

Engineering2Empower

80m² Model Home

Design and Construction Summary



Design and Construction Sequence

The proposed design is in direct response to the current void in the Haitian urban housing sector. Following the mantra of empowerment, this model fundamentally shifts the structural system used for urban residential construction in Haiti, while leveraging the existing materials and capabilities available locally. It is important to note that this model was developed to promote self-financed recovery and thus cost-effectiveness of the design was held in high priority given the limited resources of displaced families. The system is standardized and relies heavily upon prefabrication to deliver a higher level of quality control than pre-quake construction standards. As such, a conservative approach was adopted to ensure the design encapsulates likely site-specific scenarios in this region. During the research and design of the model, extensive time and effort was spent understanding the hazards and vulnerabilities, as well as the capabilities and cultural context of Haiti's urban housing problem. Built upon this research, the proposed model takes advantage of the local capacity that does exist to deliver a safe, affordable, and sustainable urban housing.

Figure 1-1 shows the primary structural system of the proposed one-story, residence. The model consists of a cast-in-place reinforced concrete frame partitioned into four full-sized bays and two half-sized bays. The footprint is 8 m x 10 m, resulting in an 80 m² floor plan with 2.5 m of vertical living space. This design is intended to accommodate a family of four to five people. The system is designed to include the option for an open-air porch, as well as the flexibility to add an indoor bathroom.

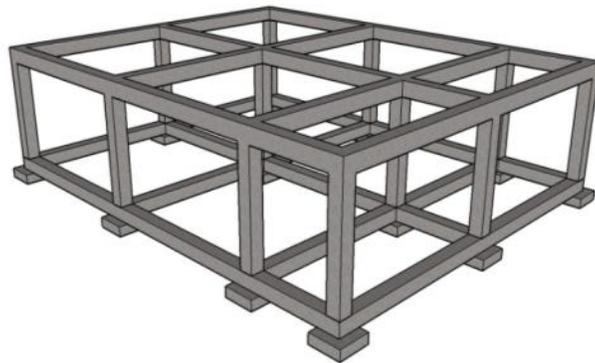
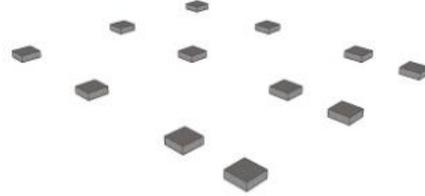


Figure 1-1. Proposed primary structural system composed of a column footing and grade beam foundation and a moment frame.

The home is built in seven stages: (1) foundation footings, (2) foundation grade beams, (3) frame, (4) roof, (5) slab-on-grade, (6) cladding/partitioning, (7) finishes. The following sequence visualizes this construction process.

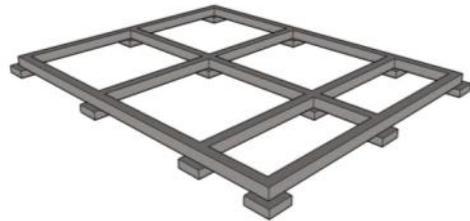
(1) Footings

The foundation system includes reinforced concrete footings centered under each column of the frame. The footings bear on compacted soil.



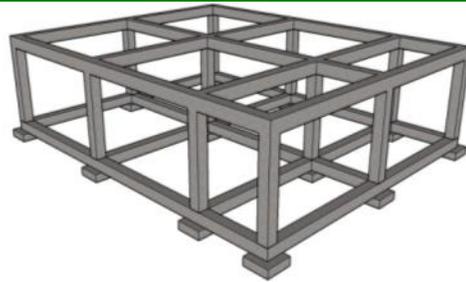
(2) Grade Beams

The foundation system also includes reinforced concrete grade beams, which engage the columns laterally.



(3) Frame

The superstructure is a reinforced concrete frame spanning the column lines defined by the grade beams.



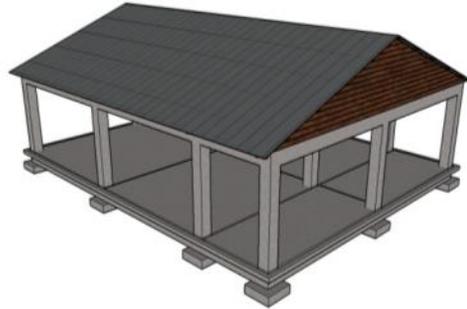
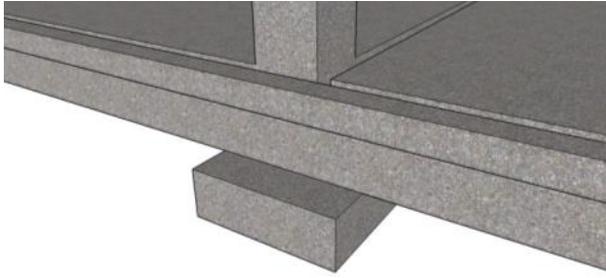
(4) Roof

The roof consists of HSS cold-formed steel purlins and trusses attached to the beams via concrete anchor bolts and topped with corrugated metal sheeting.



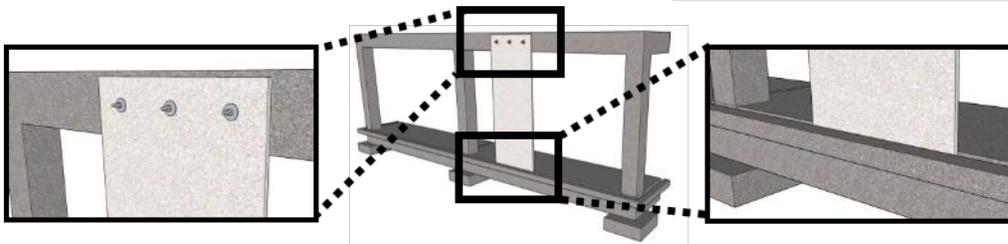
(5) Slab-on-Grade

The slab-on-grade is cast separately from the foundation and frame and is only utilized structurally to transfer occupancy live loads from each slab cell into the grade beams and underlying compacted soil supporting each slab cell. During this process, a shallow cladding channel is also created at the outer edge of each column line.



(6) Cladding/Partitioning

The cladding and partitioning system consists of lightweight, concrete panels reinforced with a steel mesh. The panels sit (and are subsequently grouted) in the cladding channel in the slab-on-grade and are attached at the top to the frame via concrete anchor bolts.



(7) Frame

Standard finishes are applied based on homeowner preferences. These finishes may include:

- stucco wall finishes
- vented plywood gables and soffits
- vented, open, or louvered windows
- doors

