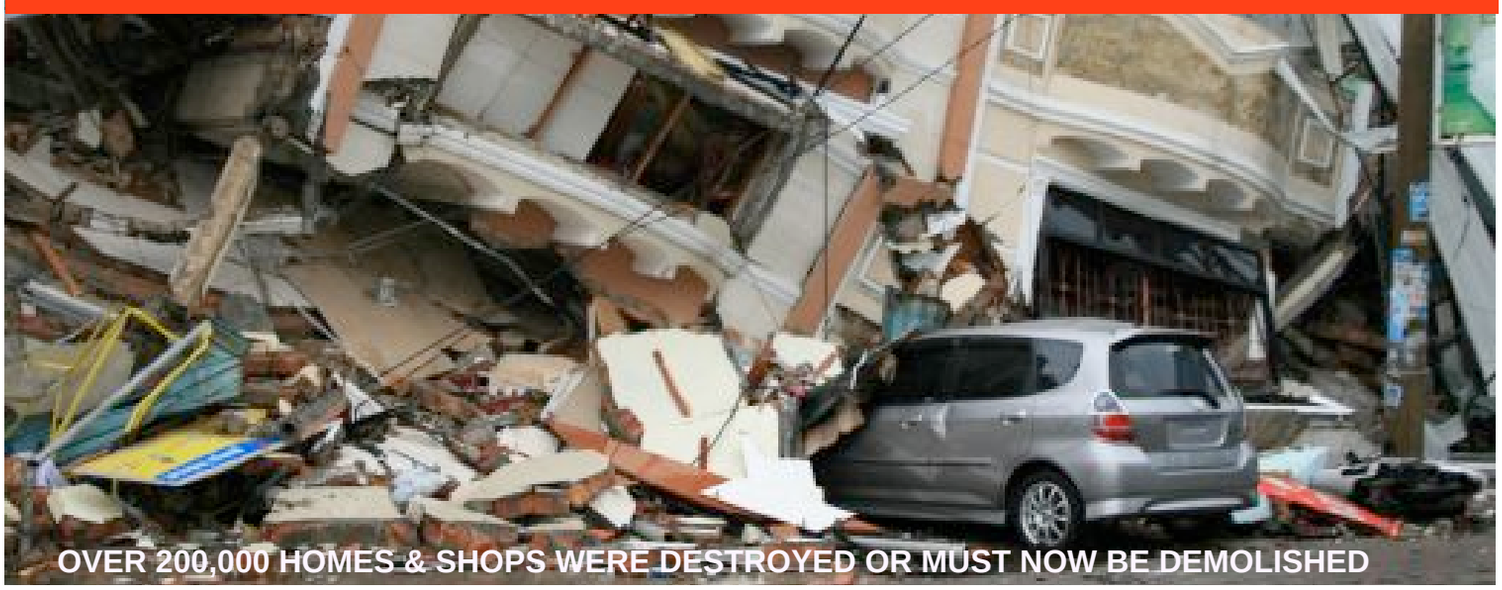
SUMATRA QUAKE!

SEPTEMBER 30 & OCT 1, 2009



OVER 200,000 HOMES & SHOPS WERE DESTROYED OR MUST NOW BE DEMOLISHED

2 months after a 7.9* earthquake devastated West Sumatra, many families are still living in temporary shelters or in unsafe homes that are beyond repair. Due to a combination of trauma, loss of income or jobs and loss of savings and assets, many families will not be capable of rebuilding safe permanent homes for a long time.

Widowed mothers, single parent families, older couples or those who have lost their tradional land in land-slides are now facing the long wet season with no secure shelter. Many families will not be capable of rebuilding safe permanent homes in the forseeable future. (*revised up from 7.6 by BMKG 11 Oct 09)

BAMBOO LIVING HOUSE

A one time US$500 donation pays for a **Bamboo Living House** kit to be delivered to a family in desperate need. e-mail: info@island-aid.org

Bamboo houses in West Java. Some of these timber and bamboo houses are over 80 years old.

The Bamboo Living House is intended to provide a dignified low cost alternative to the Transitional Shelters or tents that have been provided to impacted areas to date. The building structure, floors and walls are made from Boric Acid treated bamboo lashed with recycled inner tube rubber strips. Bamboo is plentiful and regenerates fast in Sumatra's highlands. Cutting bamboo provides work for many families without impacting rainforest or using expensive equipment or chainsaws. Donor funds bring a double benefit by support communies where bamboo grows and families who need houses.

Bamboo Treatment:

The credentials of bamboo as a renewable building material are well proven and understood in Asia. Because of the need to relocate families from dangerous structures, bamboo must be cut during the wet season and treated before fully dry. Traditional methods of mud or long pond immersion are not possible.

All bamboo used is pressure pumped with boric acid within hours of being cut to replace sap. The projected life span for this level of treatment is 5+ years but owners can enhance this by painting the underside of floors and floor structures with used motor oil or other natural preservatives. Walls and the structure above the floor can be lime-washed to discourage insect attack and brighten the interior. Crushed bamboo is soaked in a Boric Acid rich

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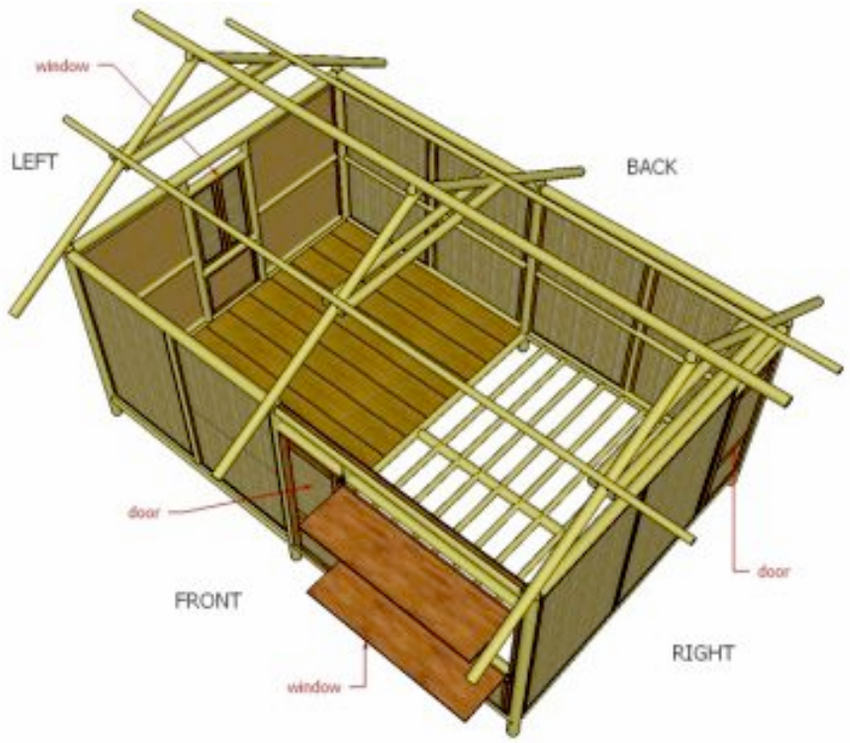

Design Criteria:

5 Year Lifespan:

Government grants to home owners will not be distributed before the middle of 2010 and for many home owners these funds will represent only a fraction of the cost of a new permanent house. The bamboo house kit is designed to provide secure, dignified and healthy living conditions for the years these families will take to save enough money to rebuild earthquake resistant new homes. For poorer families, this bamboo house can be used as the core of a permanent house by adding rooms or annexes under extended eaves.

24m^2 Internal area:

The nominal dimensions are 6m x 4m and provision is made for internal walls to be installed by owners to create either two or three rooms.

2.3m Head height:

To reduce discomfort from radiant heat, the roof height is 2.4m at the eaves and 3.6 at the ridge.

Lock Up:

Many temporary shelter solutions are not secure enough for the owners to leave unattended and this impacts the families ability to seek work or to tend to crops. The bamboo house can be locked up and the flattened bamboo walls are strong enough to deter forced entry while the owners are away working during the day.

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Earthquake Safe Structure:

A braced pole supported frame using 8 to10cm diameter bamboo (“Pering” Gigantochloa/robusta) is joined by morticing tongues into chiseled slots and then fixing with hand cut bamboo “nails“. These bamboo tapered nails are low cost and reduce the risk of splitting.

There is no need to fill the bamboo nodes with mortar as is required with bolted connections. Rubber inner tube strip is then used to lash the joint. The tension in the rubber keeps the structure from loosing integrity as the bamboo shrinks and the flex in the joints will handle seismic loads without splitting the bamboo.

The flattened bamboo walls are nailed to bamboo studs further bracing the structure by forming shear diaphrams. Because owners may elect to use other wall material or to leave some walls open, bamboo braces are added to the top post and beam junctions.

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Roof:

Plastic double thickness tarps are provided to cover the structure so that home owners can move furniture and possessions and secure them dry before salvaging roofing iron from their damaged buildings. The roof structure is designed for reuse of savaged corrugated roofing iron with purlin spacing of about 75cm. Owners or donors may elect to purchase other sheet roofing material that will provide much greater comfort. (see notes re prototype display house below) Owners can also elect to use palm thatch in cases where no roofing iron can be saved. (Owners will need to supply and fix smaller bamboo from ridge to eaves to support the thatch) The tarps have a reflective layer on the top side and a dark colored layer below to to reduce transmission of light and heat. The double thickness makes the tarps stronger and they can be re-used as annex shelters along the sides or at the rear of the building after salvaged roofing iron is in place.

Natural Ventilation:

Cross ventilation is provided by two doors and three large window openings. Owners can then install wood or bamboo shutters to secure these openings or donors can elect to provide these at additional cost. The flattened bamboo walls and floor ”breathe“ and enhance natural cooling especially at night when doors and windows are shut. The gable ends of the roof may be partially closed by owners leaving a weatherproof opening at the top to vent hot air. Bamboo lattice by owners can be used to secure these gable vents.

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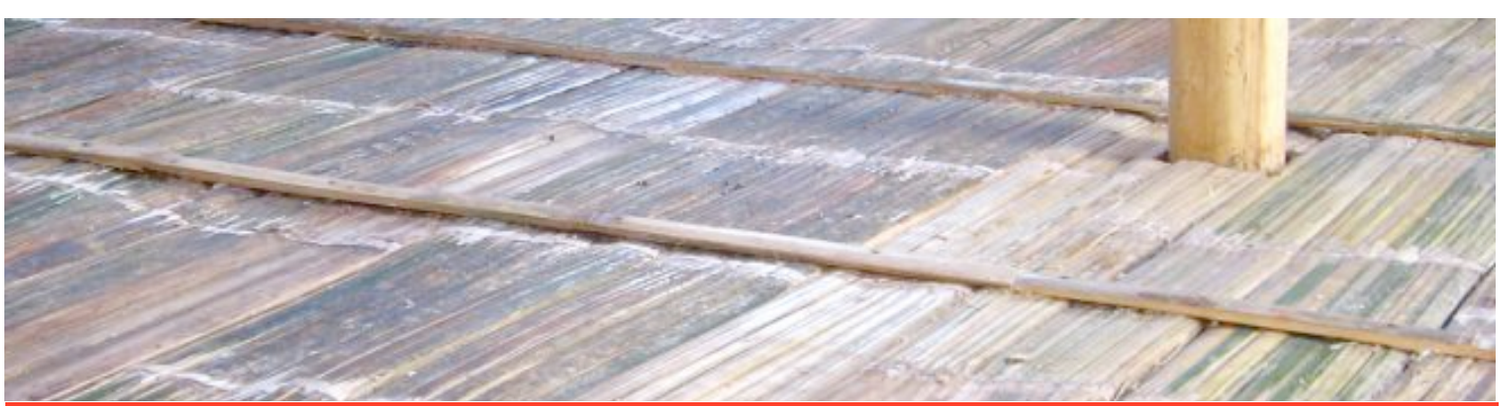
Weatherproofing:

Flattened bamboo (Palopu) is used for the external walls. This material is strong, provides adequate privacy, and it enhances ventilation by permitting air movement without rain penetration. Owners may elect to add other lining material in the bedroom areas for greater visual privacy.

Floor:

Over 30% of the material in this house is used for the raised floor. Bamboo joists support flattened bamboo panels that are fastened down with thin bamboo strips and nails. This floor has spring and it can be used with a woven Pandanas mat (Tikar) for sleeping. The narrow cracks stop large insects and allow dirt to fall through. The space under the house is valuable for dry storage of material and possessions that would otherwise clutter up the living space. This under floor space can be secured using owner supplied flattened bamboo, woven bamboo battens or salvaged masonry. The below floor clearance is sufficient to allow comfortable access for maintenance of the bamboo poles and supports.



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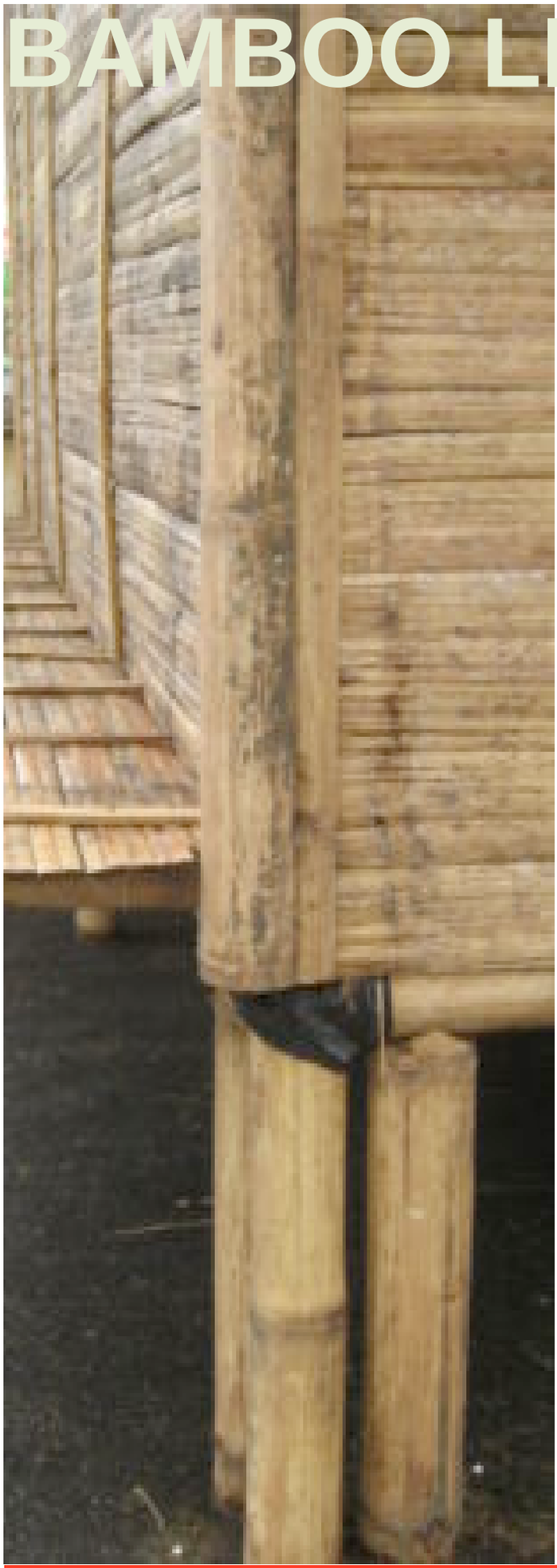

Foundations:

Owners will supply cast concrete ”Sandies“ (tapered and recessed to fit the bamboo) or, where available, large flat top river rocks can be used under each leg. This will raise the bamboo about 20cm to 30cm above the ground keeping it dry and discouraging white ants. To stop ants more effectively, owners can fill the top recess of cast concrete Sandies with exhausted engine oil. West Sumatra does not experience cyclonic storms and traditional wood buildings have been build this way for many generations. Sandies are far superior during earthquakes because the recessed top stops the poles being displaced.

Privacy:

A center pole is provided so that owners can opt for either a two room or three room interior layout. Families with older children can add two internal walls and doors. Those with infants may prefer to divide the space in to two equal areas for living and sleeping. Cooking and bathing areas are assumed to be behind or to one side of the building depending on the space available and orientation. Doors and windows can be placed anywhere the owners wish.

Flexible Use:

A large window in the side wall offers owners the option of setting up a house/shop as is common throughout the impacted area. An opening or removable flap can secure the house when the owners are absent and at night.

Cost:

Depending on donor or owner options, the cost of a kit will start at Rp5,000,000* (US$500 or Euro350). Costs assume additional input of material and assembly labour by homeowners.

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