Peru Project
IPRO 325B

Developing Affordable & Sustainable solutions
for the world's rural poor

T E A M

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Livia Lay	4th yr architecture
Justin Lim	4th yr architecture
Katrina Ongchangco	4th yr architecture
Jacob Williams	4th yr architecture

STATEMENT OF PROBLEM

Inhabitants of the southern Andes regions in high altitudes suffer from a common phenomenon known as *friaje* which affects the livelihood of the people, their animals, and their crops.

friaje: when polar winds blow from the mountainous south.

In 2003, when temperatures dropped to -35 degrees centigrade, fifty children died*, and as many as* 13,000 people suffered *severe hypothermia, bronchitis and pneumonia.*

O B J E C T I V E

Create an affordable and sustainable home design for regions in the Andes affected by *friaje* using locally available materials and passive design strategies.

I P R O 325 H I S T O R Y

evaporative cooler



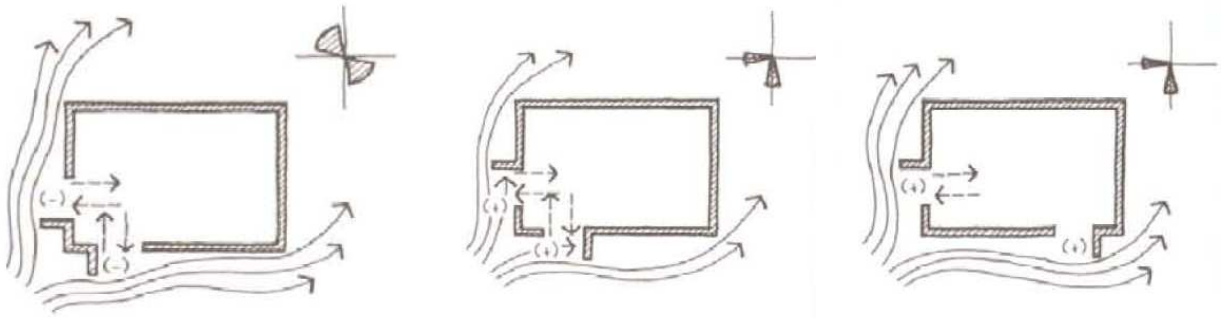
barrel rocket stove

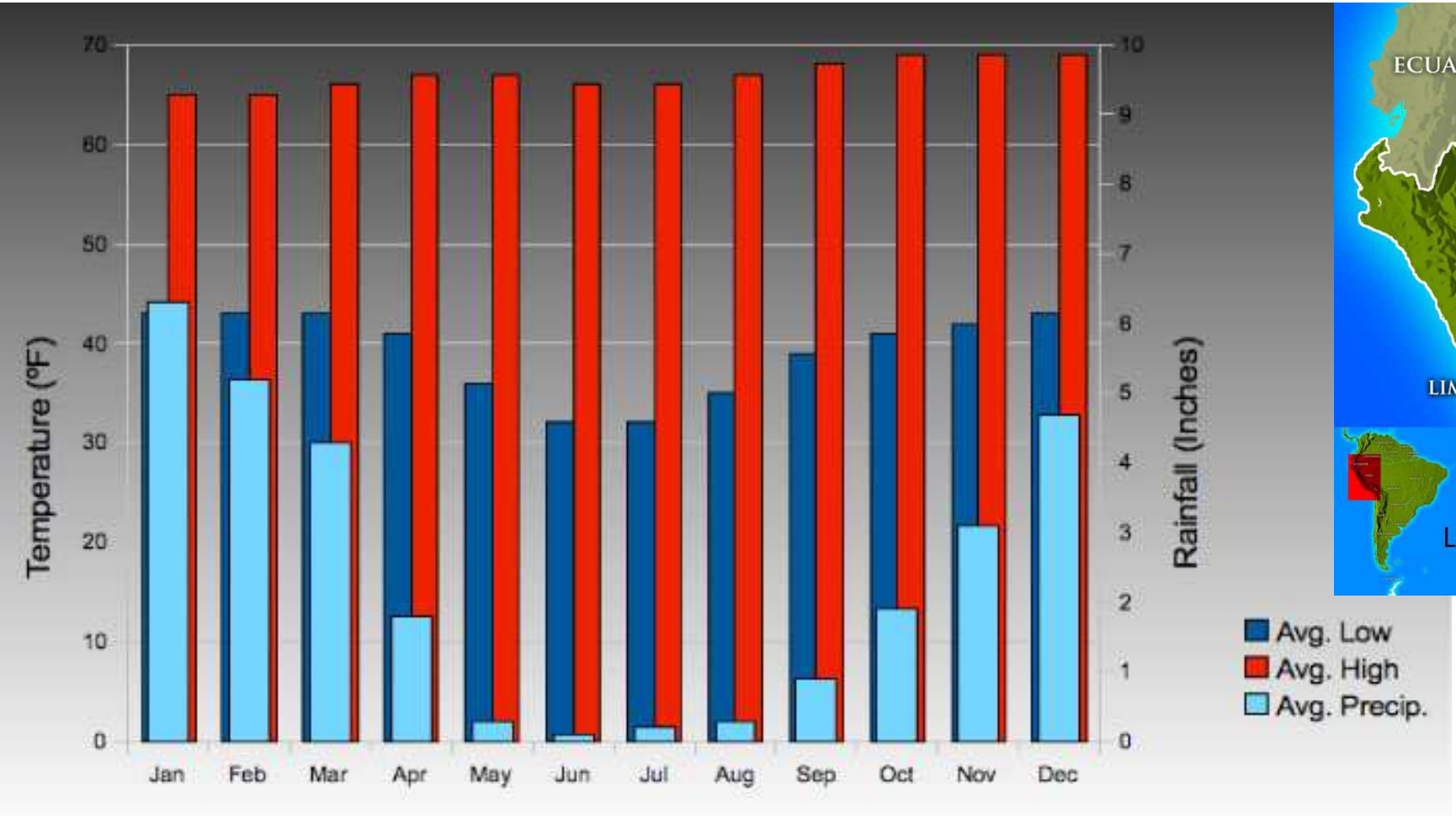


water pre-filtration system


R E S E A R C H

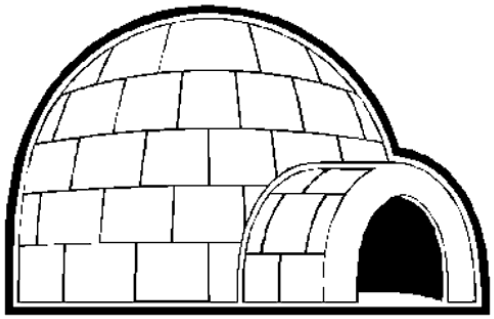
weather conditions





precedence

Peruvian homes

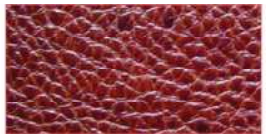


igloo

local materials

adobe

bamboo



animal skin

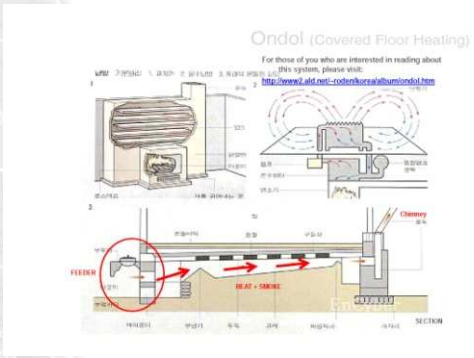
straw bale

corrugated metal

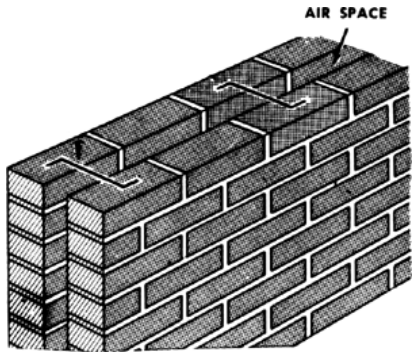
passive design

location

orientation



radiant heating



cavity wall

CURRENT CONTACTS

- Marisela Perez
  - IIT-Sincape coordinator
- Professor Duffy

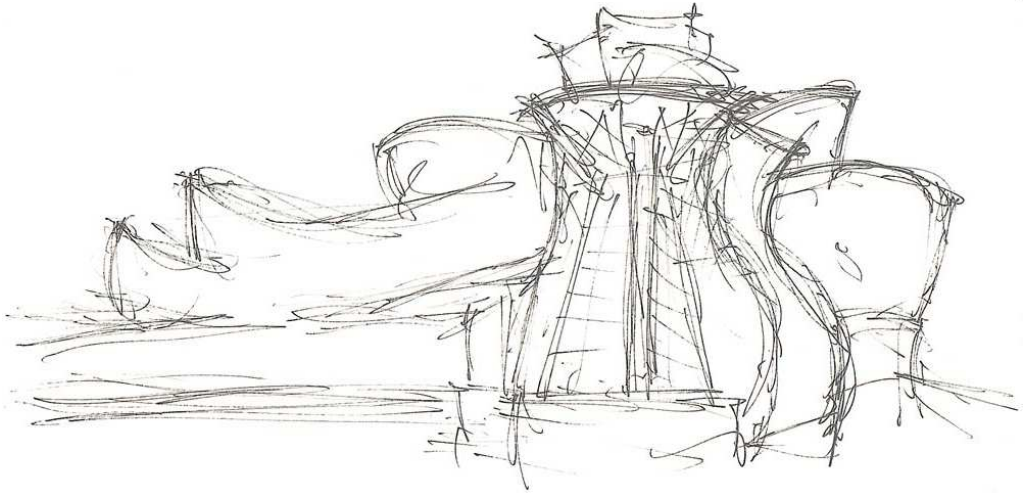
  UMass Lowell Professor
  Expertise: Mechanical engineering, control systems science, solar engineering, environmental engineering, education, statistics and manufacturing systems
- Manuel Heredia

  UMass Lowell Student
  PhD candidate in mechanical engineering
- Ursula Harman
  - GRUPO (Grupo de Apoyo al Sector Rural) at the Catholic University of Peru in Lima
  - Her Students Participate in rural community relief programs
- Lupita Montoya
  - Professor of engineering in Troy, NY
  - She and her student do work in Langui Peru an Andean Town

DESIGN CONSIDERATIONS

Improve current living conditions

Produce & maintain heat within the home



AFFORDABLE

Locally available materials, simple construction

SUSTAINABLE

Familiar construction methods, available materials

User-centered design

Needs of the user come first, culturally sensitive, understand rituals and habits of user

D E S I G N

IMPROVE CURRENT LIVING CONDITIONS

Provided an increase of over 1000% R-value in the exterior walls

Current home: 4.35 New design: 57.85

*R value insulation ratings are used to measure insulations ability to resist heat flow.

AFFORDABLE

Current home: $1,470 New design: $2,475

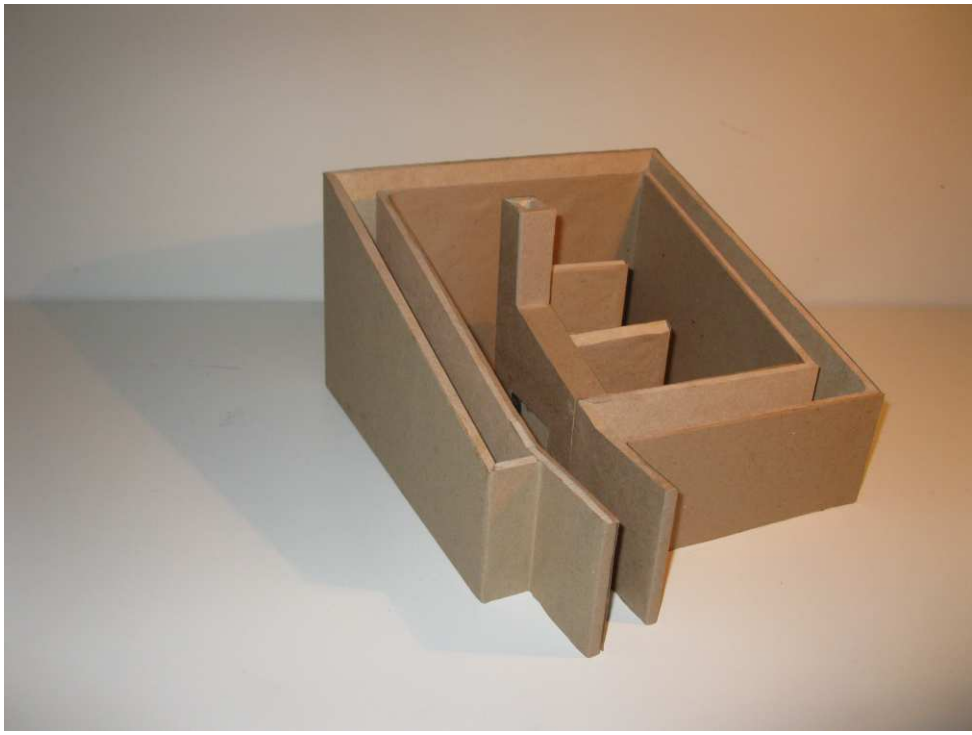
*Other groups concerned with the same project have spent upwards of $7,000

SUSTAINABLE

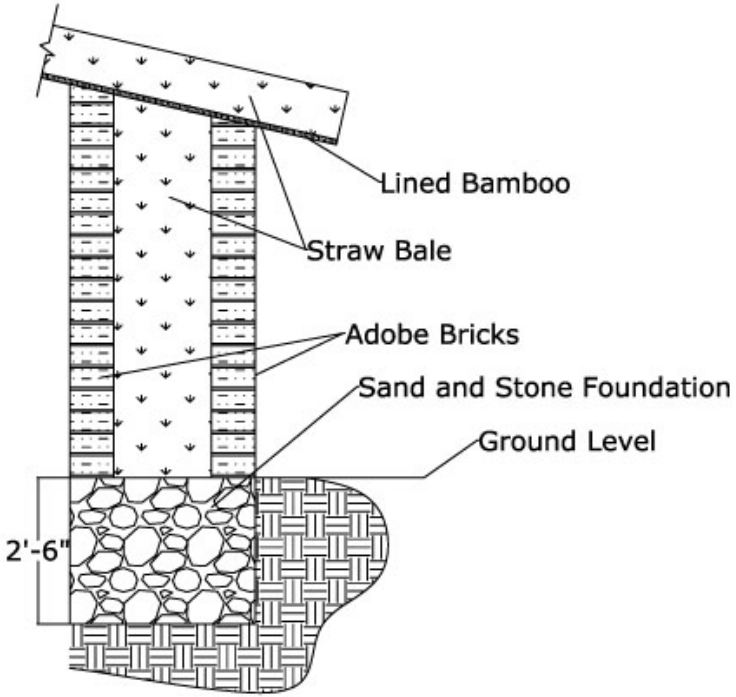
Typical adobe construction using familiar materials such as; adobe, straw bale, bamboo, corrugated metal, etc.

USER-CENTERED DESIGN

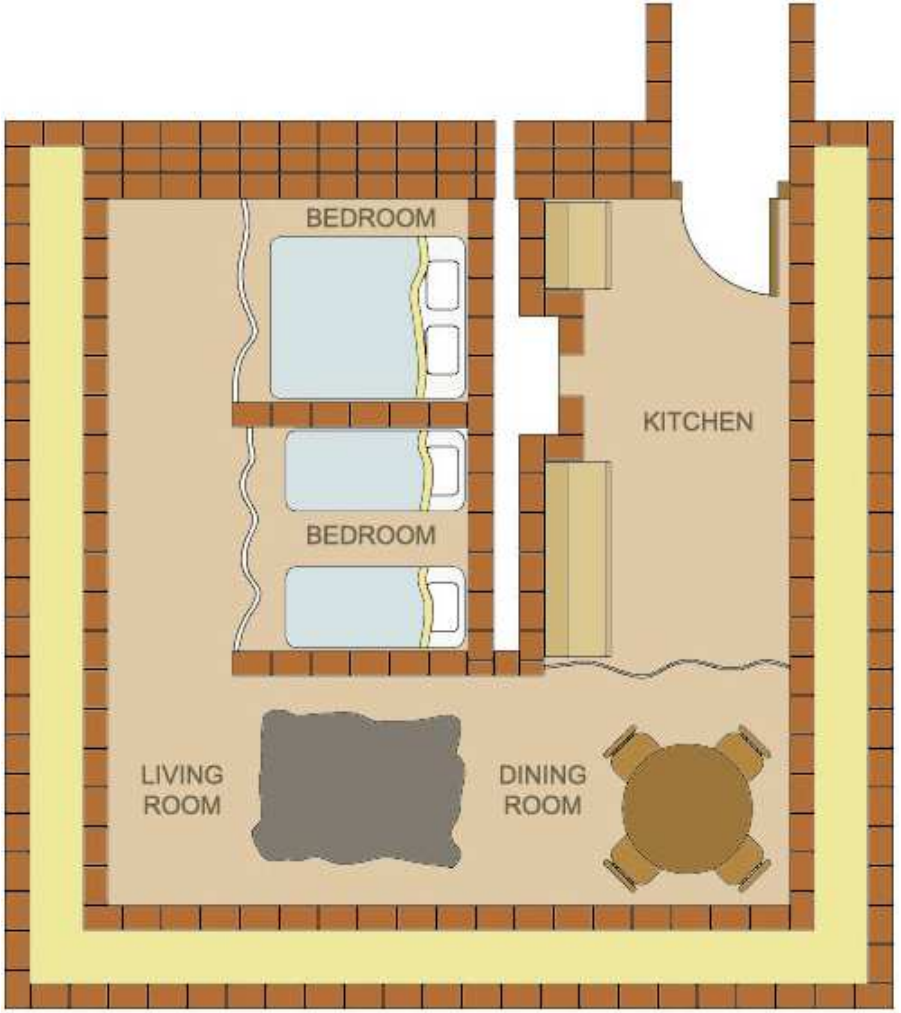
Incorporated use of cooking stove with radiant heating, enabling a typical daily event to contribute to radiant heating.



D E S I G N cont.

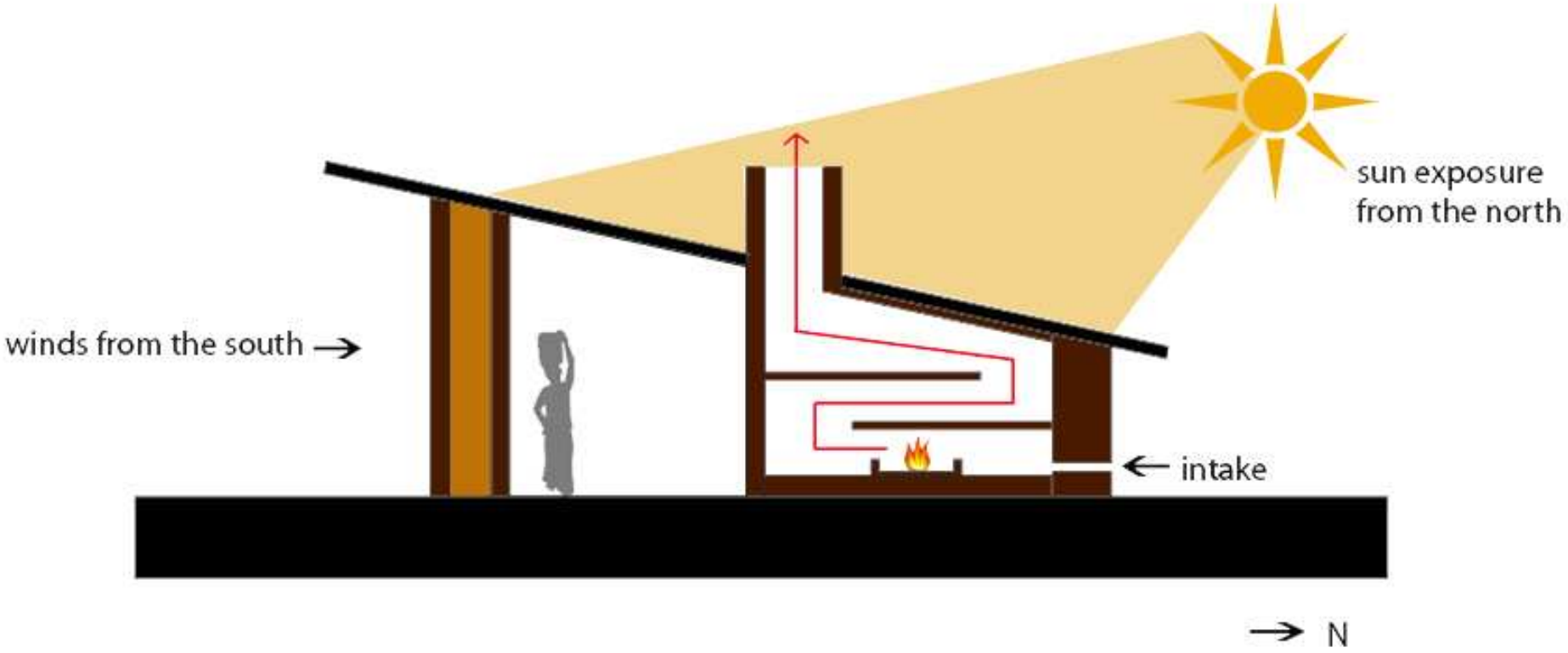


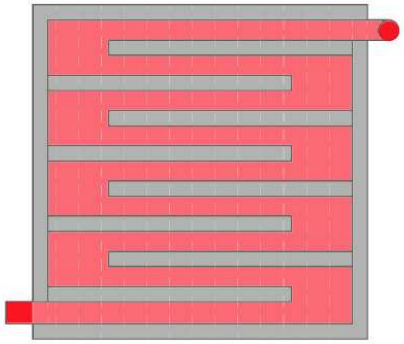
wall section

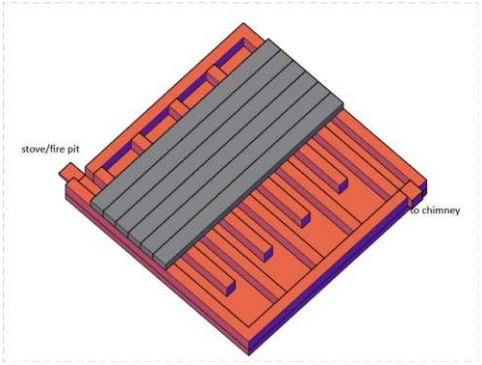


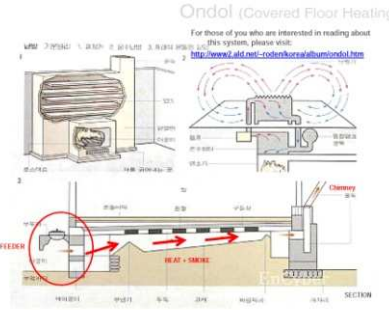
floor plan

D E S I G N cont.


sun exposure
from the north
winds from the south
intake
N




stove/fire pit
to chimney


Ondol (Covered Floor Heating)
For those of you who are interested in reading about this system, please visit:
http://www2.ald.net/~roden/korea/album/ondol.htm
Chimney
FEEDER
HEAT + SMOKE
SECTION

OBSTACLES

Obtaining information on materials and their cost.

Contacting informants in Peru

Finding a target site

First semester to begin this project

WHAT'S NEXT?

Test design in similar weather conditions

Modify design as needed

Create manuals for construction of design

Build prototype in Peru

Observe, receive input, and modify as needed

A S P E C I A L T H A N K S T O...

OUR CONTACTS

Marisela Perez

Professor Duffy

Manuel Heredia

Ursula Harman

Lupita Montoya

OUR PROFESSORS

Dr. Kenneth Schug

Dr. Margaret Huyck

Prof. Linda Pulik

THE IPRO OFFICE

QUESTIONS