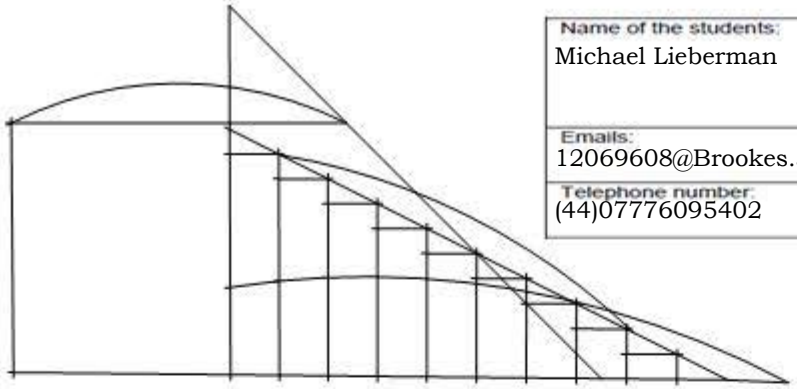

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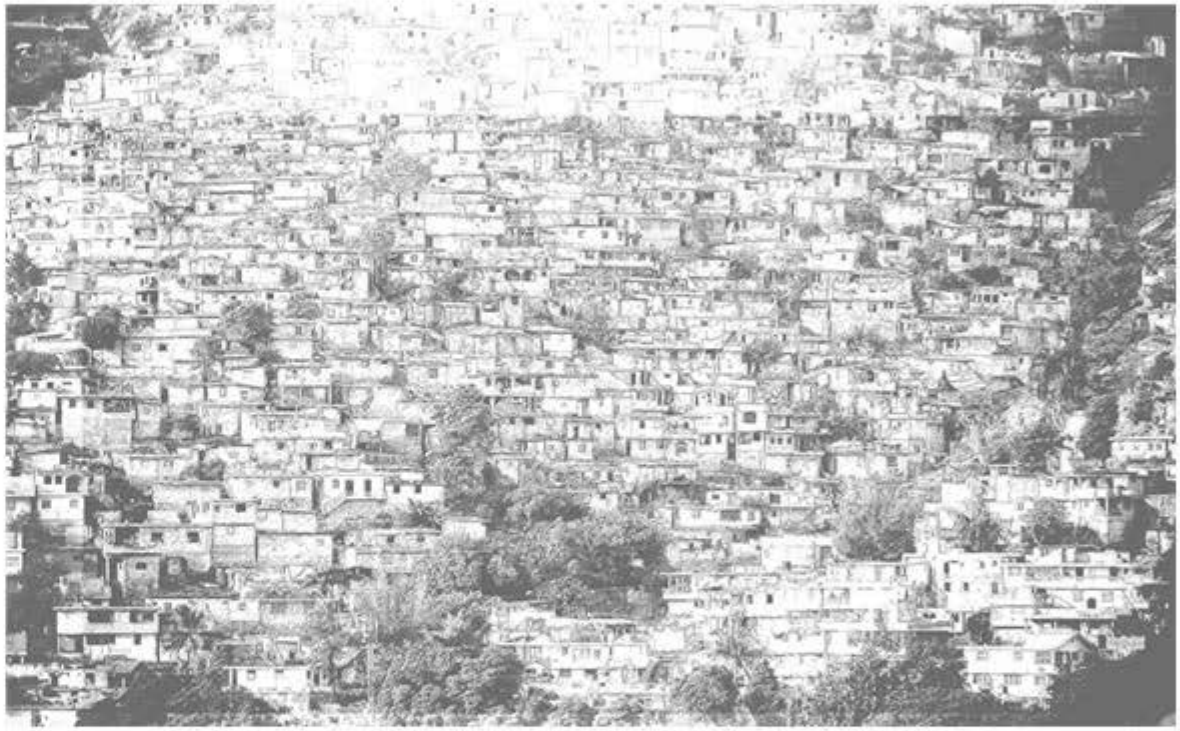
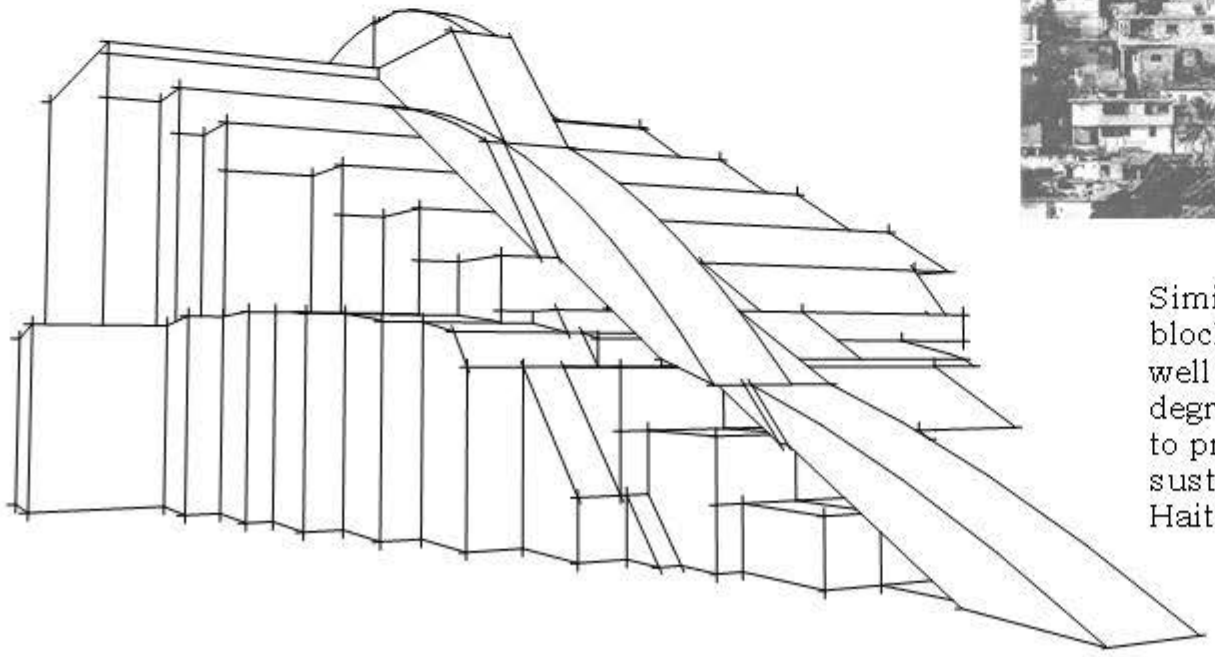
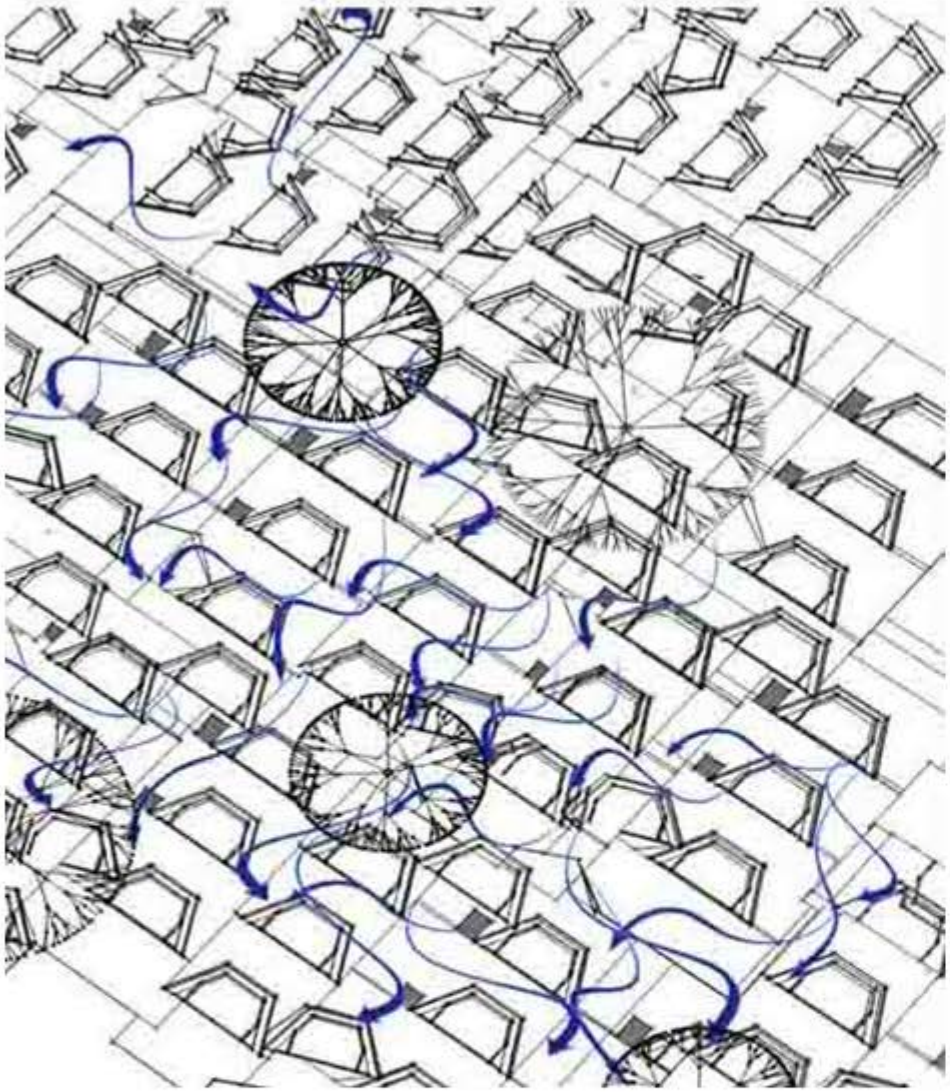
As a result of the 2009 Haitian earthquake, Port Au Prince Municipality was left with over 10-20 million cubic meters of cement debris. The projected time for cleanup in optimal conditions was more than 4 years at an approximate cost of $40 per cubic meter. Small neighborhoods across the country now have little to no hope of ever returning to their own communities.





Similarly the costs and opportunities to replace the cement and block homes has been marked with rising costs of materials, as well as contributing to an environment which already suffers from degradation and deforestation. This projects proposed solution is to provide a community led programme, which can contribute to sustainable low-cost housing, to replace the badly damaged Haitian Hillsides

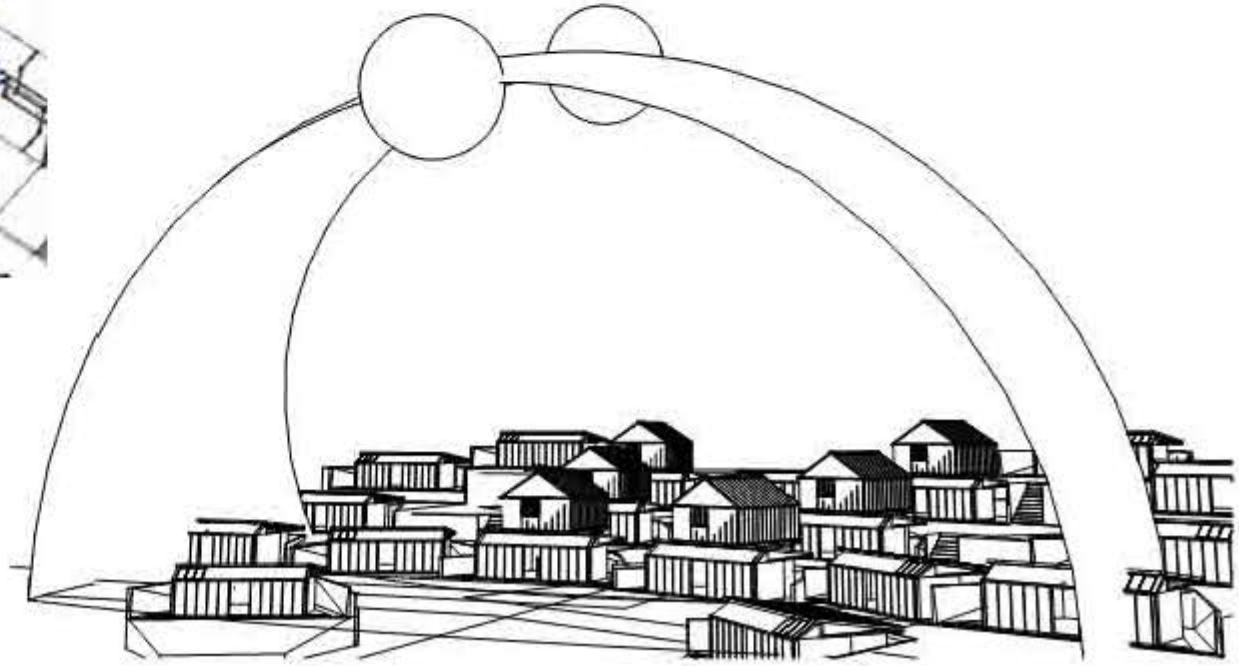


The Earthship design combines some of the difficulties mitigating shelter after disaster and reconstruction in Haiti. Drawing on ground temperature, the Veng ES incorporates traditional cement and block construction with the timber framing opportunities offered by international NGOs.

Understanding the complexity of urban informal settlements, in relation to unregulated hill side spaces represents a major dilemma in disaster risk reduction. Particularly in post disaster reconstruction process this represents a serious difficulty in building back better, which is compounded by misalignment between national governments, humanitarian stakeholders and the beneficiaries. The Haitian example has more over proven that there can be physical as well as policy level obstacles.

NGOs in particular have frequently cited the inability to manage community wide storm water mitigation. These solutions are not only a problem for planners, but also an issue of ownership, relocation, observing the 'Do no harm' principle and basic integration.

The criteria of the Veng Earthship(ES) revolve around a series of solutions proposed to incorporate sustainable design and affordable post disaster construction. It provides opportunities for erosion control, collection of potable and non-potable water sources, efficient reuse of debris and the integration of multiple shelter options including infrastructure, environmental and livelihoods strategies.

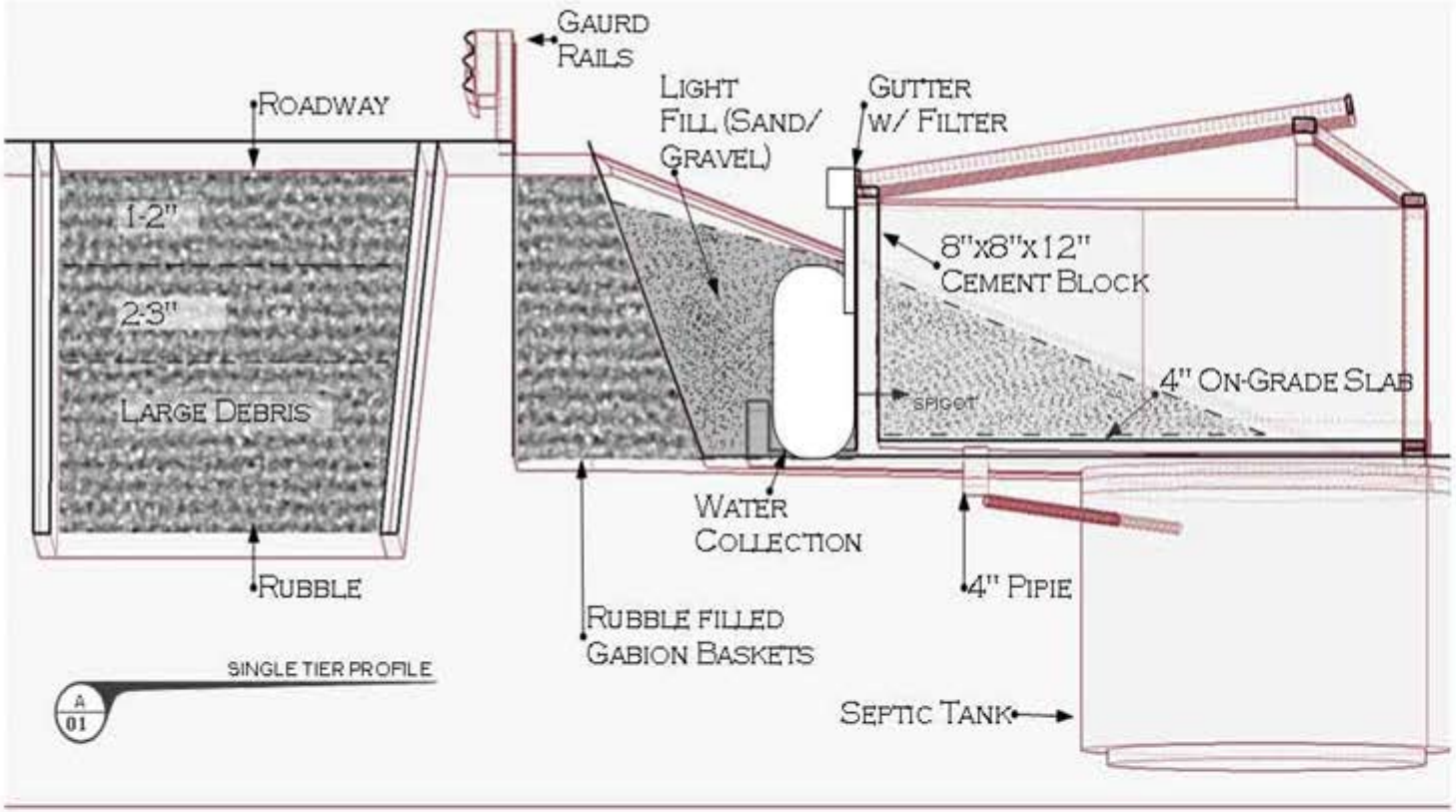


The Veng ES design provides the possibility for NGOs still providing kits for owner driven housing reconstruction to increase their implementation into hillside settlements.

- fits into existing land scape
- capitalizes on the availability of subsidized standard spruce, pine, fir (SPF)
- supports the introduction of forestry stewardship as an economic process
- continued use of skills development from transitional shelter progammes
- makes use of traditional cement and block construction
- combines strength of SMEs and donor assistance.

Key issues:

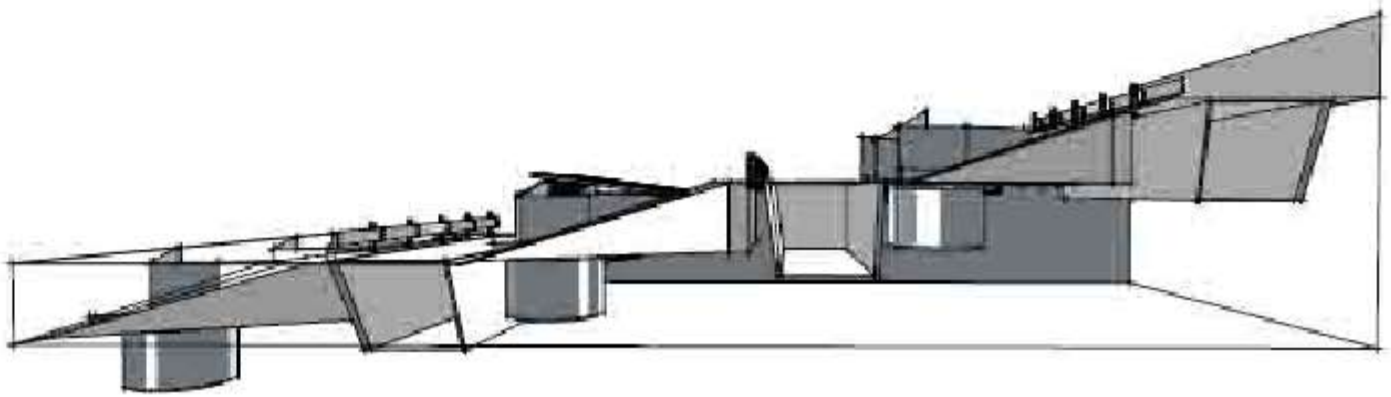
- hillside communities/inaccessible areas
- erosion/reoccurring disasters
- deforestation
- runoff, flooding and hurricane resilience
- water, health and sanitation
- lack of roadways contributing to informality
- post-earthquake areas cut off
- relocation and livelihoods
- access to assets and property
- restitution and ownership opportunities
- urbanism and sustainability

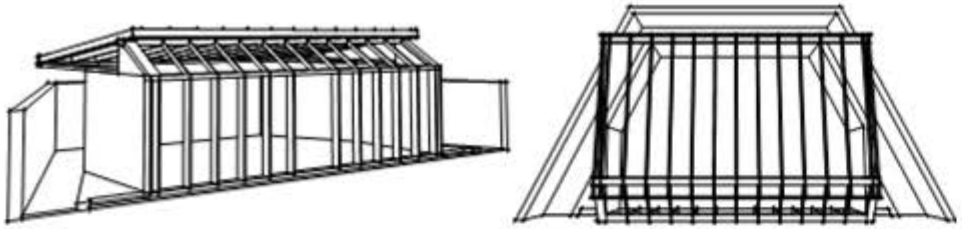


The life cycle and cost benefits of the ES are measurable in terms of its contribution to formality and infrastructure. Parceling and construction can be equally contributed to by governments, donors, contractors and beneficiaries. The efficiency of soil displacement and reuse of debris minimizes equipment costs, while the design provides accessibility and promotes disaster risk reduction. The roadways or surrounding landscapes are semi pervious contributing to water catchment. This can be combined with the individual units potable water systems, strategic use of drains prevent pooling and vertical or 'dry well' septic systems prevent disease and eutrophication. The added advantage of back filling the gabion embankment is twofold; it provides seismic dampening and security for the potable water system. The ES design is ideally situated for photovoltaic panel placement contributing to off grid energy production.

The value of small scale repetitious process involves the integration of small productive units in decentralized reconstruction. This can also result in coordination between SMEs, community based organizations, NGOs, Government and International donors. Training and education for microentrepreneurs , tradesmen and civil employees to contribute to reconstruction draws on variety of skills, distribution of labor and semi-formal subcontracting. On a case by case basis, the building process allows for small sets of carpenters, masons, hardscape and landscapers to coordinate with residents, local business and NGOs to contribute to municipal infrastructure. This can also contribute to an evolutionary process in which communities can continue to expand and improve their own neighbor hoods.

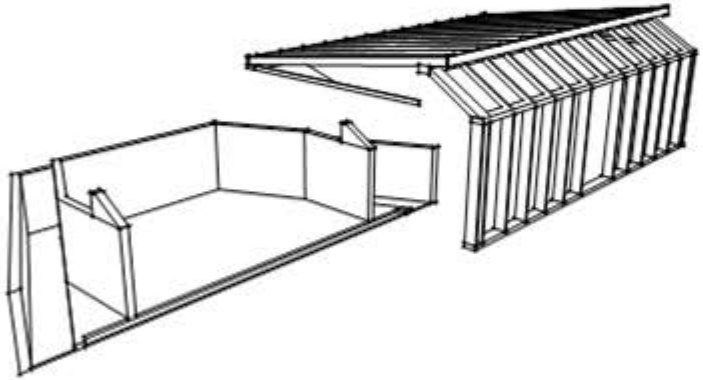
The designs advantages can also preserve and connect existing structures avoiding unnecessary relocation. The formation of stepped terrace and gradual reshaping of previous unsafe conditions is an effective reconstruction of destroyed areas, as well as economically and environmentally sustainable.



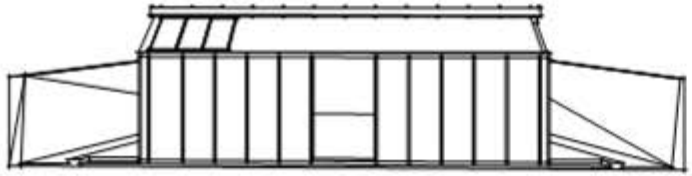


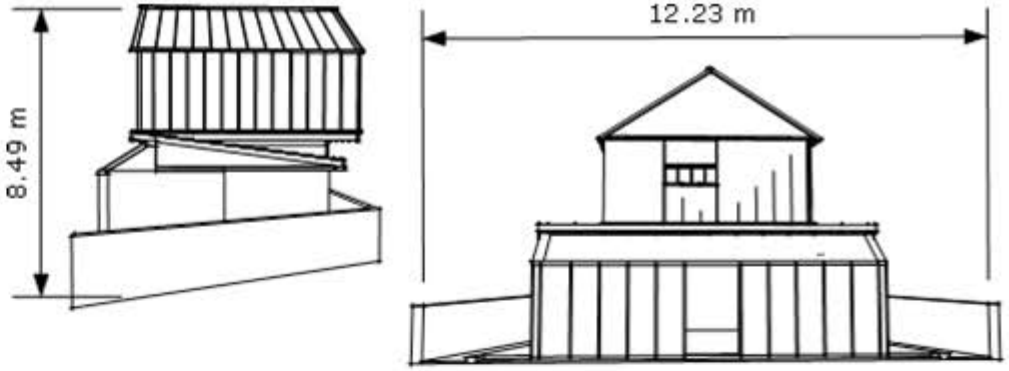
The affordability and ease of construction has potential as a small family dwelling. It's total area is approx. 350sf., conforming to minimum standards. This configuration works as a commercial storefront, well suited for microfinance opportunities.

The buildings standard construction for lightweight timber conforms to international building code. Its design, structural and loadbearing capacity are all within norm. Timber is deliverable in standard dimensional sizes and in stock 16' lengths. Roofing, sheathing and siding can thereby be assumed to maximize commercially available sizes.

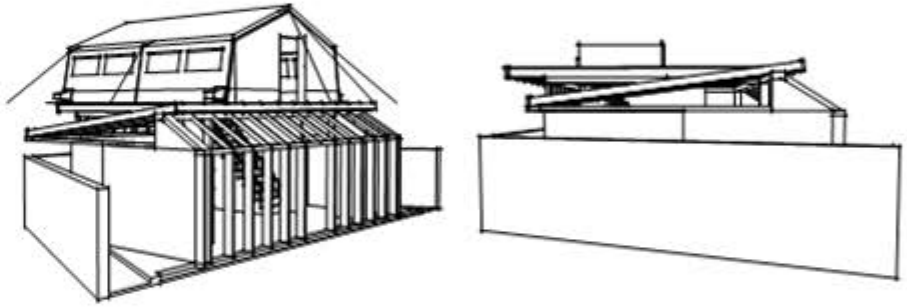


The frames split design allows for multiple iterations of the same core component. The size and variety allow for local trades to work at maximum efficiency for their productive capacity. This also can allow for sites to be prepared on a contingency basis without over investment or inadequate capacity. Contracting can be donor assisted or locally supported within the same skill sets, allowing for better interaction between the community and shelter provision





The Two story unit meets the minimum space requirements for up to five people. While not designed for optimal conditions, there is some room for home owner input. The split level egress and grade of the terrain can be built to fit integration into the surrounding environment.



The ES also provides a unique potential for the integration of sheltering options. As a core shelter design the ES can function as intermediate structure capitalizing on shelter relief expenditure. The base platform can assist in mitigate the transition from relief to reconstruction, serving as a tent platform or as a potential relocation site for T-shelters. The Façade can also be removed without interrupting the structural integrity allowing for the expansion of the ground level.

Greenhouse /Nursery- drawing on the original design components of the Earthship, a translucent facade allows for south facing units to be combined with water catchment for plant nurseries.