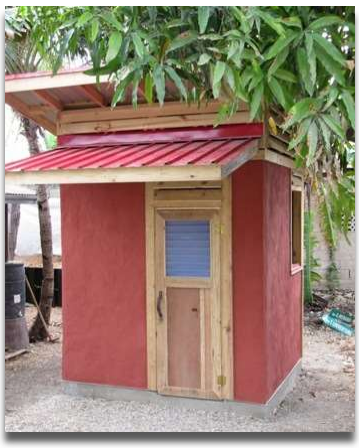
Front Porch

Appropriate Building Solutions for Haiti

The Senp Kay-Simple House

Port-au-Prince Haiti-February 2012



Overview

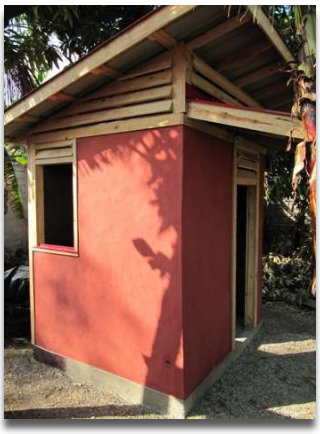
Senp Kay introduced by Andy Mueller of **Front Porch** is the first structure in Haiti constructed utilizing prefabricated, tilt-up, plastic bottle filled panels and light straw-clay walls. It was designed and constructed as an innovative solution for low-tech, sustainable housing for low income communities in emergent nations.

Affordable housing is an issue of huge social relevance in Haiti, and indeed globally. Two years have passed since the earthquake in 2010 and thousands of Haitians continue to be without permanent living structures. There are over 800 camp settlements with an estimated .5 million people still homeless. Inadequate standards of construction and poor quality materials were the root causes of many of the collapsed buildings and loss of life. It is extremely important that reconstruction addresses these issues, and ensures that new buildings are earthquake resistant and provided greater protection in the face of future seismic events and hurricanes. The need for permanent, affordable, safe housing is pressing.

There is an abundance of precedents and inspiration using plastic bottles, tilt-up panels and light straw-clay infill separately as wall systems; The World Earthship Biotecture movement utilizes plastic bottles as non-structural filler in walls. The Tilt-up method of wall construction (typically concrete) has been practiced since the early 1900's, and variations of the light straw-clay walls have been utilized for over 700 years in many parts of the world. All three methods have successfully evolved independently in their respective applications, and here they are joined as a hybrid solution for the context of Haiti.

The **Senp Kay** uses a modular wall design which incorporates the structural integrity of the Tilt-up panel, the creative repurposing of the bottle wall system and the simplicity of light straw-clay infill. It is simple to mass produce on site, assemble and customize to one's particular needs. The use of repurposed materials is a positive response to one of many environmental problems in Port-Au-Prince. The Island of Haiti currently has no successfully operational recycling facilities and there are many refuse dumps where piles of waste lie as a potential source for innovative construction material use. Rice straw is plentiful in both the Artibonite and Les Cayes valleys. Straw is a rapidly renewable resource and 80% of the rice straw in Haiti goes to waste, usually burned after harvest adding to the already serious air pollution problem in Haiti.

The **Senp Kay** explores the use of alternative, local and repurposed materials as a substitute to the widely accepted concrete block method of construction. It offers unprecedented, appropriate solutions to long-standing problems assocciated with the building of shelter in Haiti. Solutions that are not merely handed to the local population, but owned and built by them. This will take more than a single demonstration project, but the idea is to captivate the imagination of the Haitians who have contributed to the project and those which will follow.



Project Features

REPURPOSED LOCAL MATERIALS: The prototype utilizes many in-country materials; ubiquitous plastic bottles, plastic bags, discarded tarps, crushed rubble, clay soil, bamboo, sand and rice straw.

FLEXIBLE DESIGN: Prefabricated panels allow for expansion in either two or four foot increments. Each wall can contain up to one-third door or window openings. Shed, gable, or hipped roofs can be used. In addition, the shed roof can extend from the rear of the house to accommodate an outdoor kitchen and a semi-enclosed shower with access to the habitable space.

EARTHQUAKE AND HURRICANE RESISTANT: The construction of this prototype demonstrates these wall systems have excellent resistance to earthquake and hurricane forces, both in-plane and out-of-plane. It utilizes a light and resilient structural system compared to the heavy and brittle concrete and block systems typically employed in Haiti. They can be part of a well-engineered structure capable of withstanding forces of a 7.0 or greater earthquake and 140 mph hurricane winds.

COMFORT: Solutions include building orientation, window/door location, shading, wall and ceiling insulation, and generous ventilation.

COST: The Senp Kay is more sustainable and less carbon consumptive than the typical concrete block building in Haiti. Cost per square foot-$35USD. In this project, the main goals were to reduce the time and cost of the building process, and to allow community involvement.

FAST CONSTRUCTION: low-tech, easy to assemble structure, requiring only two skilled trades. The structural system is produced locally, is suited for mass production and provides job opportunities and skills development for the community.

IMPORTED MATERIAL: Haiti needs a long-term plan for reforestation and sustainable harvested lumber. We acknowledge that The Senp Kay utilizes imported wood for its light-weight wall and roof frame. However, the system uses this wood very efficiently when compared to other wood frame systems.

SIMPLE, HONEST, AND ECONOMICAL

Materials

- #179, 20 oz. plastic bottles per 4'x8' prefabricated panel
- 20 gauge x 1" galvanized mesh
- 2x4 and 1x4 lumber
- Clay, Soil-cement and Cement plaster
- Corrugated steel roofing
- Straw-clay wall infill
- Internal Bamboo reinforcement in the straw-clay infill walls
- Repurposed gutter rain catchment system
- Concrete footing and stem wall
- Roof and wall tie-downs to resist earthquake and hurricane forces

Contributors

Technical

Andy Mueller, Designer/Builder, MA
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Funding

Front Porch
Builders Without Borders

In-Country Resource

Haiti Communitere

Construction

Andy Mueller, GreenSpace Collaborative
Chad McLean
Tina Therrien, CamelBack Construction
Jean Louis Elie, Laborer
Annio Baptise, Laborer

We employ sustainable building techniques that are community based, geographically and culturally appropriate

Donations

Please consider donations to support the next phases of this important work that will create local industries and employment, provide an inspired model of sustainable reconstruction, and that is expected in time to sustain itself. All donations are tax deductible as Front Porch is a registered 501(c)3 non-profit organization.