Team Haiti

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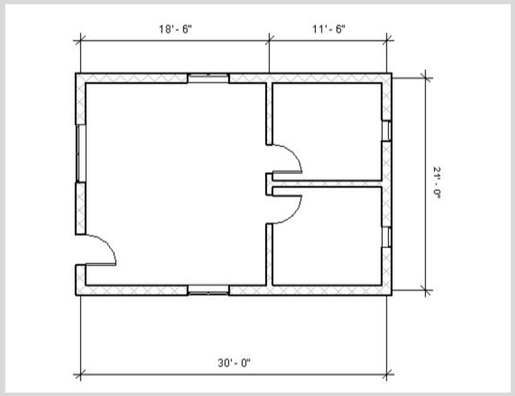
Introduction

Earthquakes have repeatedly threatened the safety of Haitian people and their properties. The most recent major earthquake occurred on August 14, 2021, killing 12,000 people and destroying almost 140,000 buildings. To reduce the damages done by this natural disaster, the structural integrity of many Haitian residences needs to be improved.

In order to do this, Team 1 set out to design a house that can firmly withstand an earthquake, have a life span of at least 50 years, and be suitable for a family of four people.

Objectives

1. Resist horizontal and vertical forces of an earthquake
2. Affordable for a local Haitian family
3. Culturally appropriate for Haitian culture and architecture
4. At least two bedrooms and a living/dining space



Floor plan of the house

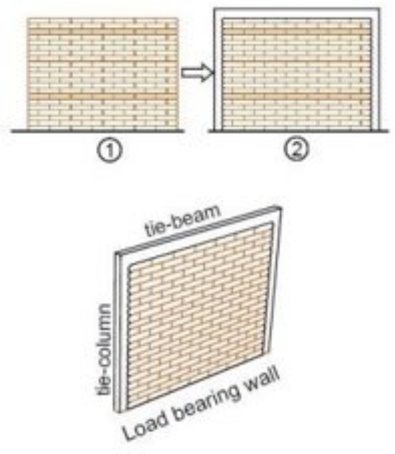
Project Overview

House Model

A rectangular house with a concrete sloped roof was chosen. Rectangles have been shown to be the best shape for confined masonry. Having a concrete roof greatly decreases the construction budget and its weight is evenly distributed on the house and its foundation. A slight slope of ¼”-12” accounts for rain. Concrete masonry was used for construction of the house walls as it is culturally appropriate and a great seismic resistance technique.

Seismic Resistance Technique

Team Haiti decided to use confined masonry as the seismic resistance technique. Confined masonry is a structural system consisting of masonry walls surrounded by reinforced concrete (RC). Not only is it effective but it is relatively cheap and easy to construct. The materials used in this technique are readily available in Haiti and are easy for construction workers to use.



Confined Masonry Example

Materials

The main building material is concrete which is relatively cheap and easily attainable in Haiti. The Haitian-made concrete typically has a compressive strength ranging from 1000 psi to 1700 psi which is more than enough for our project. Concrete will be used for our walls, roof, and foundation. Additionally, steel will be used as a reinforcing material in the concrete. All our chosen materials are readily available in Haiti and within our budget.

Budget

One of our main goals was to make sure that this house would be affordable for a local Haitian family. With a combination of insight from a few construction companies in Haiti and RS Means estimation software, the budget for our house was under $20,000.

Lynsey Baker, Duy Nguyen, Felicia Koki

Revit Model of the house.

Next Steps

Throughout this process Team Haiti has been in contact with a company called Build Change, a nonprofit organization that works with those affected by natural disasters. The final design and report will be sent to their structural team in hopes that they will use it in the future.

References/Acknowledgments

Build Change, Pierre Paya

Team Advisor: Leonard De Rooy

Design and Construction guidelines for Confined masonry housing, Guy Nordenson and Associates

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Confined Masonry by Tom Schacher – for 1 and 2-story buildings