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## CAN HABITEK'S RESILIENT FRAMING SYSTEM HELP SOLVE THE PROBLEM OF HAITI'S HOMELESS?

By: Greg Higgins, Architect and Managing Director, HabiTek, LLC



### OVER FIVE YEARS & COUNTING

Another humanitarian disaster of unimaginable scale is poised to envelope Haiti unless solutions to housing the thousands still living in tents, damaged structures, and flimsy transitional shelters are found and implemented soon.

Reports state that over [188,000 houses were badly damaged and 105,000](#) were destroyed. [64,680 Haitians are still living in tent camps](#). Thousands of transitional shelters, designed to last 3-5 years at most, have reached their expected lifetime. Over five years have passed since the calamitous earthquake, and no solution is even in sight. How can this deplorable situation change?

People concerned with the housing crisis, or involved in rebuilding Haiti directly, must accept that there are NO local building materials in Haiti beyond sand, gravel, and earth, usable for earth bricks and earthbags. However, it is not conceivable that earth bricks or earthbags, while having merit, can meet the urgent demand. Sand and gravel, mixed with cement, of course, creates concrete. Unless adequate amounts of IMPORTED cement are used with properly sized IMPORTED reinforcing bars, not an inexpensive proposition, little is achieved.

In most areas, the use of woefully inferior [masonry and concrete](#) continues as if nothing happened—the same kind of structures whose collapse accounts for most of the deaths and other casualties. Most Haitians have no alternative. As has been said before, “Earthquakes don’t kill people, buildings do!” This paper explains an alternative for Haiti: the HabiTek System, which is engineered to withstand earthquakes and hurricanes.

But the primary reason the world, let alone Haitian authorities, are at a loss to develop housing solutions that work is because the only question that has been asked for the last five years has been, “How cheap is it?” Yes, the vast majority of Haitians are desperately poor. Even so, the first question must be, “Will new housing stand up to hurricanes and earthquakes, and not kill more people in an extreme event?” This is what really matters. While the issue of affordability is vital, designing for long-term resilience must be addressed first.

Also important, pleadings by academics and the rebuilding community to make solutions people-centered and culturally appropriate appear to have been largely ignored. USAID touted their Caracol EKAM housing project as a “Model for Rebuilding Haiti” and used the phrase ‘[culturally appropriate](#)’ in numerous press releases (remarkably, the last time was February of this year). As it turned out, the project is anything but, and has likely wasted close to [\\$100m dollars for a mere 750 small dwellings](#).

How can we build housing that is both affordable and resilient? This is a moral imperative—more lives are at stake!

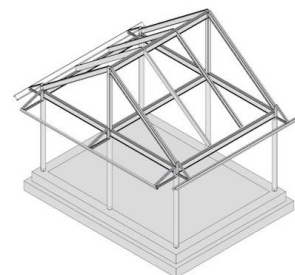
What follows are twelve questions that point to an answer. To be a viable solution, these twelve questions must be answered in the affirmative. Starting with the premise that HabiTek’s high-tech, pre-fabricated, post-and-beam, DIY steel framing *system* can meet the enormous challenges, let’s...

### FIRST ASK THE RIGHT QUESTIONS

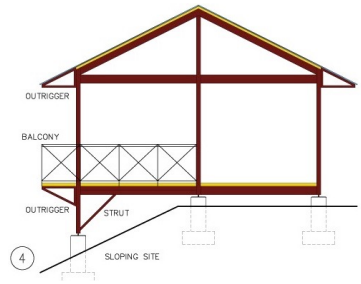
- 1) **Is the system pre-engineered to resist earthquakes and hurricanes?** A framing system that locks in adequate strength is the first order of business. Structures must be pre-engineered for the extreme loads imposed by hurricanes and earthquakes. Steel is a preferred material for resisting seismic and high wind forces, largely because it is predictably strong and ductile. ✓
- 2) **Is the system easy to assemble?** 80-90% of all Haiti’s housing is owner-built. This favors a DIY approach that allows any able-bodied person to participate in the assembly process without power tools. Components must be lightweight with the heaviest pieces easily manageable by two persons. No cutting of components onsite should be necessary. ✓



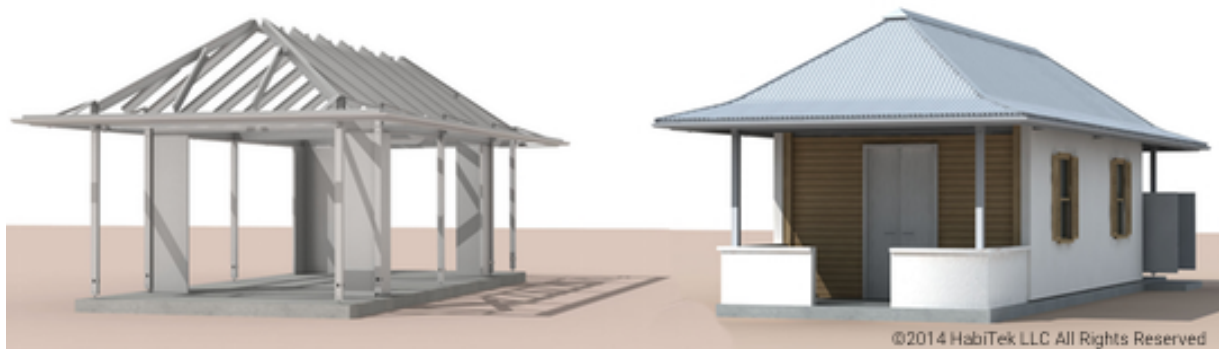
- 3) **Is the system compatible with prevailing building methods?** Because the pre-fabricated steel frame is resilient once all the bolts are tightened, many types of enclosure means can be used, including wattle & daub, or bamboo. Even a thatched roof is not out of the question. Concrete block construction is the prevailing method of building in Haiti. A straight and true steel framework could be enclosed by a non-load bearing concrete block wall. This type of wall is not difficult to construct because the primary loads, including the roof, are carried by the steel chassis. A non-structural locally made block enclosure provides safety from projectiles driven by hurricane force winds. ✓



4) **Does the system allow houses to be elevated above areas that flood or on sloping ground?** Many regions of Haiti are prone to severe flooding or flash flooding. The post & pier framing system allows structures to be readily elevated above grade using properly engineered concrete piers, and if needed, bracing struts. Pier-type foundations can also be used on sloping ground (very common in Haiti), vastly reducing the amount of excavation normally required. ✓



- 5) **Is the system expandable, and are many designs possible?** The system should be readily expandable, including capable of being disassembled for relocation. It is the norm in Haiti for homeowners to add on to homes as families grow and funds become available. The system should have identical interchangeable components for houses of varying sizes and layouts. ✓
- 6) **Can the system be assembled rapidly?** Given the enormous demand & urgency involved, the system must be simple to erect and capable of being rapidly assembled in a DIY mode. A viable systems approach must achieve safe conditions quickly, including protection from weather within a few days. To accomplish this, components must be dimensionally exact, uniform, and bolted together. ✓
- 7) **Can system components be easily transported?** Components must be able to be close-packed for transporting by virtually any mode of travel—shipping containers, pickup trucks, or even mule-pulled wagons. Components should be able to be delivered by helicopter in hard-to-access areas. ✓
- 8) **Is the system self-inspecting?** Adequate building codes and an agency to inspect construction are major problems in Haiti’s efforts to build back safely. A steel chassis, with built-in resilience, is virtually self-inspecting. Just make sure all the pre-made holes in component members have bolts in them, and that the bolts are tightened properly. ✓
- 9) **Does the system allow for roof overhangs?** Roof overhangs are an important part of Haiti’s traditional architecture for obvious reasons—protection from the rain and sun. The exceptional strength of steel allows eave overhangs to be engineered to resist hurricane force winds. ✓
- 10) **Will the system support attractive vernacular designs?** Local artisans, and even homeowners, should be able to complete and personalize their home in the process of fit-and-finish. Here is one example of a customized variation on Haiti’s vernacular tradition.



Amazingly, numerous examples of Haiti’s [traditional domestic architecture remain](#). Although largely abandoned and dilapidated, these adorable structures appear to stay protected by Haitians as a reminder of the way things were. ✓

- 11) **Is the system sustainable and green?** Durability and longevity are the hallmarks of sustainability. By utilizing properly galvanized steel, dwellings should last for 100 years or more, and be part of a community for generations. Steel is immune to mold, rot, and termites as well as 97% recyclable, which is why it is a component of the US Green Building Council's LEED rating program. ✓
- 12) **How cost-effective is the building system?** Important factors are often overlooked when evaluating the true cost of building: site preparation costs, speed of onsite assembly, construction time, resistance to natural disasters, and maintenance costs over the lifespan of the building. Given the large number of houses needed, an economy-of-scale is achieved that allows mass-production of components to substantially lower costs. Charles and Ray Ames, the highly acclaimed designers, directed their problem solving through mass production. Their motto was, "The best for the least for the most." Solving Haiti's housing crisis requires this kind of thinking—solve the problem in the best possible way, then work to mass-produce the steel components to lower costs. ✓

### **HOW CAN WE MOVE FORWARD?**

It is my conviction that once the above questions are fully addressed then, and only then, should strategies be developed to implement a cost-effective solution for housing internally displaced persons (IDP) and even building safer schools. HabiTek answers all of the above questions in the affirmative, and we are committed to helping solve the housing crisis. We are willing to work with the Government of Haiti and non-governmental organizations to introduce HabiTek's new erector-set-like technology in Haiti as soon as possible.

The HabiTek System was developed over 10 years of research & development, working with two distinguished structural engineers. We have completed several beta projects, including two homes in tropical Hawaii. Our current challenge is to implement a program in Haiti to lower costs, meet demand, and capture the imagination of the Haitian people. HabiTek-Haiti could be the game changer the homeless, or ill-housed, so urgently need.

I have been in discussions with Aldy Castor, MD, President of the [Haiti Resource Development Foundation](#), and others, on developing an R&D program to identify strategies for establishing a fabrication operation in Haiti to produce HabiTek's steel components, and make HabiTek-Haiti a Haitian owned-and-operated benefits corporation or cooperative. We welcome your input on how best to proceed to bring our innovative construction technology to Haiti. Please feel free to contact me.

Greg Higgins, Managing Director, HabiTek, LLC

Phone: 509.482.2764

Email: [ghiggins@habitek.biz](mailto:ghiggins@habitek.biz)

Web site: [www.habitek.biz](http://www.habitek.biz)