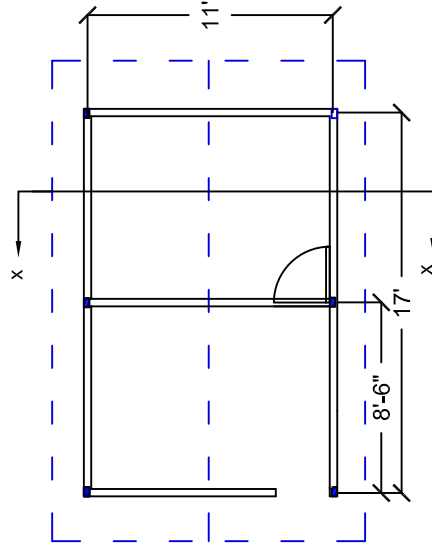
Emergency Shelter (17'x11')
Implemented By: JSAC (Jaffna)



FRONT ELEVATION



SECTION X-X

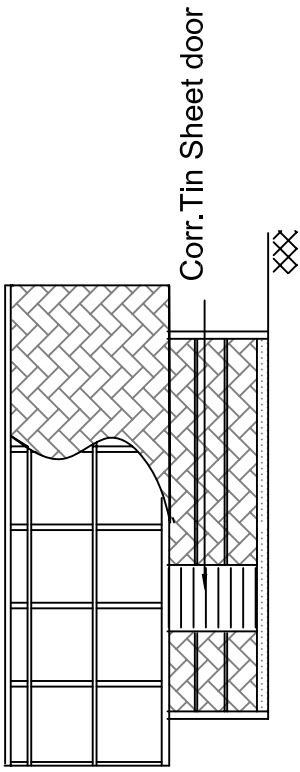


PLAN

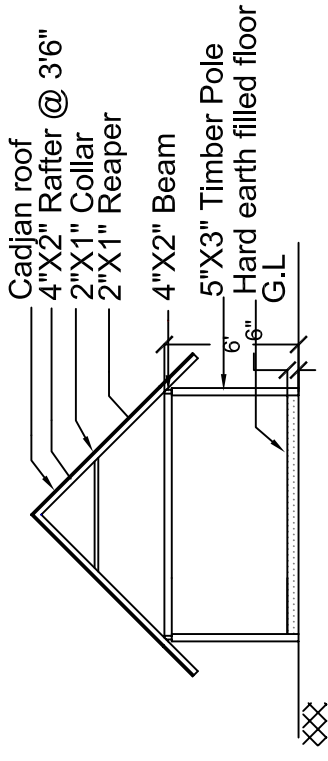
NOTE

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- 5) Minimum floor height 6" from the ground level.

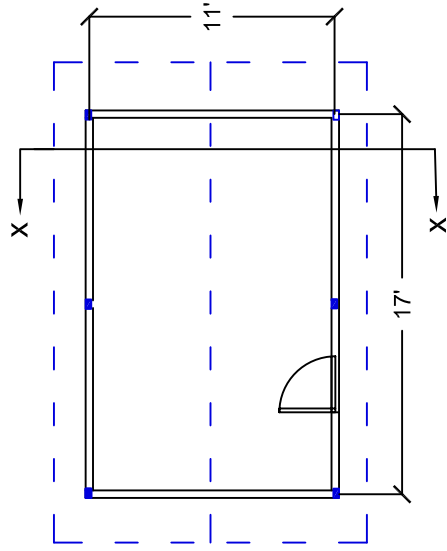
Shelter Coordination Cell		MATERIALS
Single Unit Transitional Shelter		STRUCTURE : Timber pole
AREA : 187 Sq.ft(17'x11')		ROOF : Cadjan roof
LOCATION : Jaffna		WALL : Cadjan wall
		Implemented by : JSAC



FRONT ELEVATION



SECTION X-X



PLAN

NOTE

- 1) For the cadjan roof minimum roof angle is 40°.
- 2) Minimum eave horizontal length is 2'.
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- 4) Minimum height of the wall is 6'.
- 5) Minimum floor height 6" from the ground level.

Shelter Coordination Cell

Single Unit Transitional Shelter

AREA : 187 Sq.ft(17'x11')

LOCATION : Jaffna

MATERIALS

STRUCTURE : Jungle pole

ROOF : Cadjan roof

WALL : Cadjan wall

Implemented by :JSAC

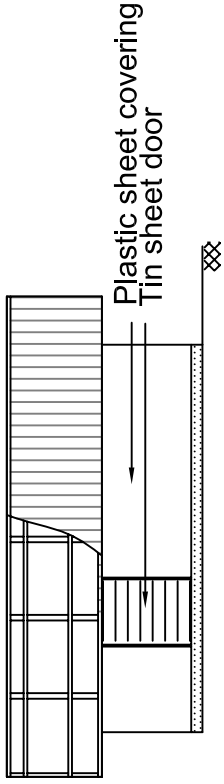
BILL OF QUANTITIES FOR SINGLE SHELTER UNIT (17'x11')**Materials** : Cadjan roof+Timber pole+cadjan wall**Implemented by:** JSAC**Location:** Jaffna

S.No	Description	Unit	Qty
	1.Labour		
	Skilled	Days	7.00
	Un skilled	Days	10.00
	2.Material		
1	Timber post 5"x3"x8'-0"	Nos	6.00
2	Palmyrah Piller Plate 4"x2"x10'-0"	Nos	4.00
3	Palmyrah Rafter 4"x2"x9'-0" @ 3'6"	Nos	10.00
4	Tiebeam 2"x2"x5'-0"	Nos	7.00
5	Reaper 2":x1"	Lft	360.00
6	Cadjan	Pairs	250.00
7	3 1/2"x3/8" MS Bolt&Nut	Nos	4.00
8	4 1/2"x1/4" MS Bolt&Nut	Nos	10.00
9	2 1/2"x1/4" MS Bolt&Nut	Nos	9.00
10	M.S Washer for 3/8" bolt	Nos	8.00
11	M.S Washer for 1/4" bolt	Nos	30.00
12	Wood preservative (Used engine oil/other)	Ltr	6.00
13	Wire nail 2" No-10	Kg	1.50
14	Wire nail 3" No-10	Kg	0.50
15	Coir rope for roof thatching	Kg	2.00
16	Coir rope for Side covering thatching	Kg	1.00
17	Ekkil	Kg	1.50
18	Iron Butt Hinges 4"x2"	Nos	2.00
19	Hasp &staple	Nos	1.00
20	Iron Drop bolt 3"	Nos	1.00
21	Screw 1"	Nos	16.00
22	Screw 3/4"	Nos	15.00
23	Roofing sheet	Nos	2.00
24	Nylon rope	Nos	1.00
25	Miscellaneous		Lump sum

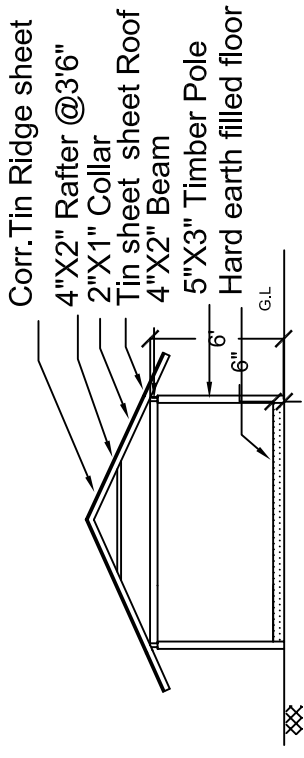


Corrugated Tin Sheet Gable Roof ; Plastic Sheet Walls

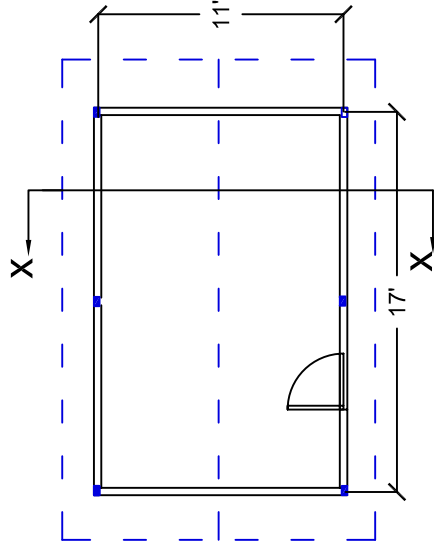
Emergency Shelter (17'x11')
Implemented By: JSAC (Jaffna)



FRONT ELEVATION



SECTION X-X



PLAN

NOTE

- 1) For Tin sheet roof minimum roof angle is 20°.
- 2) Minimum eave horizontal length is 2'.
- 3) Foundation depth is 2'.
- 4) Minimum height of the wall is 6'.
- 5) Minimum floor height 6" from the ground level.

Shelter Coordination Cell		MATERIALS
Single Unit Transitional Shelter		STRUCTURE : Timber pole
AREA : 187 Sq.ft.(17'x11')		ROOF : Corr. Tin Sheet
LOCATION : Jaffna		WALL : Plastic wall
		Variation on: JSAC model

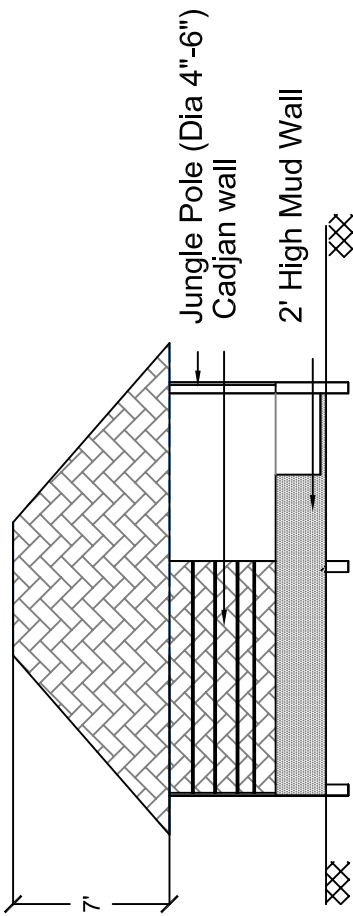
BILL OF QUANTITIES FOR SINGLE SHELTER UNIT (17'x11')**Materials** : Tin roof+Timber pole+Plastic wall**Implemented by:** JSAC**Location:** Jaffna

S.No	Description	Unit	Qty
	1.Labour		
	Skilled	Days	7.00
	Un skilled	Days	9.00
	2.Material		
1	Timber post 5"x3"x8'-0"	Nos	6.00
2	Palmyrah Piller Plate 4"x2"x10'-0"	Nos	4.00
3	Palmyrah Rafter 4"x2"x9'-0" @ 3'6"	Nos	10.00
4	Tiebeam 2"x2"x5'-0"	Nos	7.00
5	Reaper 2":x1"	Lft	360.00
6	Tin Sheet(Gauge 32) for roof(8'x27")	Nos	22.00
7	3 1/2"x3/8" MS Bolt&Nut	Nos	4.00
8	4 1/2"x1/4" MS Bolt&Nut	Nos	10.00
9	2 1/2"x1/4" MS Bolt&Nut	Nos	9.00
10	M.S Washer for 3/8" bolt	Nos	8.00
11	M.S Washer for 1/4" bolt	Nos	30.00
12	Wood preservative (Used engine oil/other)	Ltr	6.00
13	Wire nail 2" No-10	Kg	1.50
14	Wire nail 3" No-10	Kg	0.50
15	Coir rope for roof thatching	Kg	2.00
16	Coir rope for Side covering thatching	Kg	0.50
17	Ekkil	Kg	1.50
18	Iron Butt Hinges 4"x2"	Nos	2.00
19	Hasp &staple	Nos	1.00
20	Iron Drop bolt 3"	Nos	1.00
21	Screw 1"	Nos	16.00
22	Screw 3/4"	Nos	15.00
24	Nylon rope	Nos	1.00
25	Plastic sheet(6'x60') for wall	Nos	1.00
26	Miscellaneous		Lump sum

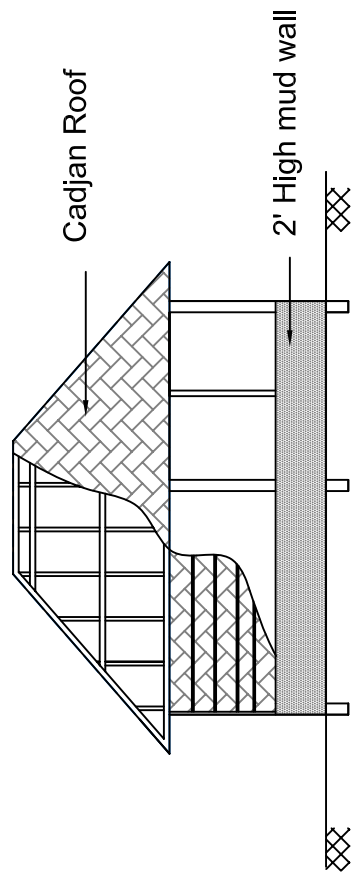


Cadjan Gable Roof; Mud & Cadjan Walls

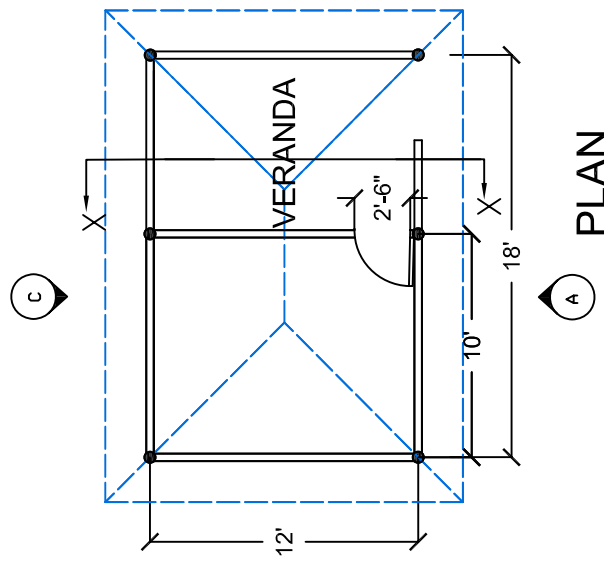
Emergency Shelter (18'x12')
Implemented By: Solidar & FORUT in the Vanni



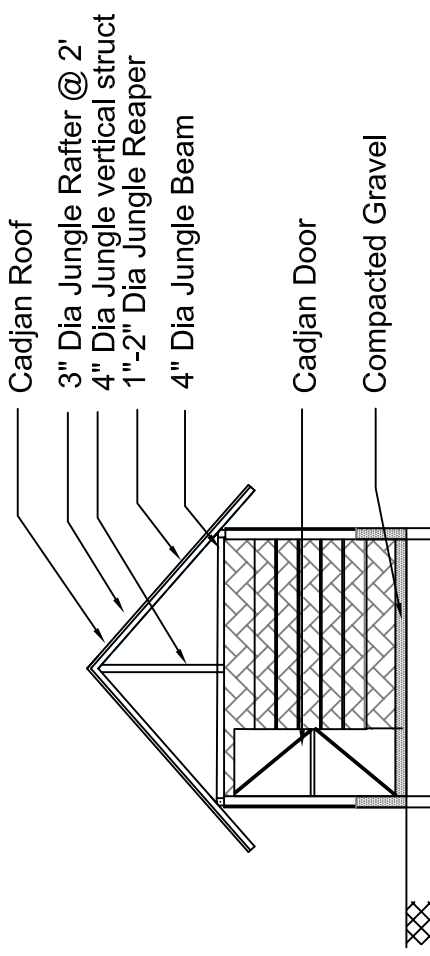
ELEVATION A



ELEVATION C



PLAN



SECTION X-X

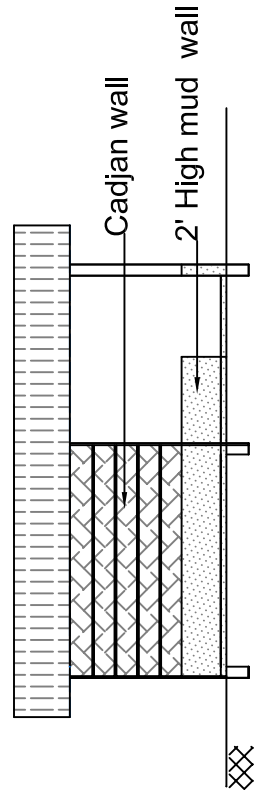
NOTE

- 1) For Cadjan roof minimum roof angle is 40°.
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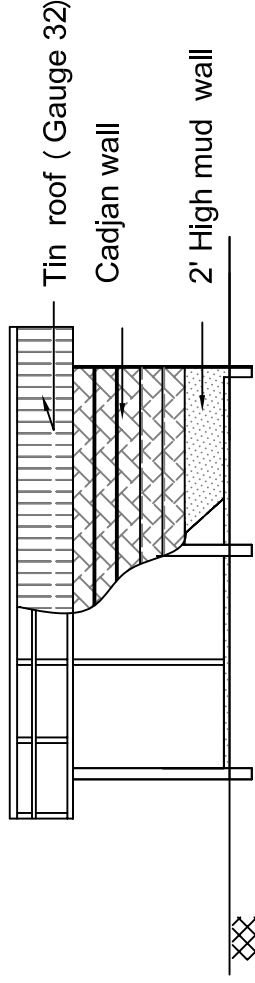
Shelter Coordination Cell		Implemented by	
Single Unit Transitional Shelter		INGO consortium	
AREA	: 216 Sq.ft (18x12')	Solidar	
LOCATION	: Killinochchi and Mullaitivu	INGO consortium	
		Norwegian Peoples Aid	
		SASB	
		Swiss Labour Assistance SAH	

BILL OF QUANTITIES FOR SINGLE SHELTER UNIT (18'x12')**Materials** : Cadjan roof+Jungle pole+(cadjan +2' mud)wall**Implemented by: Solidar****Location:** Kilinochchi and Mullaitivu

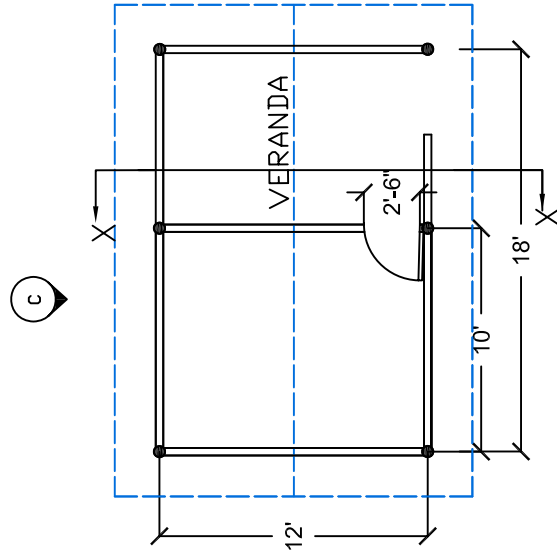
S. No	Description	Unit	Quantity
Frame Work			
1	4" - 6" dia Jungle post - 9 ft	Nos	6.00
2	4" dia. Jungle beam - 13 ft	Nos	4.00
3	4" dia. Jungle beam - 12 ft	Nos	2.50
4	4" dia. Jungle beam - 12 ft(With strut 6')	Nos	3.00
5	3" dia Jungle corner ridge-15'	Nos	4.00
6	3" dia Rafter - 10 ft - No-1 (intervals 2')	Nos	26.00
7	Reapers - bundle (10'-15')	Nos	38.00
8	Carpentry charge for frame work	Days	2.00
9	Labour charge for Frame work	Days	2.00
Thatching Work			
10	Cadjan for roof (minimum length 7 ft)	Pairs	225.00
11	Roof thatching	Day	3.00
Enclosure - Work by cadjans			
12	3" dia Rafter - 10 ft - No.4 for enclosure	Nos	14.00
13	Cadjan for enclosure (minimum length 7 ft)	Pairs	50.00
14	Labour for making enclosure& Door	Days	1.00
Floor work			
15	Supplying soil / clay (Gravel sand)	T.Load	0.50
16	Supplying type -2 soil	Cube	1.00
17	Labour for spreading and compacting Gravel and type - 2 soil	Day	1.00
Wall Work			
18	Labour & material charge for mud wall	cube	0.72
Other Materials			
19	Wire nails - 2"	Kg	2.00
20	Wire nails - 3"	Kg	1.00
21	Coir rope - 2 kg for roof	Nos	2.00
22	Coir rope - 1.25 kg for enclosure	Nos	1.25
23	Ekkil	Kg	3.00
24	Rubber coir	Kg	0.75
25	Material transport & handling		Lump Sum



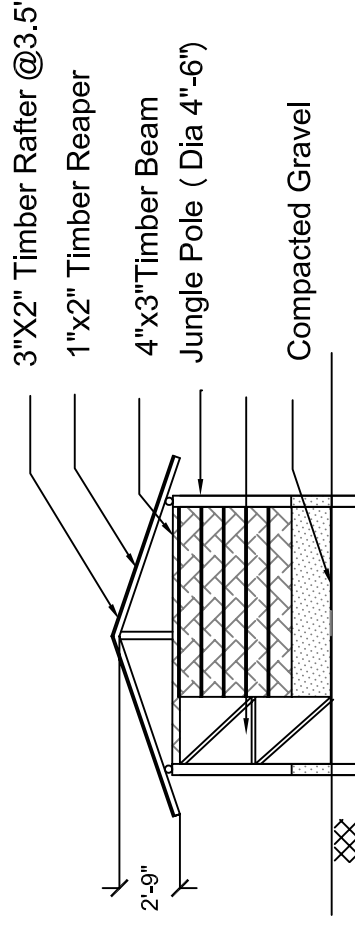
ELEVATION A



ELEVATION C



PLAN



SECTION X-X

NOTE

- 1) For tin sheet roof minimum roof angle is 20°.
- 2) Minimum eave horizontal length is 2'.
- 3) Foundation depth is 2'.
- 4) Minimum height of the wall is 6'.
- 5) Minimum floor height 6" from the ground level.

Shelter Coordination Cell

Single Unit Transitional Shelter

AREA : 216 Sq.ft (18x12')

LOCATION : Killinochchi and Mullaitivu

MATERIALS

STRUCTURE : Jungle pole

ROOF : Corr. Tin Sheet

WALL : 2' Mud wall+Cadjan wall

Variation on : Solidar model

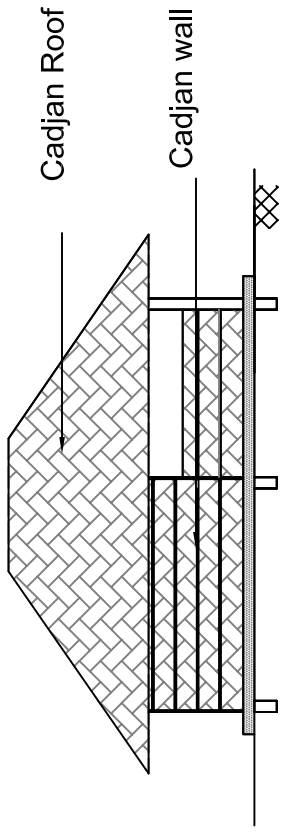
BILL OF QUANTITIES FOR SINGLE SHELTER UNIT (18'x12')**Materials** : Tin sheet roof+Jungle pole+(Cadjan+mud) wall**Implemented by: Solidar****Location:** Kilinochchi and Mullaitivu

S.No	Description	Unit	Qty
Roof work			
1	4'' - 5'' Dia Jungle Post 9 ft	Nos	6.00
2	4''x3"Timber Beam - 13 ft	Nos	3.00
3	4''x3"Timber Beam - 20ft	Nos	4.00
4	4''x3"Timber Strut - 12 ft	Nos	1.00
5	3"x2" Rafter - 11 ft No -1 (intervals 3.5')	Nos	16.00
6	1"x2" Reeper -22ft (interval 3')	Nos	8.00
7	Carpentry charge for Frame work	Sqrs	3.60
8	Tin sheet(Gauge-32)-12'x27"	Nos	26.00
9	Labour for making Roof	Sqrs	3.60
Enclosure-Work by Cadjan			
10	3'' Dia Rafter 10 ft No 4 for Enclosure	Nos	14.00
11	2" Dia Reaper 10ft	Nos	13.00
12	Cadjan for enclosure (minimum Length 7 ft)	Pair	50.00
13	Labour for making enclosure & door	Days	1.50
Floor work			
14	Supplying soil / clay (Gravel sand)	T.Load	0.50
15	Supplying type -2 soil	Cube	1.00
16	*Labour charge for Spreading and compaction Gravel and Type 2 soil	Days	1.00
Wall work			
17	Material &Labour charge for mud wall	Cube	0.72
Other materials			
18	Wire Nails - 2''	Kg	2.00
19	Wire Nails - 3''	Kg	1.00
20	Cap Nails-1.5"	Kg	1.50
21	Coir Rope - for enclosure	Kg	1.25
22	Ekkil	Kg	0.50
23	Rubber coir	Kg	0.25
24	Materials Transport & Handling		Lump Sum

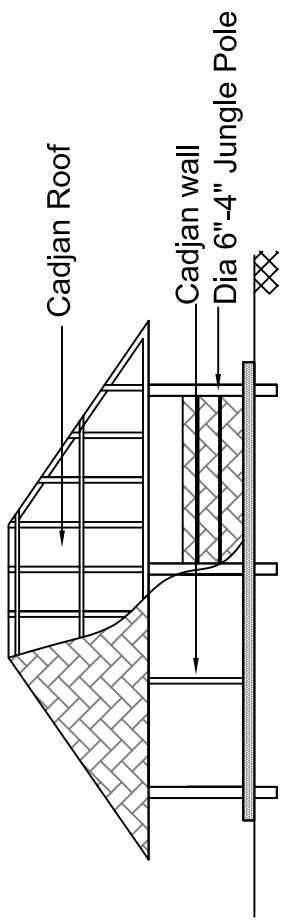


Cadjan Hip Roof & Cadjan Walls

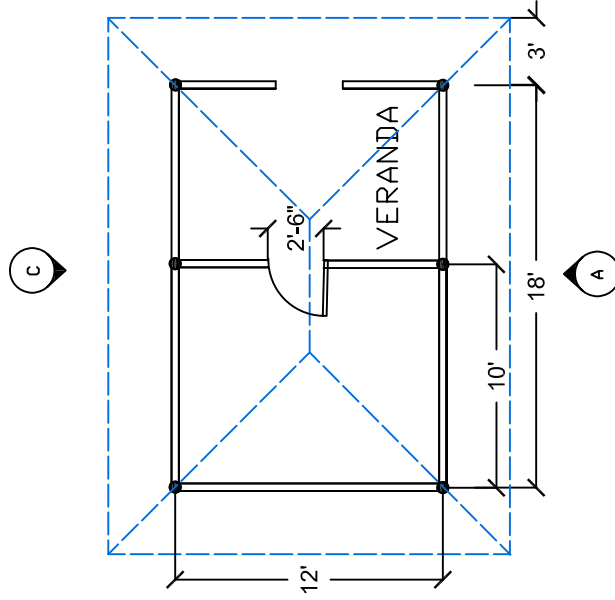
Emergency Shelter (18'x12')
Implemented By: Oxfam, Solidar, UNOPS in the Vanni



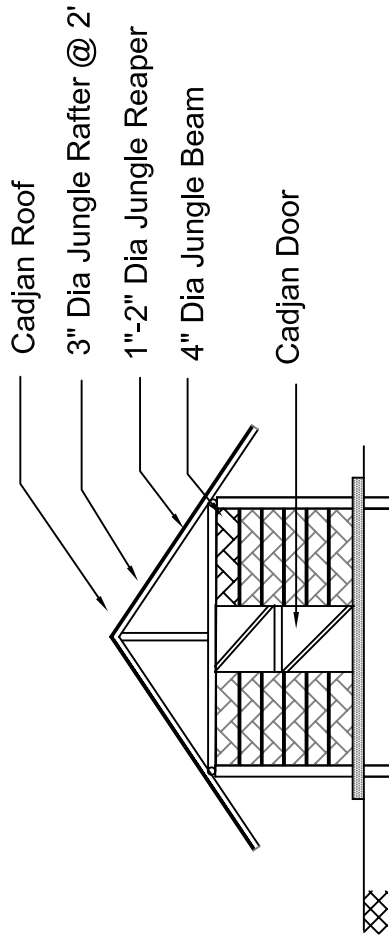
ELEVATION A



ELEVATION C



PLAN



NOTE

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SECTION X-X

Shelter Coordination Cell

Single Unit Transitional Shelter

AREA : 216 Sq.ft (18x12')

LOCATION : Killinochchi and Mullaitivu

MATERIALS

STRUCTURE : Jungle pole

ROOF : Cadjan roof

WALL : Cadjan wall

Implemented by:



UNOPS

BILL OF QUANTITIES FOR SINGLE SHELTER UNIT (18'x12')

Materials : Cadjan roof+Jungle pole+Cadjan wall

Implemented by: UNOPS

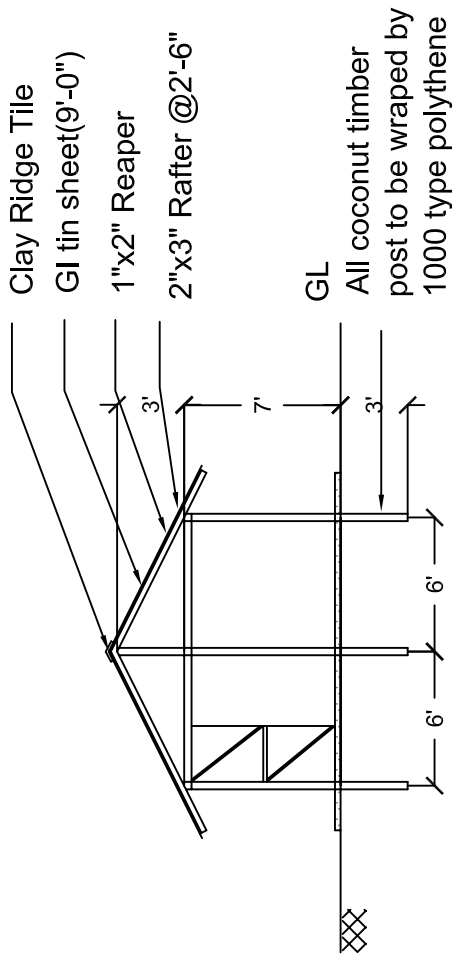
Location: Kilinochchi and Mullaitivu

S. No	Description	Unit	Quantity
Frame Work			
1	4" - 6" dia Jungle post - 9 ft	Nos	6.00
2	4" dia. Jungle beam - 13 ft	Nos	4.00
3	4" dia. Jungle beam - 12 ft	Nos	2.50
4	4" dia. Jungle beam - 12 ft(With strut 6')	Nos	3.00
5	3" dia Jungle corner ridge-15'	Nos	4.00
6	3" dia Rafter - 10 ft - No-1 (intervals 2')	Nos	26.00
7	Reapers - bundle (10'-15')	Nos	38.00
8	Carpentry charge for frame work	Days	3.00
9	Labour charge for Frame work	Days	3.00
Thatching Work			
10	Cadjan for roof (minimum length 7 ft)	Pairs	225.00
11	Roof thatching	Day	3.00
Enclosure - Work by cadjans			
12	3" dia Rafter - 10 ft - No.4 for enclosure	Nos	7.00
13	Cadjan for enclosure (minimum length 7 ft)	Pairs	50.00
14	Labour for making enclosure& Door	Days	1.00
Floor work			
15	Supplying soil / clay (Gravel sand)	T.Load	0.50
16	Supplying type -2 soil	Cube	1.00
17	Labour for spreading and compacting Gravel and type - 2 soil	Day	1.00
Wall Work			
18	Masonry charge	Days	1.00
19	Labour charge	Days	1.00
Other Materials			
20	Wire nails - 2"	Kg	2.00
21	Wire nails - 3"	Kg	1.00
22	Coir rope - 2 kg for roof	Nos	2.00
23	Coir rope - 1.25 kg for enclosure	Nos	1.25
24	Ekkil	Kg	3.00
25	Rubber coir	Kg	0.75
26	Material transport & handling		Lump Sum

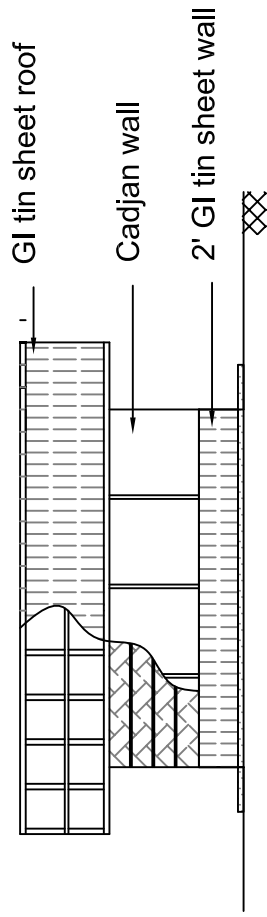


Corrugated Tin Sheet Gable Roof+ Cadjan nd Corrugated Tin Sheet Walls
(NRC photos by: Sujeewa de Silva)

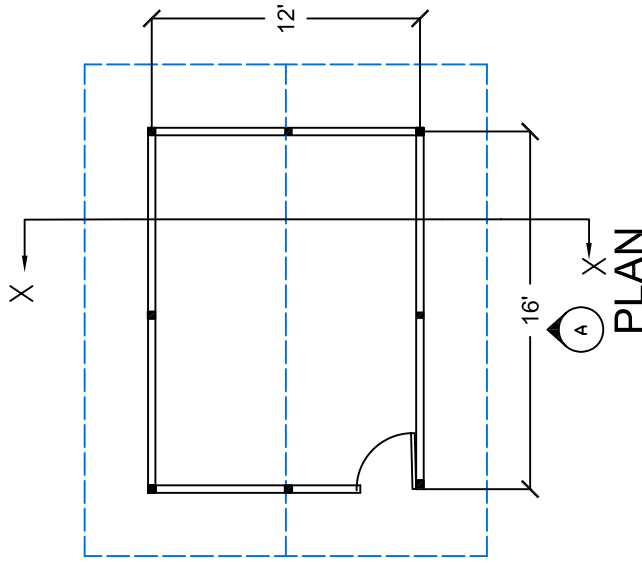
Emergency Shelter (16'x12')
Implemented by: NRC in Batticaloa



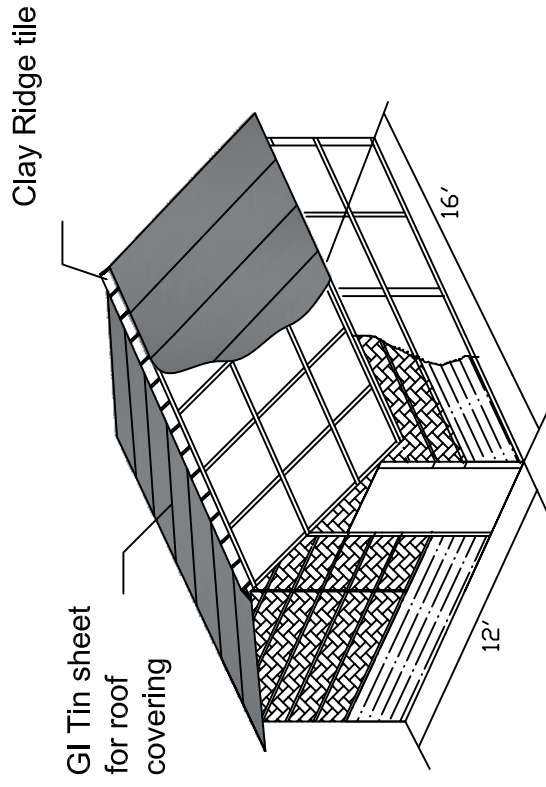
SECTION X-X




ELEVATION A



3D DETAILS



Shelter Coordination Cell		Implemented :	
Single Unit Transitional Shelter			
AREA	: 192 Sq.ft.(16'x12')	ROOF	: GI Tin sheet roof
LOCATION :	: Batticaloa	WALL	: GI Tin sheet+Cadjan wall
		 NORWEGIAN REFUGEE COUNCIL	

BILL OF QUANTITIES FOR TRANSITIONAL SHELTER KIT ASSISTANCE BY NRC (192 ft2)**Materials** : Tin roof+Timber pole+cadjan wall**Implemented by:** NRC**Location:** Vaharai

No	Description	Unit	Quantity
1	2" x 4" Struts for using vertical poles 10' long 6 Nos.	Ft	60
2	2" x 2" Struts for using vertical poles 8' long 7 Nos.	Ft	56
3	2" x 4" Struts for using Horizontal supports 12' long 1 No. 2" x 3" Struts for horizontal supports 12' - 2 nos	Ft	12 24
4	2" x 3" strut using for vertical supports 4' long 1 no.	Ft	4
5	2" x 4" Struts for using Vertical poles 12' long 2 Nos.	Ft	24
6	2" x 4" Ridge beam & Wall plate placing on the vertical struts 9' long 6 nos	Ft	54
7	2" x 3" Rafter 9' long 17 nos. Fixing @ 2.5 c/c	Ft	153
8	1" x 2" Purlin	Ft	250
9	1' x 6' Cadjan	Nos	80
10	CGI sheet (32 gauge, large Corrugated) placing on 2.5' from GL 2.5' X 12' long 1 No. 2.5' X 8' long 4 Nos. (side cover) 2.5' X 6' long 1 Nos. 2.5' X 9' long 17 Nos. (roofing)	Nos	1 4 1 17
11	Clay Ridge Tiles	Nos	14
12	Nails (2", 5" long)	Nos	3
13	Cap nails	Nos	1
14	Polythene sheet	Nos	1
15	Door hinges , handle and screws		LS
16	Coir rope 6 mm	Kgs	1.25
17	Labour charges or construction of shelter		Lump sum
18	Transportation and Loading Charges		Lump sum



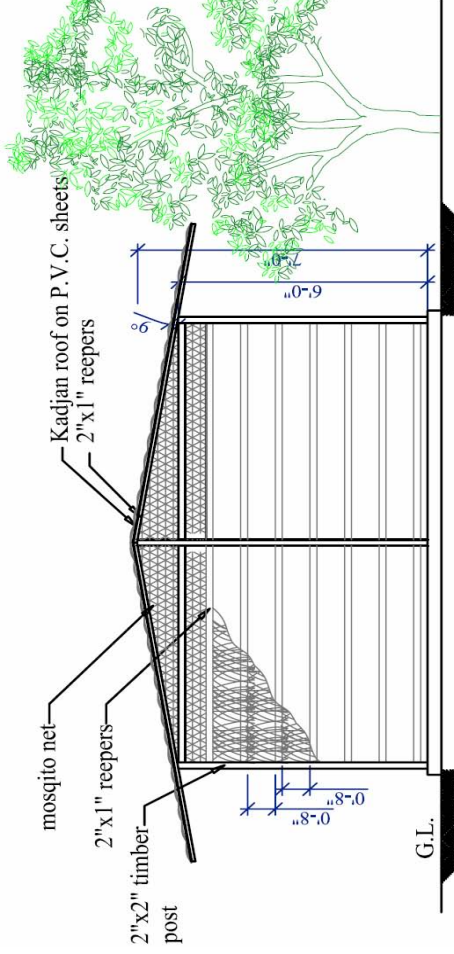
Perspective



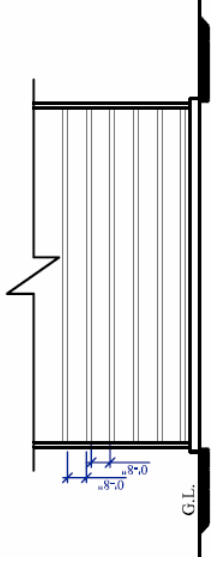
Model

Sandwich Cadjan & Plastic Sheet Gable Roof+ Sandwich Cadjan and Plastic Sheet Walls

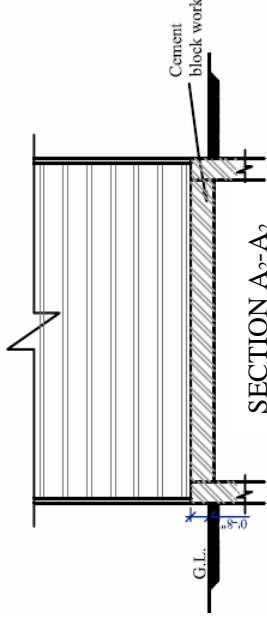
Emergency Shelter (16'x12')
Implemented by: HELP in Batticaloa



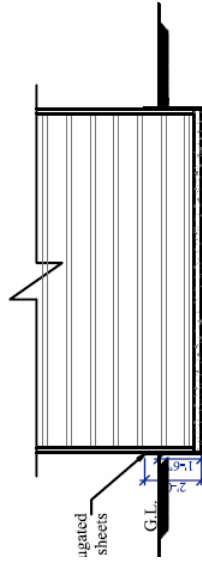
SECTION A-A



SECTION A₁-A₁
Type - 1



SECTION A₂-A₂
Type - 2



SECTION A₃-A₃
Type - 3

Shelter Coordination Cell

MATERIALS : Prefabricated timber elements

Single Unit Transitional Shelter

STRUCTURE : Timber frames

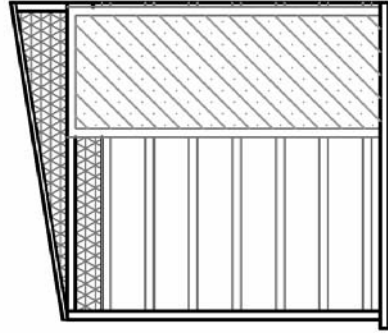
AREA : 168sq. ft (12' 0"x 14' 0")

ROOF : Sandwich plastic-cadjan

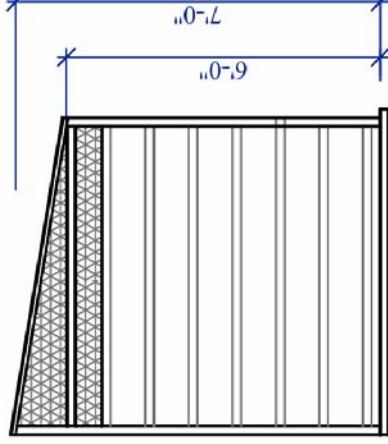
LOCATION : Batticaloa

WALL : Sandwich plastic-cadjan

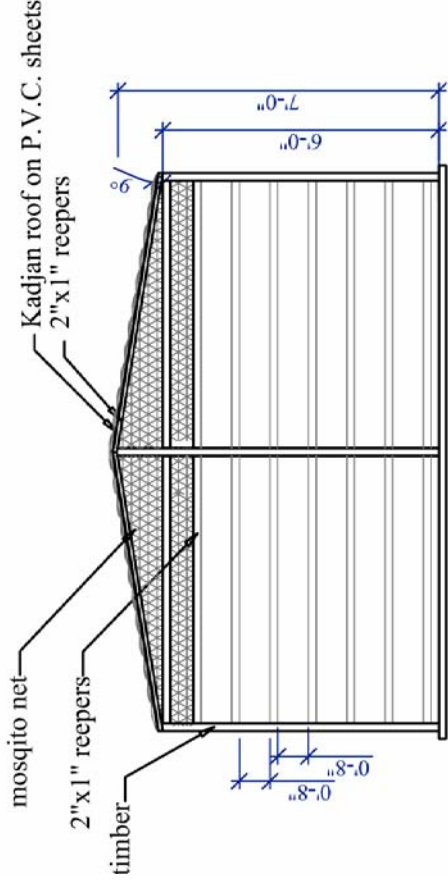




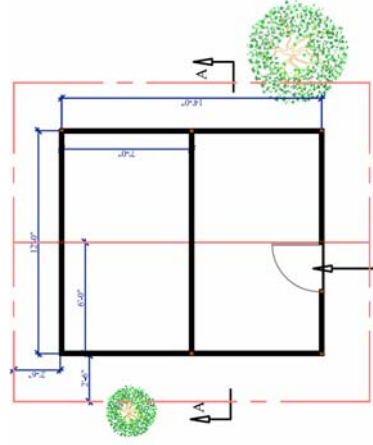
Unit A - 1



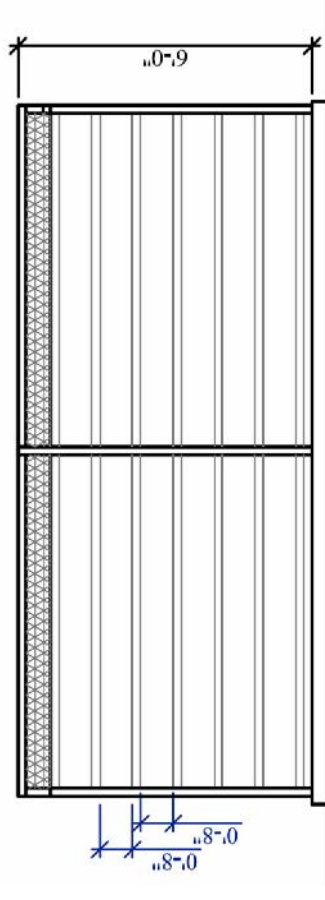
Unit A - 2



Unit C



Floor plan



Unit B

Shelter Coordination Cell

MATERIALS : Prefabricated timber elements

Single Unit Transitional Shelter

STRUCTURE : Timber frames

AREA

: 168sq. ft (12' 0" x 14' 0")

ROOF : Sandwich plastic-cadjan

LOCATION

: Batticaloa

WALL

: Sandwich plastic-cadjan



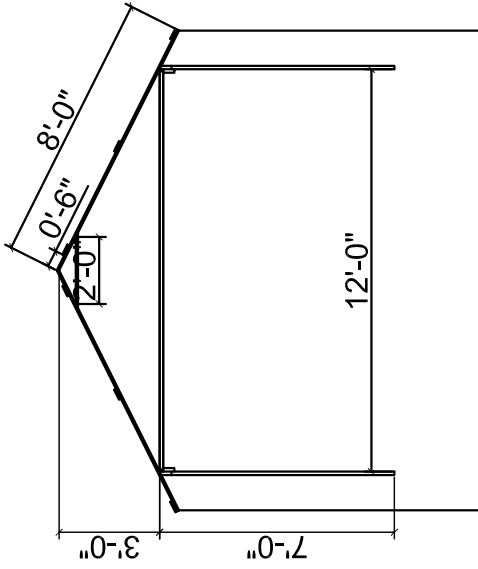
Help from Germany

BILL OF QUANTITIES FOR SINGLE SHELTER UNIT (14'x12')**Materials** : Timber, (plastic and Cadjan)roof and (plastic and cadjan)wall**Implemented by:** HELP from Germany **Location:** Batticaloa

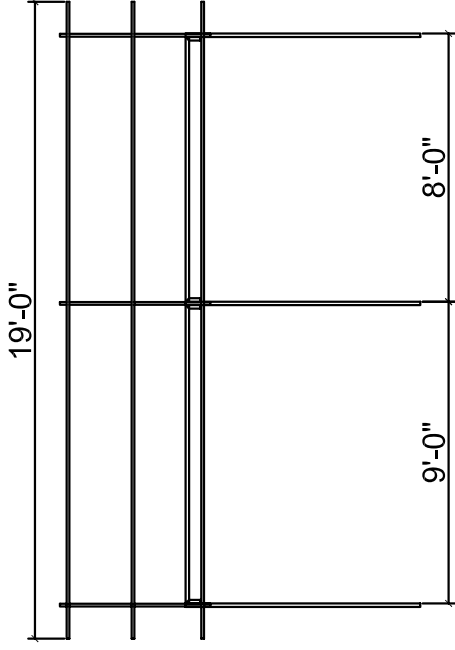
S. No	Description	Unit	Quantity
	1. Labour		
1	Skilled	Days	1.00
2	Un-skilled	Days	10.00
	2. Material for roofing		
3	Timber post 2"x2"x6 ft	Nos	24.00
4	Timber post 2"x2"x8 ft	Nos	16.00
5	Plastic sheet	Ft ²	180.00
6	Tie beam 2"x1"x8 ft	Nos	12.00
7	Cadjan	Ft ²	216.00
8	Ridge tile	Nos	14.00
9	Coir rope	Ft ²	36.00
	3. Material for walls		
10	Timber post 2"x2"x3 ft	Nos	2.00
11	Timber post 2"x2"x6 ft	Nos	24.00
12	Timber post 2"x2"x8 ft	Nos	24.00
13	Timber post 2"x2"x10 ft	Nos	4.00
14	Plastic sheet	Ft ²	268.00
15	Tie beam 2"x1"x8 ft	Nos	12.00
16	Tie beam 2"x1"x10 ft	Nos	4.00
17	Mosquito net	Ft ²	50.00
18	Door and fixtures	Nos	1.00
19	Division beam 2"x2"x12 ft	Nos	1.00
20	Cadjan	Ft ²	268.00
	4. Materials for fixing		
21	Glue	Kg	1.50
22	Staple	Kg	0.50
23	Nails/screws	Kg	2.00
24	Wood preservative (Used engine oil/other)	Ltr	3.00
25	Material transport & handling		Lump Sum



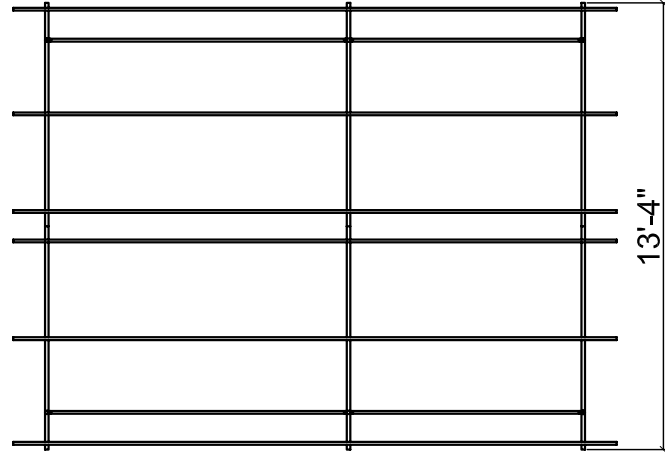
Emergency Shelter (17'x12')
Implemented by: Zoa in Batticaloa



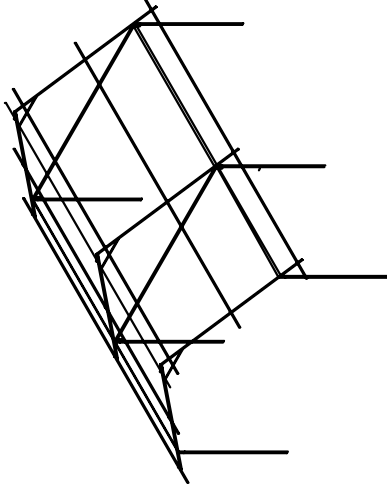
ELEVATION



SIDE ELEVATION



PLAN



3D STRUCTURAL VIEW

Bar Dia.	Bar Lft.	Qty.(No)	Tot. len.	No. of Bar
1-1/4 inch	6'-0"	02	12'-0"	
1-1/4 inch	6'-0"	02	12'-0"	
1-1/4 inch	6'-0"	02	12'-0"	36'-0" 02
1-0 inch	8'-0"	03	24'-0"	
1-0 inch	8'-0"	03	24'-0"	48'-0" 03
3/4 inch	2'-0"	03	6'-0"	
3/4 inch	7'-0"	02	14'-0"	
3/4 inch	9'-0"	02	18'-0"	
3/4 inch	11'-0"	02	22'-0"	
3/4 inch	18'-0"	06	108'-0"	168'-0" 10

Shelter Coordination Cell

Single Unit Transitional shelter(GI frame structure)

AREA : 204 Sq.ft(17'x12')

LOCATION : Batticaloa

Implemented By

STRUCTURE : GI Pipe

ROOF : Tin sheet roof

WALL :

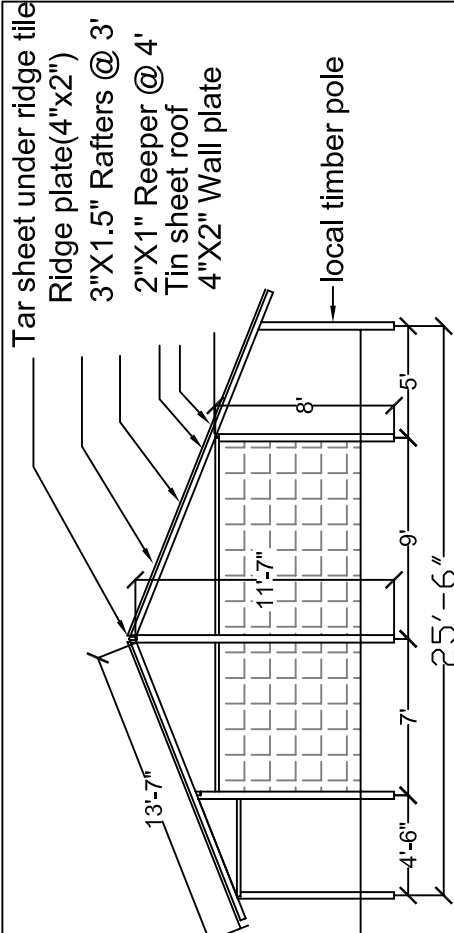


MULTI-FAMILY UNITS SHELTERS

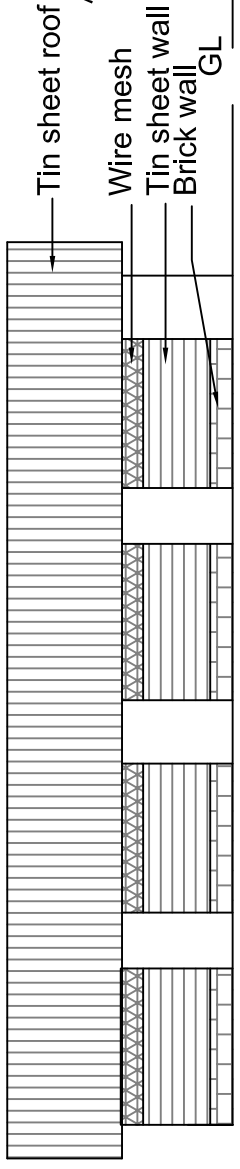


Corrugated Tin Gable Roof; Corrugated Tin + Plywood Walls

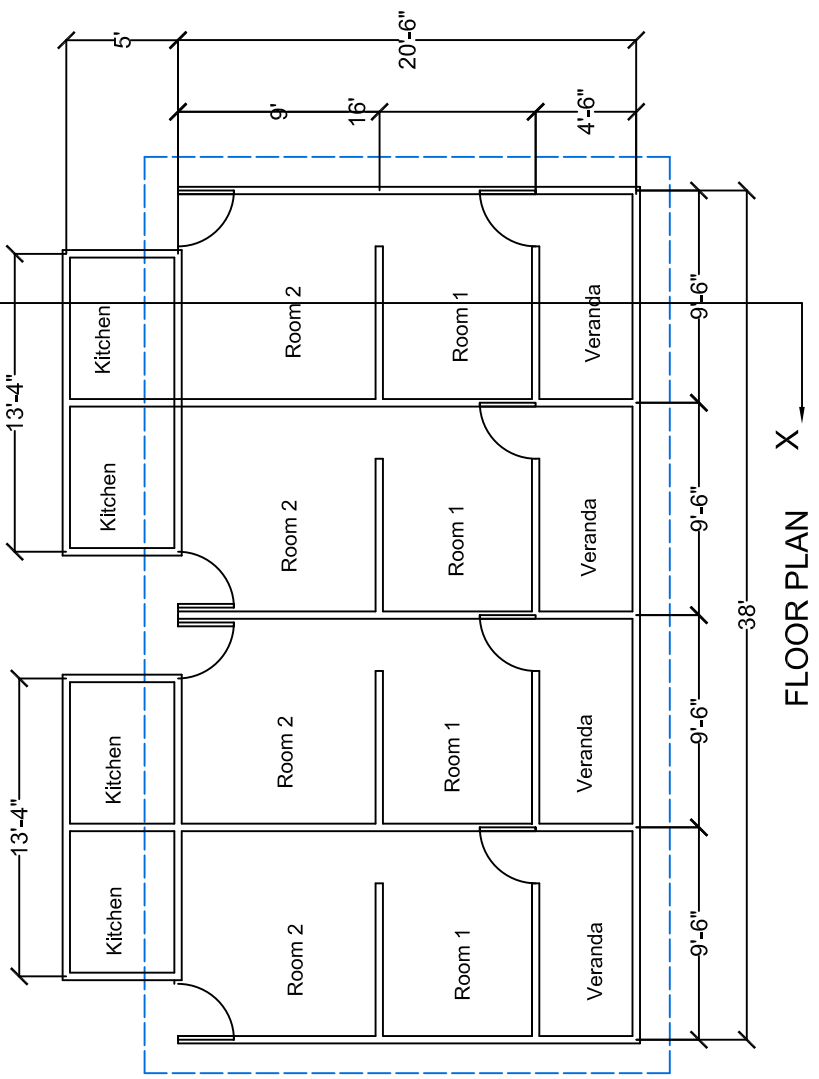
**Multi-Family Units
Implemented by: IOM in Batticaloa & Jaffna**



SECTION A-A



FRONT ELEVATION X



FLOOR PLAN X

Shelter Coordination Cell		MATERIALS	
Multiple Unit Transitional shelter (4 Families)		STRUCTURE : Timber pole	
AREA : 228 Sq.ft per family (9'6"x20'6") with kitchen (6'8"x5')		ROOF : Corr. Tin sheet	
LOCATION : Batticaloa		WALL : Brick+Corr. Tin sheet+wire mesh	
		Implemented By:	
		IOM International Organization for Migration	



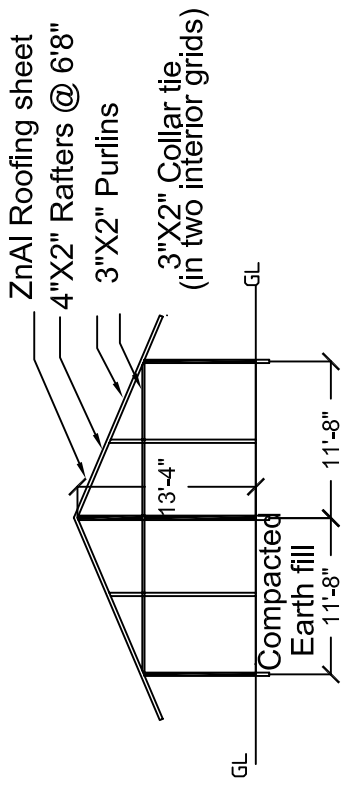
BILL OF QUANTITIES FOR FOUR SHELTER UNIT (38'x20'6")**Materials** : Tin sheet roof+Timber post+(Brick+Tin sheet) wall**Implemented by: IOM****Location: Batticaloa****Bill of Quantities for Four shelter unit(38'x20'6")-Batticaloa(IOM)**

No	Description	Unit	Qty
1	Timber (4"x3")	Ft	60.00
2	Timber (4"x2")	Ft	125.00
3	Timber (2"x2")	Ft	165.00
4	For Roof		
	Rafter(3"x1.5")	Ft	226.00
	Wall plate(4"x2")	Ft	210.00
5	Reaper(1"x2")	Ft	365.00
6	Ridge plate(4"x2")	Ft	48.00
7	Tin sheet (12') for roof ,Gauge 34	Nos	4.00
8	Tin sheet (8') for roof ,Gauge 34	Nos	60.00
9	Tin sheet (6') for roof ,Gauge 34	Nos	21.00
	For Clading		
10	Tin sheet (8') for Clading ,Gauge 34	Nos	36.00
11	3mm thick MDF board (4'0"x8'0") for internal partition	Nos	18.00
12	Cement Block(4"x8"x14")	Nos	80.00
13	Wire mesh(4' high),50ft long	Roll	1.20
14	Tarpaulins(Width-8',3mm thick)	Ft2	140.00
15	Door(2'-6"x6'-0")	Nos	8.00
16	Door hinges(4"x2"x1/2")	Nos	16.00
17	Tower bolt	Nos	8.00
18	Screw(3/4")	Kg	176.00
19	Wire nail(5")	Kg	5.00
20	Wire nail(4")	Kg	5.00
21	Wire nail(3")	Kg	4.00
22	Wire nail(2")	Kg	4.00
23	Wire nail(1")	Kg	1.00
24	Roofing nail(1 1/2")	Kg	3.50
25	Cement(50 Kg bag)	Bag	2.50
26	Sand	cube	0.10
27	Metal	cube	0.20
28	Gravel for intemal floor area	cube	2.00
29	Ridge tile	Nos	33.00
30	Tin sheet(6'0 Partition for kitchen)	Nos	4.00
31	Material Transport		Lump sum

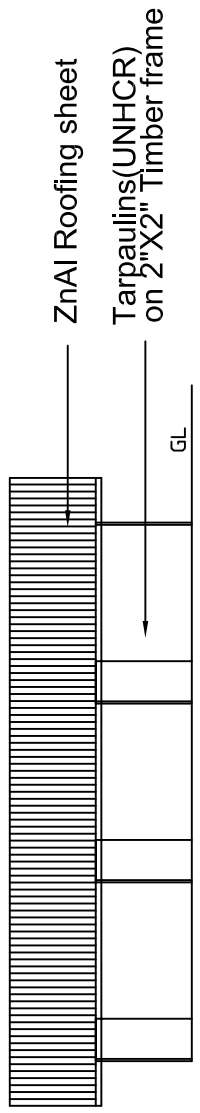


Corrugated Tin Gable Roof; Corrugated Tin Walls

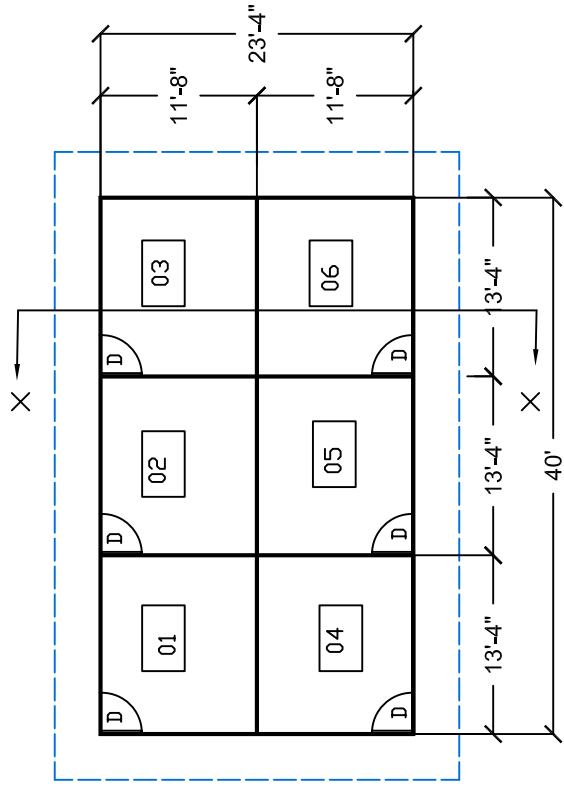
**Multi-Family Units
Implemented by: UNOPS in Trincomalea**



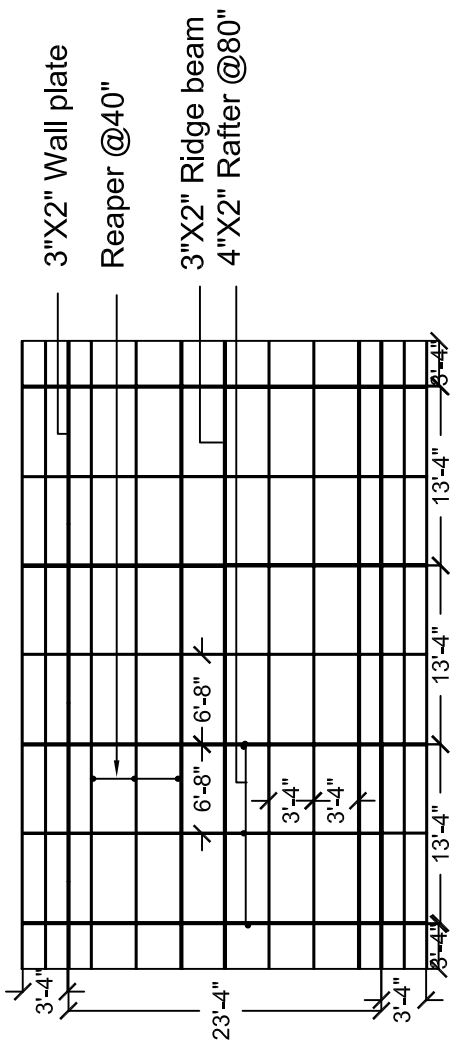
SECTION A-A




FRONT ELEVATION



FLOOR PLAN



ROOF PLAN

	
Implemented by: UNOPS	
Shelter Coordination Cell	MATERIALS
Multiple unit Transitional shelter (6 Families) (40'-0" x 23'-4")	STRUCTURE : Timber pole
AREA : 156 Sq.ft per family (13'4" x 11'8")	ROOF : ZnAl roofing sheet
LOCATION : Batticaloa	WALL : Trapaulins (UNHCR)

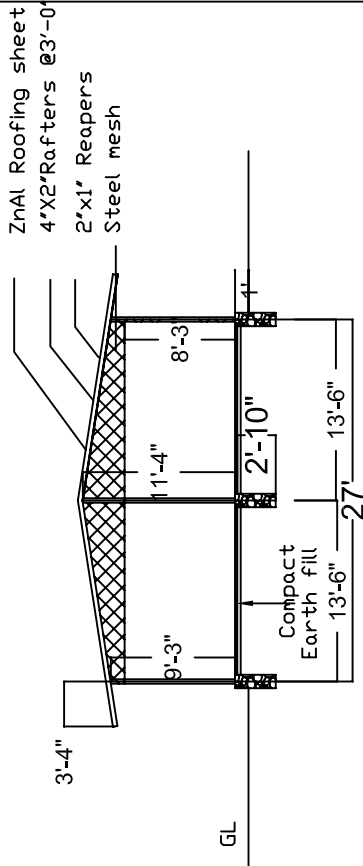
BILL OF QUANTITIES FOR MULTIPLE SHELTER UNIT-6 FAMILIES (40'0"x23'4")

Materials : Tin sheet roof+Timber pole+Tin sheet wall

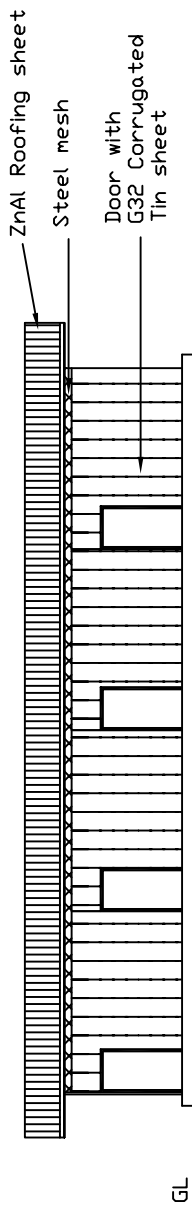
Implemented by: UNOPS

Location: Batticaloa

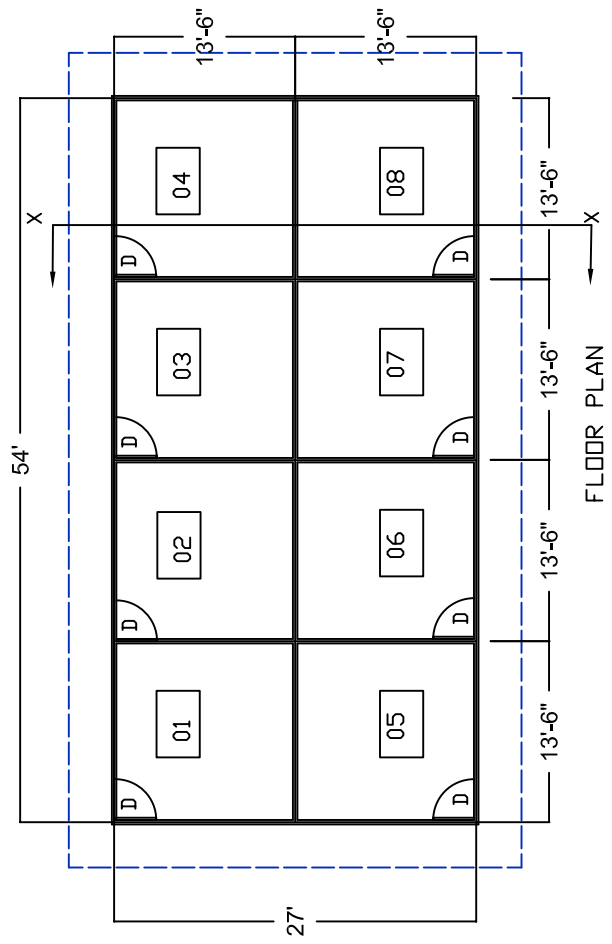
Item No	Item	Material Description	Size in mm	Size	Unit	Quantity
1	Centre support 1	Timber post	50x100x4490	2"x4"x15'	No	4.00
2	Centre support 2	Timber post	50x100x3650	2"x4"x13'	No	8.00
3	Side support	Timber post	50x100x2990	2"x4"x10'	No	8.00
4	Wall plate 1	Timber	50x75x5200	2"x3"x17'	No	6.00
5	Wall plate 2	Timber	50x75x4200	2"x4"x14'	No	3.00
6	Tie beam	Timber	50x75x3700	2"x3"x12'	No	4.00
7	Rafter	Timber	50x100x4900	2"x4"x16'	No	14.00
8	Purlins	Timber	50x75	2"x3"	m	170.00
9	Wall covering(frame)	Timber	50x50	2"x2"	m	370.00
10	Wall covering(frame)	Timber	25x50	1"x2"	m	370.00
11	Wall cladding	UNHCR Tarpaulins			m2	120.00
12	Nails for main structure	Normal iron nails	100mm	4"	Kg	5.00
13	Nails for main structure	Normal iron nails	75mm	3"	Kg	6.00
14	Nails for main structure	Normal iron nails	50mm	2"	Kg	3.00
15	Cap nails	Cap nails	50mm	2"	Box	2.00
16	Transport/Handling				Sum	Item
17	Labour	For(frame,roof,wall covering)			Sum	Item
18	ZnAl Roofing sheets		2400x825	8'x33"	No	96.00
19	Ridge sheet	Aluminium(30" wide)			m	15.00
	FOR PARTITION					
1	Frame work	Timber	50x50	2"x2"	m	200.00
2	Frame work	Timber	25x50	1"x2"	m	200.00
3	covering	UNHCR Tarpaulins			m2	80.00
4	Nails for partition	Nails with washer	50mm	2"	Kg	2.00
5	Labour	For partition			Sum	Item



CROSS SECTION A-A



FRONT ELEVATION



FLOOR PLAN

Shelter Coordination Cell		MATERIALS
Multiple unit Transitional shelter (8 Families) (54'-0" x 27'-0")		STRUCTURE : Timber pole
AREA : 182 Sq.ft per family (13.5'x13.5')		ROOF : ZnAl roofing Sheet
LOCATION : Trincomalee		WALL : Corr. Tin sheet
		Implemented by:



BILL OF QUANTITIES FOR MULTIPLE SHELTER UNIT-8 FAMILIES (54'x27')

Materials : Tin sheet roof+Timber pole+Tin sheet wall

Implemented by: UNOPS

Location: Trincomalee

Item No	Item	Material Description	Size in mm	Size	Unit	Quantity
1	Centre support	Wooden post (coconut)	75x100x3861	3"x4"x13'	No	5.00
2	Side support	Wooden post (coconut)	50x100x3243	2"x4"x11'	No	10.00
3	Tie beam	Coconut wood	50x100x4200	2"x4"x14'	No	10.00
4	Wall plate 1	Coconut wood	50x100x4200	2"x4"x14'	No	6.00
5	Wall plate 2	Coconut wood	50x100x5200	2"x4"x17'	No	6.00
6	Rafter	Coconut wood(centre/side)	50x100x5200	2"x4"x17'	No	48.00
7	Wall covering	Wood-Timber-side/partition	50x50	2"x2"	m	350.00
8	Floor covering	UNHCR Tarpaulins			m2	150.00
9	Roof support	Wood -Timber	25x50	1"x2"	m	250.00
10	Mesh for gable ends	Galvanized iron(25mmx25mm)			m2	20.00
11	Nails for main structure	Normal iron nails	100mm	4"	Kg	5.00
12	Nails for main structure	Normal iron nails	75mm	3"	Kg	5.00
13	Nails for main structure	Normal iron nails	50mm	2"	Kg	3.00
14	Nails for partition	Nails with washer	50mm	2"	Kg	3.00
15	Cap nails	Cap nails	50mm	2"	Box	2.00
16	Transport/Handling				Sum	Item
17	Labour	For(frame,roof,wall covering)			Sum	Item
18	Galvanized sheets	corrugated	2400x825	8'x33"	No	72.00
19	ZnAl Roofing sheets		2400x825	8'x33"	No	96.00
20	Ridge sheets	Aluminium			m	20.00
	FOR PARTITION					
1	Frame work	Timber	50x50	2"x2"	m	340.00
2	Frame work	Timber	25x50	1"x2"	m	340.00
3	covering	UNHCR Tarpaulins			m2	120.00
4	Nails for partition	Nails with washer	50mm	2"	Kg	2.00
5	Labour	For partition			Sum	Item