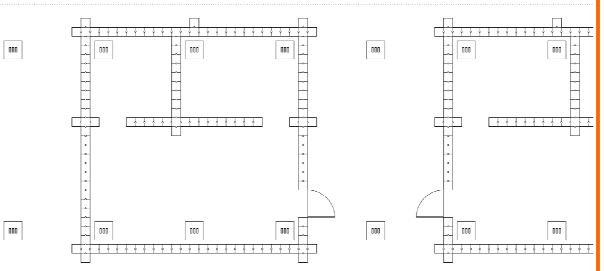
Layout



Final Design

Challenges

- Contacts in Peru
  - Long periods of time between sending questions and receiving answers.
  - Language barrier
- Ethical Issues
  - Design must be affordable, sustainable, and seismically sound in order to be relevant
  - Native Peruvians must be able to implement and understand the benefits of the design
- Distance
  - It would be beneficial to go to Peru and use local materials to test design to make changes where necessary

Recommendations

The final design is feasible and therefore applicable. Something that would be beneficial to the application of the design is a detailed instruction booklet. The process of building a home using Rammed Earth bricks should be described mostly using pictures to cross over any language barriers.

Conclusions

The large number of lives lost each year due to the effects of seismic activity in places such as Peru is preventable. This design of a seismically sound house is sustainable and affordable. Because of the flexibility of the walls in this design, the bricks are free to move with seismic activity and return back to their original position.

A Special Thanks To

Our contacts in Peru that provided us with helpful information: Sara Mascola, Megan Bandosz, and Dave Brinkmeier.

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ILLINOIS INSTITUTE OF TECHNOLOGY

IPRO 325B

peru 2.1

Designing Seismically Sound Housing Solutions for Peru

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IPRO It takes a team!
INTERPROFESSIONAL PROJECTS PROGRAM

Problem

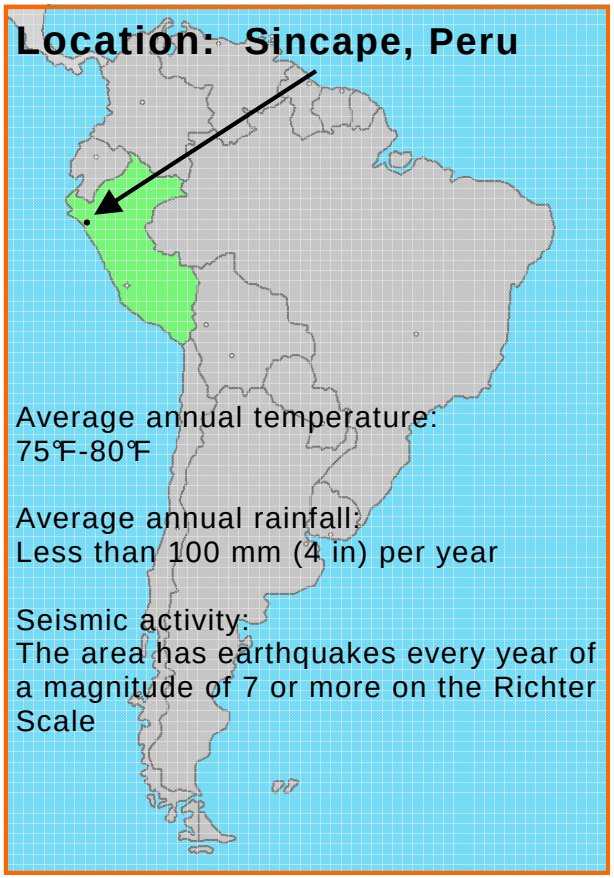
Seismic activity in Sincape, Perus destroys number homes each year.

Main Issues: roof caving in, walls crumbling/cracking, lack of reinforcement, brittle adobe bricks/mortar, upkeep of adobe in homes

Objectives

Build an affordable, sustainable house capable of withstanding seismic activity in Sincape using mostly local materials.

Location: Sincape, Peru



Average annual temperature:
75℉-80℉

Average annual rainfall:
Less than 100 mm (4 in) per year

Seismic activity:
The area has earthquakes every year of a magnitude of 7 or more on the Richter Scale

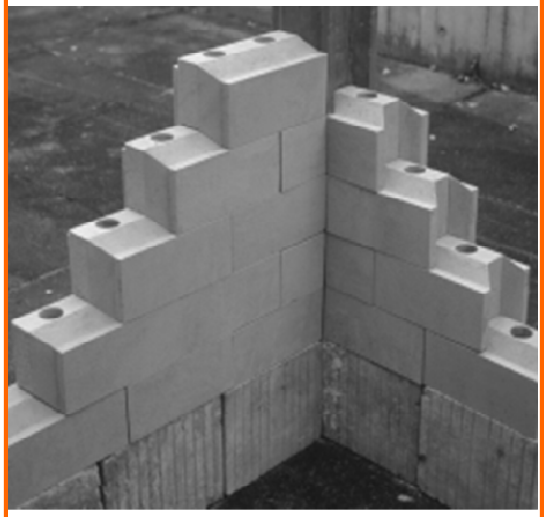
Solution

- Walls
  - Rammed Earth is earthquake resistant due to flexibility
  - Vertical reinforcement
- Roof
  - Detached from wall structure
  - Lightweight
    - Materials
      - Wood/bamboo
      - Corrugated metal
  - Separate foundation
  - Separate columns for movement

Rammed Earth

- Process
  - Mixture of dirt, clay, sand, fibers/hay, moisture
  - Formwork made of scrap wood
  - Tamper used to ram 4” layers
- Problems
  - Not easily mass-produced
  - Not flexible
- Solution
  - Interlocking (vertically and horizontally)
  - Typical layout - mass produced in jig
  - Vertical reinforcement
    - Tied from foundation to ring beam

Walls



Pieces can move and slide and still fall into place with vertical reinforcement bars that run throughout and are connected to a ring beam

Roof

Roof structure is detached from the wall structure for independent movement from the wall structure during seismic activity