APSA PROJECT DOCUMENTATION & REPORT

HUM PROJECT STAGE: PHASE B
DESIGNING, PROTOTYPING & DEVELOPING

A H.U.M Project executed by Selco Foundation in collaboration with APSA
PROJECT INTRODUCTION

LOCATION

The Site is located near Annasandra Palya, 1.5km from the HAL Bus Stop on the Old Airport Road, Bengaluru, Karnataka.

SITE DESCRIPTION

The Project Site is a 9m x 13m (approx.) plot located opposite to the APSA office and residential complex, under the ownership of APSA.

COMMUNITY PROFILE

- **Population:** 80
- **No. of Dwelling Units:** 25
- **Main Occupation of Men:** Construction Labourers
- **Main Occupation of Women:** Domestic Help
- **Owner of Land:** Private Individual
- **Duration of Stay:** 4-5yrs
- **Vulnerability:** Medium
  - The owner has already constructed a 4 storey walkup residential complex on the site opposite to the Community. Eviction of the Community is not expected in the next 3 yrs.
  - All Children go either to the Govt Anganwadi or the APSA Dream School for education.
  - Most of the Units are using Selco Battery lights from the Integrated Energy Centre at APSA.
- **Main Issues of the Community:**
  - Dilapidated Dwelling Units – lack of Ventilation, Strength, Durability and protection against pests and mosquitoes.
  - Acute Cooking Smoke inside Units while Cooking.
  - Anti Social Elements within community such as Goondaiism, Alcoholism.
  - Water Scarcity, Sewage Drainage and Sanitation Issues

APSA: ASSOCIATION FOR PROMOTING SOCIAL ACTION

A rights-based child-centered community development organisation, APSA work towards the development of the community through a systematic process of empowerment. They partner with communities of street children, child labourers and other children in distress, including abandoned and runaway children, child victims of abuse and prostitution, children of sex workers as well as the larger communities of the urban slums. APSA has already partnered with Selco Foundation to set up an IEC in its campus.

PROJECT JUSTIFICATION

Owning a temporary portable dwelling unit is perhaps the biggest investment an ultra poor person/family would make in megacities like Bangalore. Therefore, in order to cultivate the awareness of a cheap, durable alternative, a prototype was needed to be constructed so that they can ‘see and believe’. By allowing one or more families to voluntarily shift to the new units and then experience the difference of living in a better environment, it is expected that they can influence the people in the community and convince them of the advantages of living in a dwelling unit with adequate light, head room and ventilation. By collaborating with APSA, an organization which is already working with the community, the community will trust the intentions of this project and what it offers to them.
DESIGN

Frame
Deal wood

Roofing
Canvas Sheet

Front Wall
Deal Wood Pallet
FRP Flat Sheet
Mosquito Net

Back Wall
Corrugated GI Sheets
Mosquito Net

Doors and Windows
1. GI Sheet Pivot
Door with Deal wood frame and Polycarbonate Peep Sight Opening.
2. Aluminium Frame Window with Polycarbonate Shutter inserted into GI Sheet Wall.
3. Deal Wood Frame window with Polycarbonate Shutter fixed to Dealwood Frame.

Flooring & Parapet
PCC Floor
Conc. Block Masonry

Additions
2 vessel TIDE Mud
Stove
Shelf
**Frame**
Square Section Metal Frame

**Roofing**
Tarpaulin Sheet
Cardboard
Split Bamboo Frame

**Front Wall**
Chipboard
Dealwood
Umbrella Fabric

**Back Wall**
Chipboard
Canvas

**Doors and Windows**
1. GI Sheet Pivot Door with Deal wood frame
2. Deal Wood Frame window with Polycarbonate Shutter fixed to Chipboard.
3. Bamboo Frame backed with Mosquito Net.

**Flooring & Parapet**
PCC Floor
Conc. Block Masonry

**Additions**
3 vessel TIDE Mud
Stove
Shelf

---

**UNIT 2: METAL FRAME**

FRAME

Roofing
Tarpaulin Sheet
Cardboard
Split Bamboo Frame

Front Wall
Chipboard
Dealwood
Umbrella Fabric

Back Wall
Chipboard
Canvas

Doors and Windows
1. GI Sheet Pivot Door with Deal wood frame
2. Deal Wood Frame window with Polycarbonate Shutter fixed to Chipboard.
3. Bamboo Frame backed with Mosquito Net.

Flooring & Parapet
PCC Floor
Conc. Block Masonry

Additions
3 vessel TIDE Mud
Stove
Shelf
### Project Implementation Timeline

**Project Initiation**
- First Discussion with APSA

**Design Brainstorming**
- Site Visit
- Community Interaction

**Design, Research & Planning**
- Material Procurement

**Material Transportation**
- Site Visit

**Site Levelling**
- Unit 1 Frame & Walls Assembled

**Material Procurement**
- Site Levelling
- Unit 2 Frame & Wall Parapet Walls Flooring
- Doors, Windows, Openings

**TIDE Stove Material Procurement**
- Flooring
- TIDE Stove Installation
- Finishing, Fixtures & Storage

**Settling of Accounts**
- Poster
- Handing Over

### Duration of Stages

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#### Project Timeline

- **Project Initiation**: 12 Nov 2014 - 1 Dec 2014
- **Material Procurement**: 29 Nov 2014
- **Material Transportation**: 30 Nov 2014
- **Assembly**: 2 Dec 2014
- **Finishing**: 12 Dec 2014
- **Handing Over**: 29 Dec 2014
MATERIAL SOURCING

ANNASANDRAPALYA
- Cement
- Sand
- Jelly
- Bricks
- Mud
- Hardware
- Mosquito Net
- Fixtures
- Cardboard

KAGGADASAPURA
- Corrugated GI Sheets

TEVAREKARE MAIN ROAD
- Concrete Pipe
- Concrete Elbow
- Concrete Chimney

KARIYAMMANA AGRAHARA
- Material Storage

MALLESHWARAM
- TIDE Stove Grate & Cast

BANASHANKARI
- Split Bamboo

JC ROAD
- Canvas Sheets
- Tarpaulin
- Umbrella Fabric
- Translucent Fabrics

ISLAMPUR
- Deal wood Pallets
- Beading
- Wood Cut Pieces

BELANDUR
- Casuarina

BAMBOO BAZAAR
- Bamboo Frame
- Deal Wood
- Metal Section

Selco Foundation
Project Site
Location & Distance from Site
**ASSEMBLING**

1. Sorting Frame Components on Site
2. Attaching Components Using Nuts & Bolts
3. Arranging and Aligning Main Supports
4. Tarp Cut Piece Used to Cover Portion of frame inserted into the Ground
5. Attaching Corrugated GI Sheet to Frame
6. Attaching Dealwood Pallets and Door to Frame
7. Mosquito net and FRP Sheet Fixed to the Frame
8. Canvas Sheet Laid Out onto Frame
9. Fixing of canvas Sheet to the Frame

**UNIT 1: DEAL WOOD FRAME**

**Sorting Frame Components on Site**

**Attaching Components Using Nuts & Bolts**

**Arranging and Aligning Main Supports**

**Tarp Cut Piece Used to Cover Portion of frame inserted into the Ground**

**Attaching Corrugated GI Sheet to Frame**

**Attaching Dealwood Pallets and Door to Frame**

**Mosquito net and FRP Sheet Fixed to the Frame**

**Canvas Sheet Laid Out onto Frame**

**Fixing of canvas Sheet to the Frame**
FIXING AND ADDITIONS

UNIT 1: DEAL WOOD FRAME

Shelf fixed to a support member with an L Bracket.

The Mosquito Net is wrapped around the frame and held in place with binding wire.

GI Sheet Nailed onto to the frame. The Parapet wall fills in the space between the support members.

The Mosquito Net is wrapped around the frame and held in place with binding wire.

The Canvas is kept in shape using split bamboo. The frame components are attached with nuts and bolts.

The door is attached to the frame using a pivot hinge.

The Aluminium frame is inserted to an equal hole in the GI sheet and sealed with MSEAL. The shutters are attached to the outward projected corrugation of the GI Sheet.

The dealwood pallets backed by nailed FRP Sheet rests on the parapet wall and is attached to the frame with L Clamps.

The door’s pivoted base wood is held in place by the floor PCC.
VIEWS

INTERIOR

Front Wall View 1
Front Wall View 2
Back Wall View 1
Back Wall View 2
Back Side

EXTERIOR

Entrance View 1
Entrance View 2
ASSEMBLING

UNIT 2: METAL FRAME

1. Sorting Frame Components on Site
2. Attaching Components Using Nuts & Bolts
3. Parapet Wall construction
4. Attaching Pivot Door Lintel Piece onto frame
5. Attaching Door to Frame
6. Attaching Chipboard Walls to the Frame
7. Attaching Cardboard, Umbrella Fabric and Split Bamboo Supports to the Frame.
8. Laying Out Tarp sheet with two weights on either side and attached to the Split Bamboo on the long walls
9. Deal wood attached to fill in the gap near the door

APSA PROJECT DOCUMENTATION: ASSEMBLING
FILLING AND ADDITIONS

UNIT 2: METAL FRAME

The Tarpaulin is attached onto the frame using binding wire through eyelets on the tarp.

The Umbrella fabric is held by driving binding wire through eyelets. Dealwood is held by binding wire.

The Mosquito Net is nailed onto the chipboard and wrapped around the frame held by binding wire onto which the bamboo frame is nailed.

The Chipboard and the canvas are bolted onto the frame. The tarp is pulled in using binding wires through the chipboard and knotted.

The Door is pivoted onto the frame. The infilling dealwood wall is held onto the frame by binding wire. Flat Clamps are used between dealwood members.

The Umbrella fabric bolted onto the frame and wrapped into the cardboard and the tarp.

The Window is attached to the Chipboard with L Clamps. The Shelf is bolted onto the Chipboard with L Brackets.

The tarp is held done by a heavy casuarina pole and hung inwards onto the split bamboo which is attached onto the frame by binding wire.

The Chipboard and the canvas are bolted onto the frame. The tarp is laid out onto a sheet of interconnected cardboards which is attached to the split bamboo with binding wire. The bamboo is held to the metal frame by coir ropes.
### UNIT 1: DEAL WOOD FRAME BREAKUP

#### FRAMEWORK
- **Deal wood framework**: 3600
- **Prefabricated by SELCO foundation**: 3500

#### ROOFING
- **Canvas Sheet**: 1
  - 3496
  - 12'x20'

#### WALLS
- **Deal Wood**: 4
  - 450
  - 2 Dealwood Palletes, 2x10'L
- **FRP Sheet**: 1
  - 480
  - 5'x6'
- **GI Sheets**: 3
  - 1100
  - 1x3'x12', 1x3'x8'
- **Concrete Blocks**: 16
  - 425

#### DOORS & WINDOWS
- **Pad Lock, Hinge, Hook**: 1
  - 50
  - For Window
- **Screws and Hinges**: 22
  - 2'' Hinges
- **Aluminium Channel**: 2
  - 110
  - 1" L Section - 6", U Section - 7"
- **Polycarbonate**: 1
  - 100
- **Fabrication**: 150
- **Door**: 788
- **Bolts and Screws, L Angles**: 60
  - For Canvas, Dealwood

#### FLOORING
- **Cement**: 3/4 bag
  - 310
  - 1 Cement bag - 400/- Flooring, Walling
- **Sand**: 3 sacks
  - 300
  - 1 Sack Sand - 100/-Flooring, Walling
- **Jelly**: 15 bundles
  - 300
  - Jelly (gravel) - Flooring

#### FLOOR FINISH
- **Cement**: 1/2 bag
  - 200
- **Sand**: 30 bundles
  - 600

#### MISCELLANEOUS
- **Screws, Washers, Bolts**: 80
- **Hardware**: 325
- **Screws, Mseal, Lock**: 195

**TOTAL**: 13141
## UNIT 2: METAL FRAME

### Framework
- Steel frame: 6000
- Bamboo: 10 splits
- Coir Rope: 1

### Roofing
- Tarpaulin: 1
- Casuarina Poles: 2
- Cardboard Box: 5

### Walls
- Chip board: 2
- Canvas: 1
- Translucent Sheet: 2
- Concrete Blocks: 25
- Cement: 1/2 bag
- Sand: 15 Bundles

### Doors & Windows
- Metal Sheet: 1
- Bolts and Screws, L Angles: 20

### Floors
- Sand: 3 sacks
- Cement: 3/4 bag
- Jelly: 15 bundles

### Flooring
- Concrete Blocks: 25
- Sand: 15 Bundles

### Miscellaneus
- PVC Mosquito Net: 100
- Hook, Screw, Pad Lock, L Clamp: 209
- Hardware: 309

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**Total**: 13474

### UNIT 2: METAL FRAME BREAKUP

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**ACCOUNTS**

### PROJECT BREAKUP

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**SUMMARY OF PROJECT EXPENSES**

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**TIDE STOVE BREAKUP**

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**LABOUR**

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**UNDERSTANDINGS**

**PLANNING AND IMPLEMENTATION**

- Successful in collaborating with another organization familiar with the community. Cost shared 50:50. Use of existing partnership for another project.
- The Project planning did not include contingencies. The implementation was riddled with unnecessary delays in material procurement, transportation and inefficient use of available labour.
- Contingency Planning and effective project coordination is really important in avoiding delays and bringing down costs. Scale down the duration of similar projects down to a maximum of 2 weeks.

**MATERIAL PROCUREMENT AND TRANSPORTATION**

- 70% of the Materials were procured from outside an 8km radius of the site, thereby pushing transportation costs higher.
- Unnecessary expenditure on transportation on repeated orders of cement, sand, jelly, mud, bricks etc.
- More than 70% of the materials should be procured from within 5km radius of the site. Plan transportation routes and exact materials required efficiently to avoid multiple trips.

**DESIGN**

- The design was able to provide for the basic requirements of the project such ample amounts of light, ventilation, head room, protection from pests and mosquitoes and the rain.
- Assembly of the basic frame of the Units was easy and fast

**UNIT 1:** Translucent FRP Sheet onto deal wood pallets worked well in giving really good amounts of light and an aesthetic appeal while still providing privacy.

**UNIT 1:** Aluminium frame window on corrugated GI Sheet is a working solution.

**UNIT 1:** Mosquito Nets Work in ventilating while providing protection from mosquitoes

**UNIT 2:** Bamboo Grill Window with mosquito Net backing works well.

**UNIT 2:** Umbrella Fabric and Canvas on Walls were counter productive. The former was difficult to fix and the latter was blocking light and was flimsy.

**FIXING**

- Reduce Joineries and Junctions. Explore options which has less work of site, quick and easy to build.
- Alternate Fixing Details with less, non protruding elements such as bolts and binding wire.
- Push for Child safe fixing details.
- Avoid Binding Wire as much as possible.
- Explore better designs for openings which avoids minute slits and openings, and better opening – closing mechanisms.
- Avoid using mosquito nets on the upper pitched/curved portions of the frame to avoid entry of rainwater.

**FIXING DETAILS TO WORK ON**

- Mosquito Net – Frame
- Roofing Fabric – Metal Frame
- Fabrics on Walls – Metal Frame
- Windows Opening – Closing Mechanisms
- Parapet Wall – Frame & Walls
- Between 2 Deal Wood Pallets
- Concealing Projecting Bolts
- Shelves which can take upto 20kg.
- Fabric - Chipboard

**DESIGN UNDERSTANDINGS**

- The Curved Roof option of the Metal Frame did not give any significant head room or any other major advantage over pitched roof option of the Deal Wood. Pitched Roof option must be explored more as the fabrication cost is less.
- Avoid Sharp edges on the frames. Chamfer edges so that the roofing sheet does not tear.
- More support tie members between Support rafters of the frames to keep the roofing material in shape.
- Find more water resistive canvas fabrics.
- Current Flooring Option of PCC is too expensive and Labour Intensive. Explore more portable, reusable flooring and walling options.
- Find alternate cheaper ways to seal the units from pests and mosquitoes and make it more resistant to tampering. Explore termite protection which is cheap.
- **Fire Resistance:** Fire rating for each material used in the units. Explore options to increase fire resistance to easily inflammable materials by coating and/or chemical treatments which is cheap and eco friendly.
- A Study on the exact structural strength of the frame and the amount of weight it can take is necessary for further design development and value added additions to the unit.
WAY FORWARD: SHIFTING TO PHASE C: PROGRAMMATIC PILOT DESIGN

Frame:
- Deal Wood
- Metal
- Pitched Roof

Roof:
- High Quality Canvas
- Cardboard Insulation
- Tarpaulin

Flooring Options:
- PCC: Cement, Sand, Jelly (Cost 2k)
- Tiles
- Mud
- Pavers

Parapet Wall:
- Conc. Block Masonry (Cost 2k)
- Bricks (2 layers)
- Walling Tiles

Recycled Waste:
- Bottles, Cans

Walls:
- A. Deal Wood Pallet + FRP Sheet
- B. Top FRP Sheet
- C. Bamboo Grill + Mosquito Net
- D. Opaque Options
- Chipboard
- GI Sheet
- Laminate Board

Operable / Fixed Mesh Window

W: Window

To be experimented

FUTURE R&D: Light, Portable, Collapsible / Detachable Frame

Front Wall

Back Wall

APSA PROJECT DOCUMENTATION: WAY FORWARD: DESIGN
WAY FORWARD: EXPANSION AND REPLICATION

VALUE ADDING ACCESSORIES

- Common Water Storage
- Light Fixtures
  - Home Lighting
  - IEC Battery Light
- Lockable Bed cum Storage
- Shelves, Hooks, Racks
- Stove
- Bath + Wash Percolation Pit and Drains

Value +

HUM TOOLKIT

- Complete Assembly Instructions with ‘Do It Yourself’ Illustrations
- All Materials Packaged with Joinery.
- Sets of Whole Prefabricated Walls
- Include Brochure for the Project, Available Financial Options for Owning the Unit.
- Catalogue for Materials having information on Prices, Available locations, Vendors, Fabricators, Strength and Durability
- Catalogue for Value Adding Accessories
- Brochure for Best Practices and Safety Instructions

FINANCES

Develop customizable user specific financial models which can be implemented through a combination of various stakeholders such as:

- Fabricators
- Users
- Vendors
- Entrepreneurs
- Rental Systems
- Contractors
- Banks
- Landlords
- Partner NGOs, Ed. Institutions, CSR, Design Firms

- Financial implications of after sale services such as:
  - Assistance in Reselling
  - Relocation Expenses
  - Servicing of Damaged Parts. (Warranty)
- Explore possibilities in Ecommerce

OUTREACH

- Constant Community Connect for feedback on design and financial models. Community Survey, Impact Study and Awareness Programmes
- Conduct Workshops for Vendors and Fabricators
- Spread Awareness through existing IECs and the SELCO Networks in Urban Areas
- Meetings with Contractors and Landlords.
- Partner with NGOs working in communities, Educational Institutions for Design Development and Material Testing, Corporates for CSR Funding.