The Problem

Three billion people live on less than $3 a day

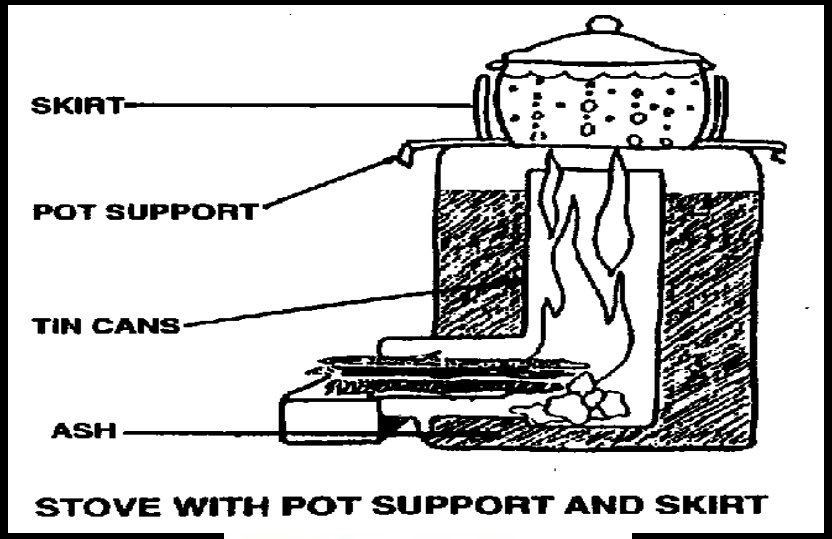
Objective

Design, build and test energy, water or shelter solutions costing $5 or less that can be implemented and maintained by local people using locally available materials.

Barrel-Rocket Stove

Brian Chung
Chaitanya Murti
David Khem
Jerry Jose

The Rocket Stove



- Very Efficient stove
- Insulated combustion chamber, skirt, and chimney
- Air passage allows constant influx of air
- Result: Very clean burning

The Problem

- An estimated 2.7 million people die prematurely each year due to smoke and toxic emissions from wood burning over open fires.

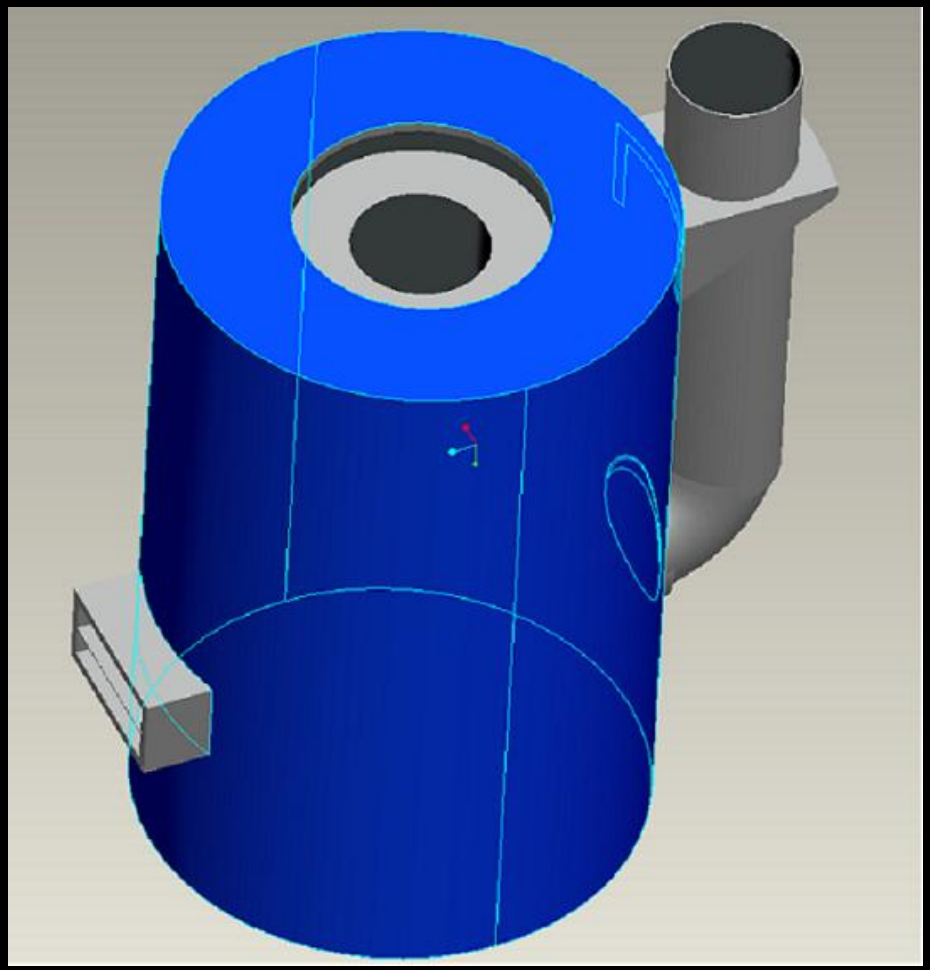
- Over 600 million tons of wood are consumed every year in the forms of firewood and charcoal.

- 6.7 billion tons of greenhouse gas (CO_2) will be released into the atmosphere by 2050.

Picture: Living conditions for the rural poor in most of the world.

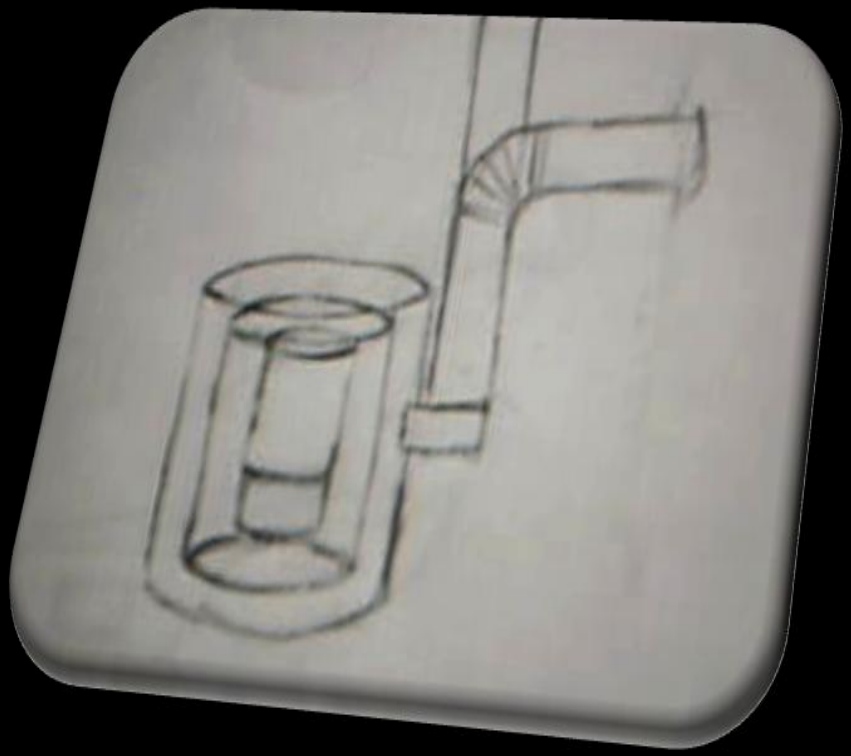
Solution Design

- Barrel-Rocket stove
- Same principles as rocket stove used in combustion chamber
- Has exhaust to remove excess smoke



Solution Testing

- Comparison of heating time of design with elementary rocket stove
- Testing with varied combustion chamber and air passage size
- Test of miniature prototype



Status

- Research Completed
  - Nature and extent of problem
  - Existing alternative solutions
  - Implementation of alternative solutions worldwide
  - Rocket and barrel stove design
  - Physics of rocket and barrel stoves
- Design
  - Basic miniature prototype built
  - Design nearly complete
  - Construction phase started

Testing

- Miniature prototype tested for functionality of idea
  - Test was succesful.
- Variables identified:
  - Size of combustion chamber
  - Size of air passage
- Parameters identified:
  - Efficiency of stove
    - Tested by the time taken to boil a standard quantity of water
  - CO_2 and CO exhaust
    - Measured using CO and CO_2 emission testers
- Experimental Controls
  - Type of wood used, quantity of water for heat tests

Obstacles and Barriers

Departure of Matt Cosenza (resolved)

Location for testing(resolved)

Implementation Location (unresolved)

Evaporative Cooling

Abraham Akutagawa
Andrew Rust
Narciso Corral
Sara Wilde
Young Ju Jo

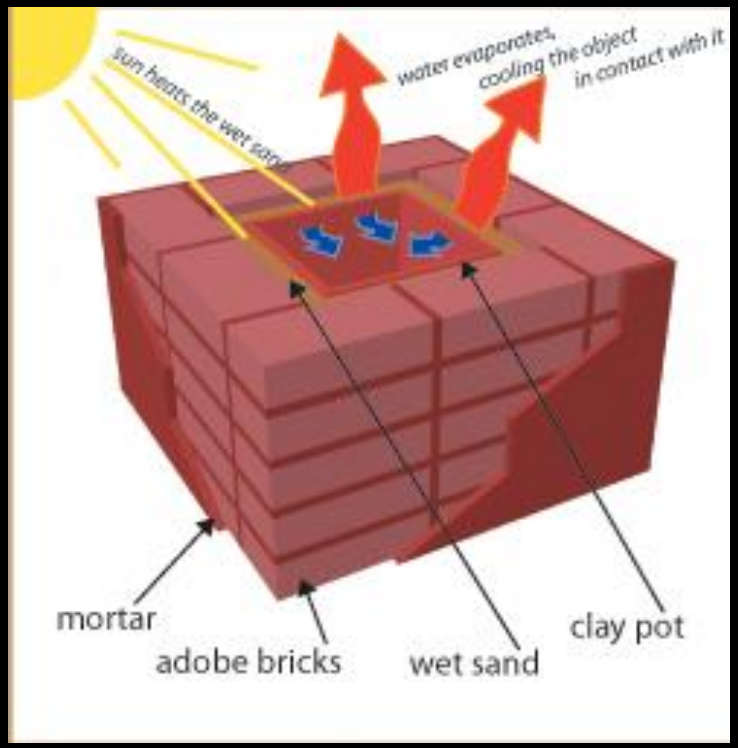
The Problem

- Malnutrition affects 792 million people worldwide
- 5 million children die from malnutrition every year
- 1 out of 5 people suffering from MNM has access to needed fruits and vegetables
- 20% of fruit and vegetable losses occurs during storage
- Loses are primarily temperature and humidity related

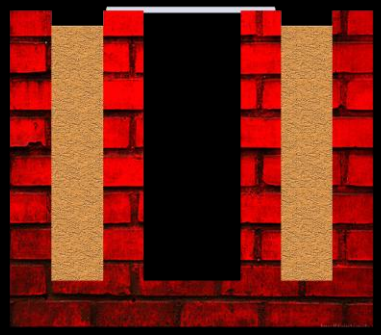
2 Pot System

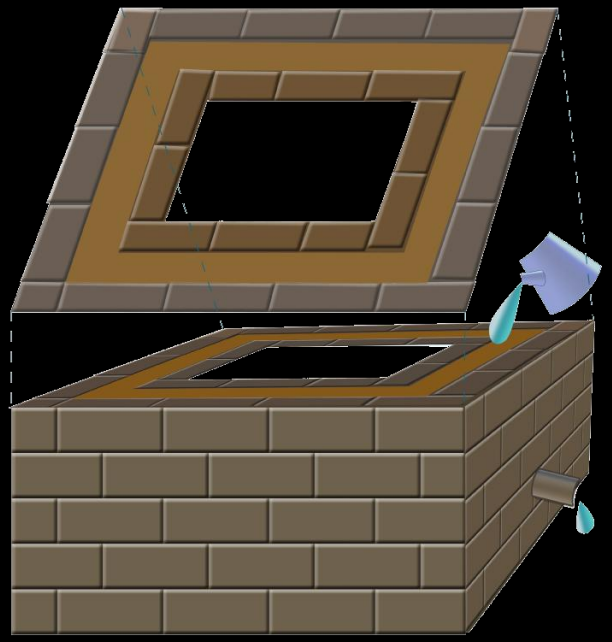
- Used already as an evaporative cooling system.
- Test its effectiveness versus our brick design.

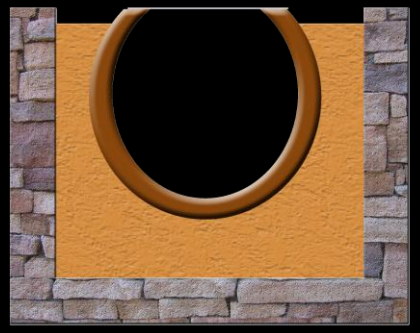
Brick System



Design Improvements







Milestone Report

Milestones Reached

Phase 1- RESEARCH PHASE:

- Last semester progress review
- Expand design & plan research
- Establish desired objective
- Begin prototype research/planning
- Find construction & test site

Milestones Ahead

Phase 2 – CONSTRUCTION & DEVELOPMENT PHASE:

- Obtain materials
- Construct pot in pot system
- Construct brick systems
- Clean-up
- Compare & contrast data
- Revaluate objective & provide feedback

Obstacles

Problems	Solutions
Construction is time consuming	Use premade bricks and pots
Coordination & resolving of team working schedules	
Finding construction & test site	Prof. Schug Chemistry lab. Adequate work space.
Lab Space	
Obtaining building materials: Bricks, clay/terracotta pots, transportation method	Home Depot, Menards, etc.

Composting Toilet

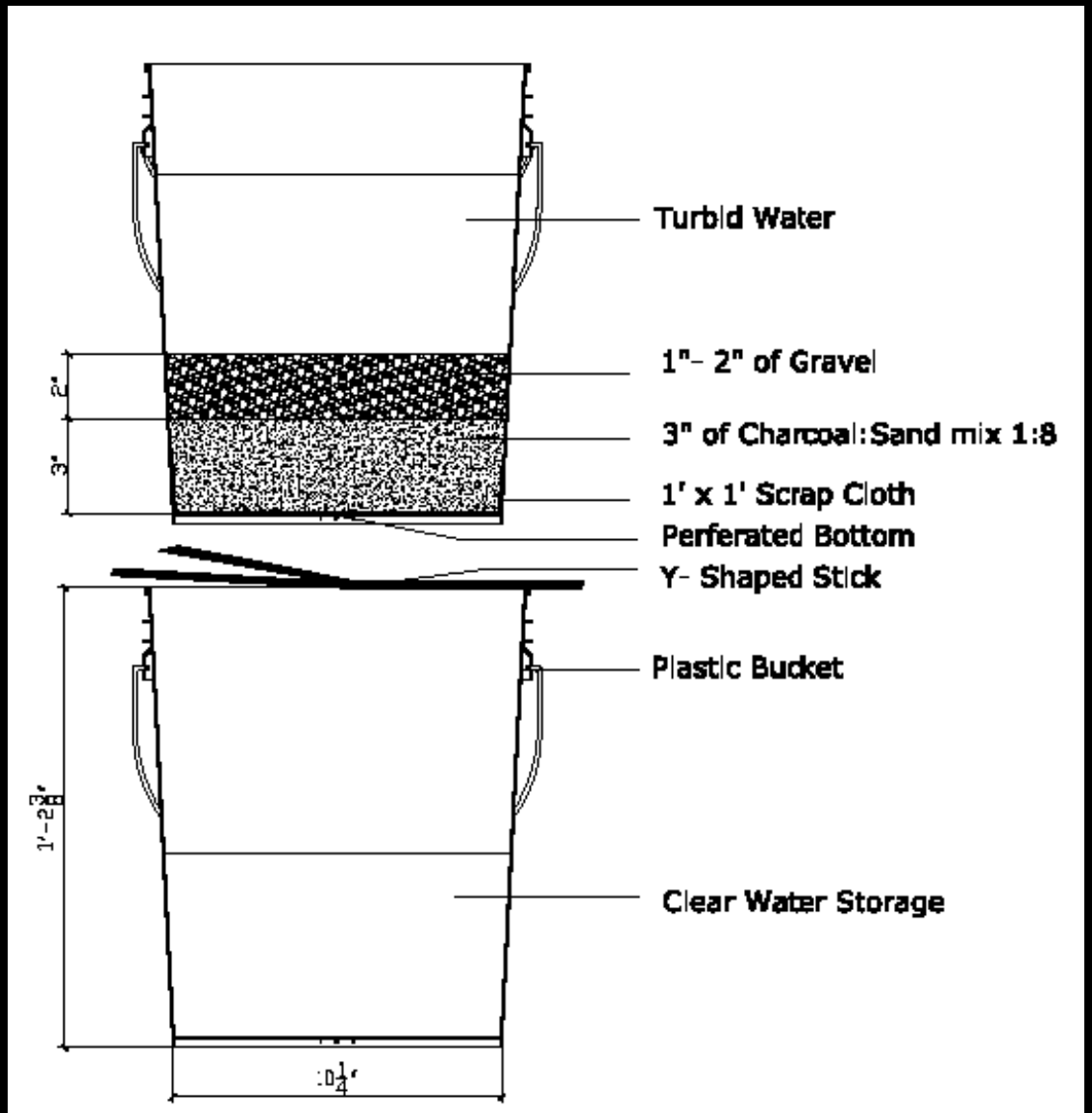
Tomomi Tsukioka
Joshua Bergerson
Blake Hellman
Daniel Hutchinson
Reema Paranthan

The Problem

- 1 billion people lack access to an improved water supply
- Every 15 seconds, a child dies from a water-related disease
- 88 percent of all diseases are caused by unsafe drinking water, inadequate sanitation and poor hygiene

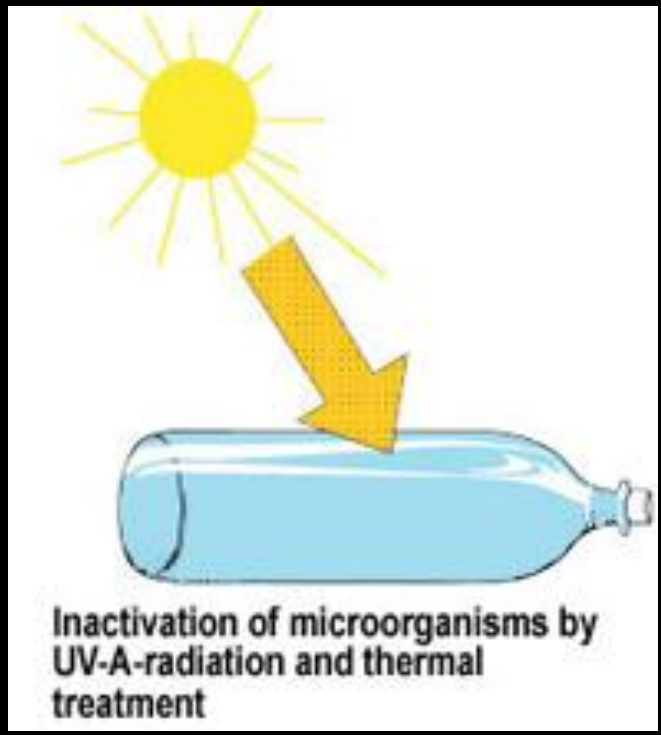
Facts cited from WHO and United Nations Human Development Report (2006)

Last Semester's Solution

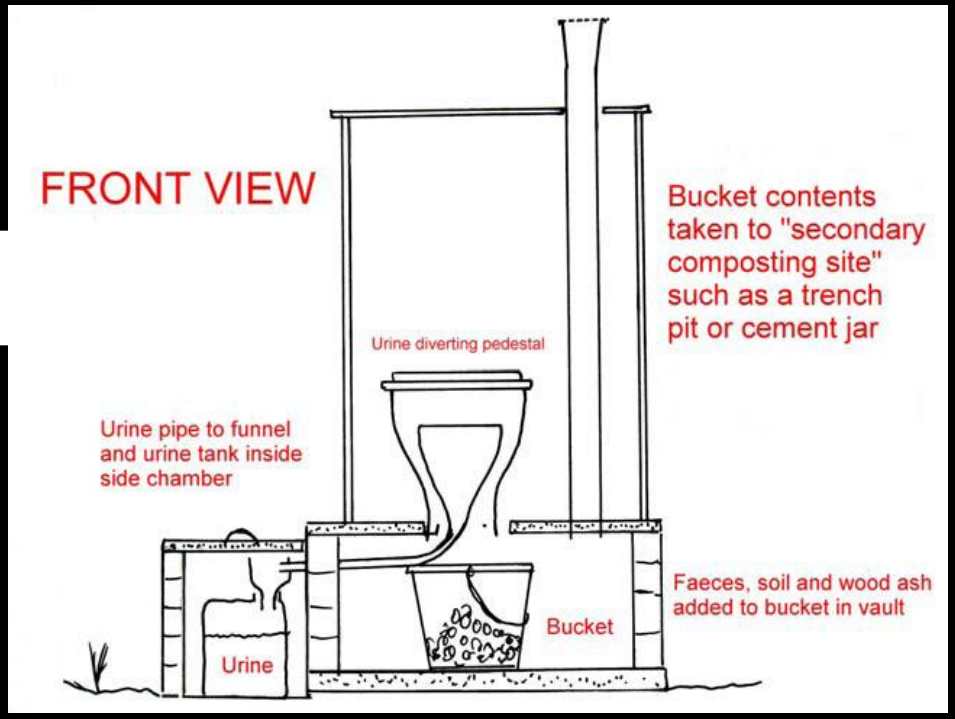


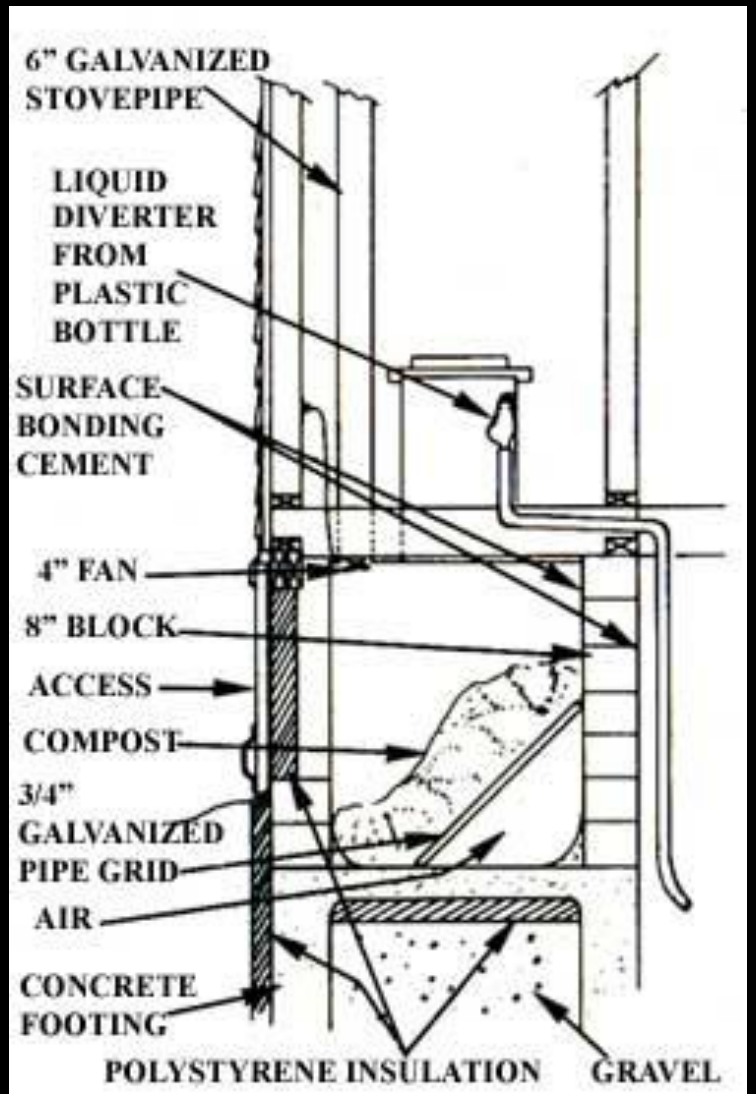
2 Bucket System

And SODIS

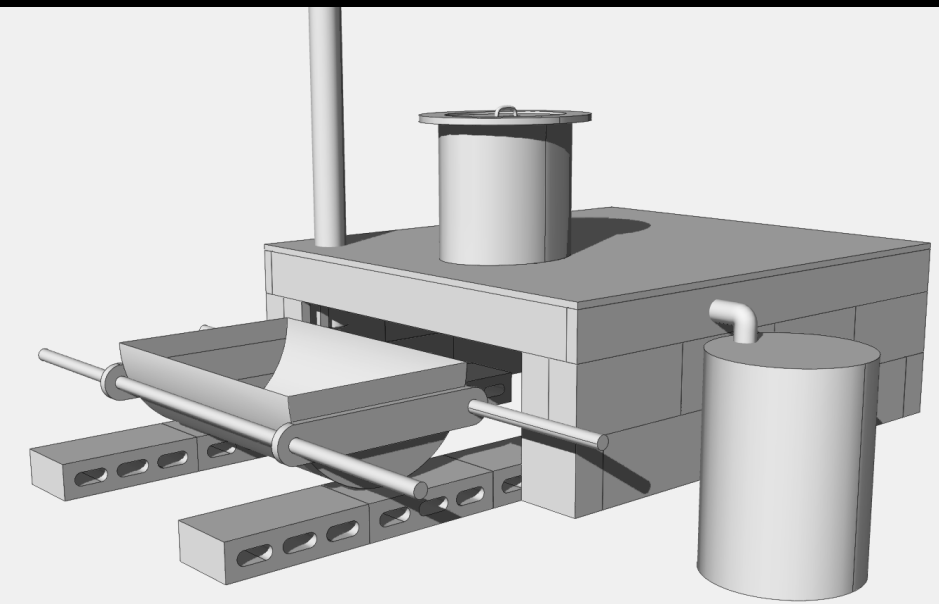


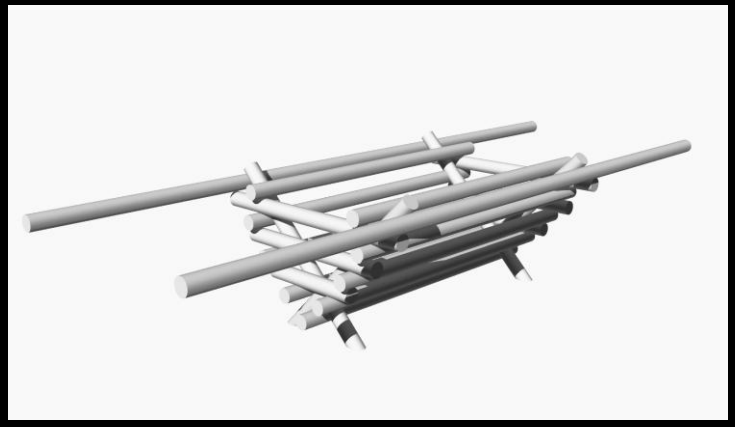
Proactive Solution: Compost Toilet

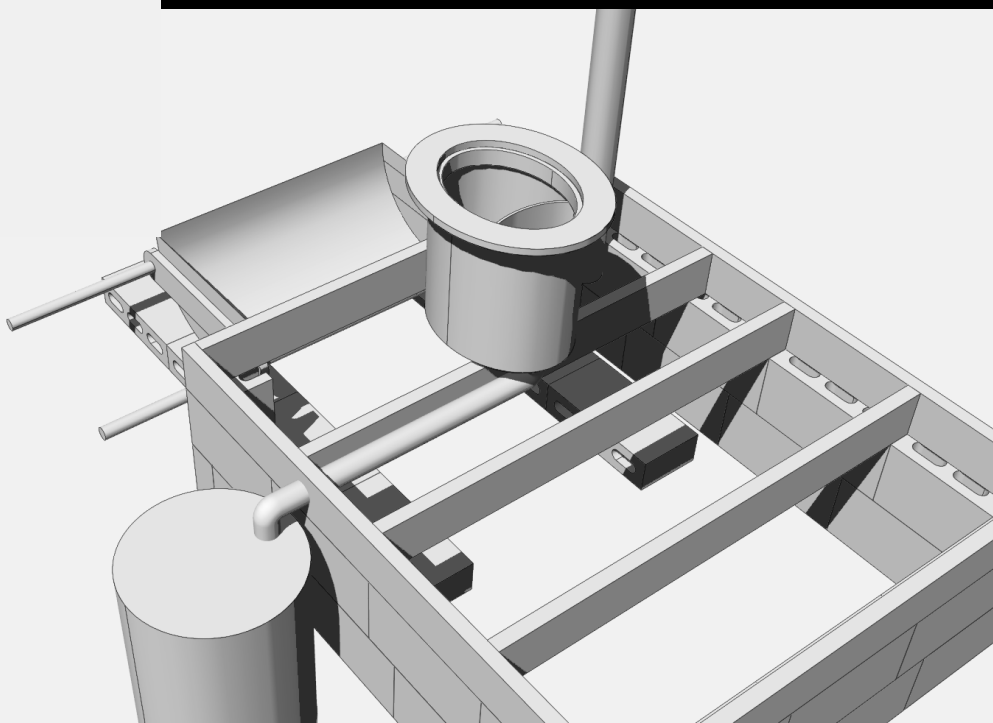




Our Design





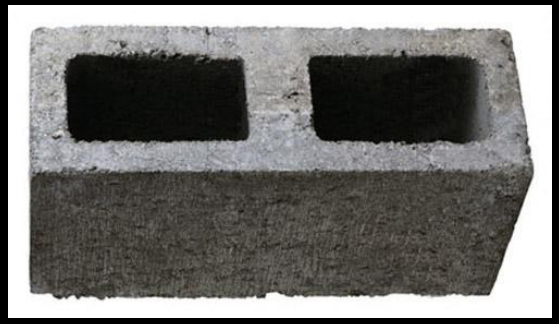


Materials

5 Gallon Plastic Bucket (2)

Plywood

55 Gallon Plastic Drum (1)



CMU Blocks (35) – 4” x 8” x 16”

Lumber 2”x6”x10’l

PVC Pipes (24) – 5’ x 3”

Progress

Materials in the Third World

5 Gallon Plastic Bucket (2)

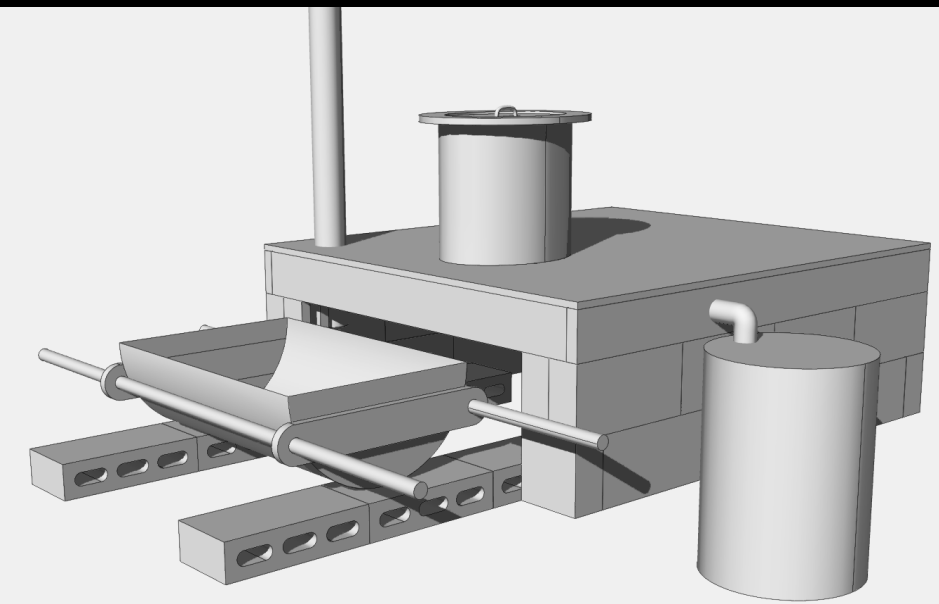
55 Gallon Plastic Drum (1)

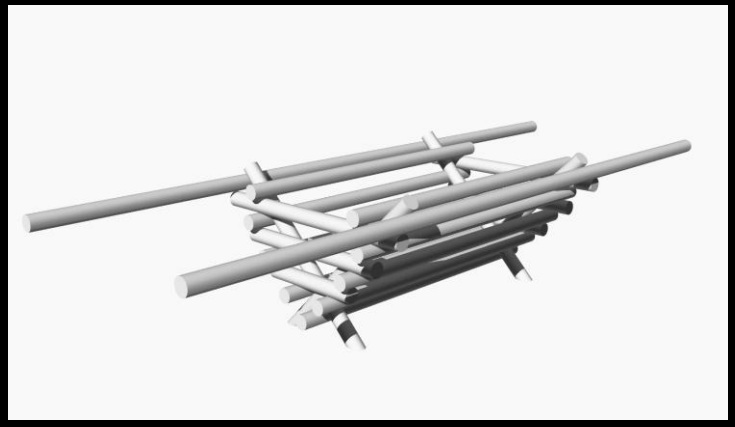
Adobe Bricks

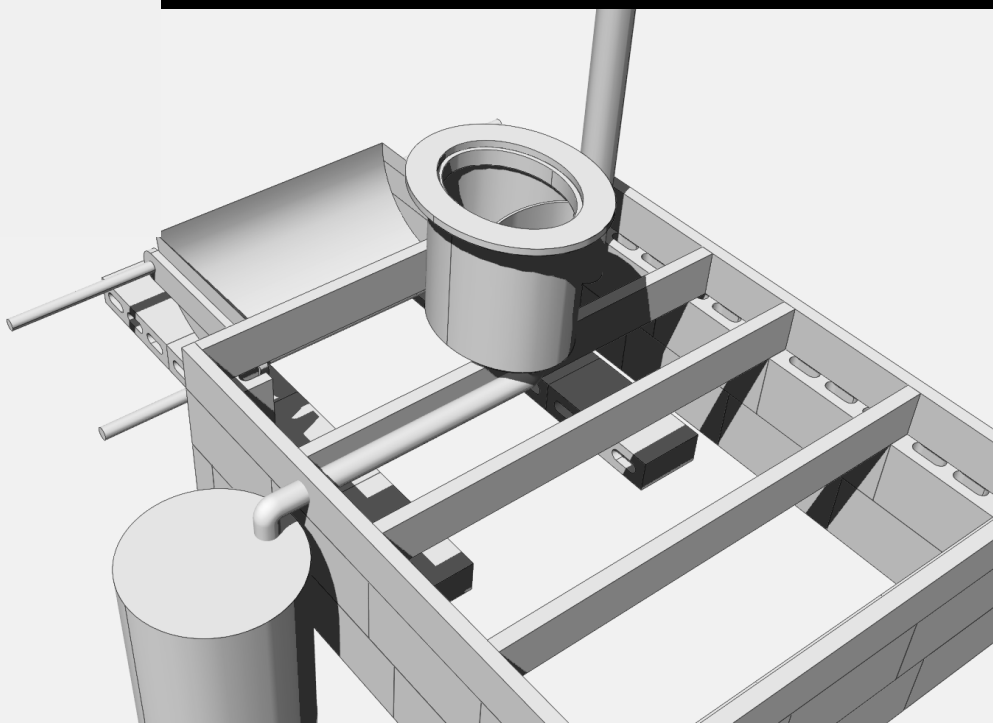
Cana Brava

Obstacle	Solution
• Materials	• Cana Brava • Adobe Bricks
• $100 NSF Regulations	• Donation from NSF
• Sanitation	• Increase Latency – Add 2nd Receptical • Composting Rate – Add Airflow – Paint Sides Black • Plastic Cover
• Compost Pile	• Design Fence
• Complicated Process	• Workshops • Field Manuals
• Urine Disposal	• Evaporation? • Compost Pile?

Our Design







The Problem

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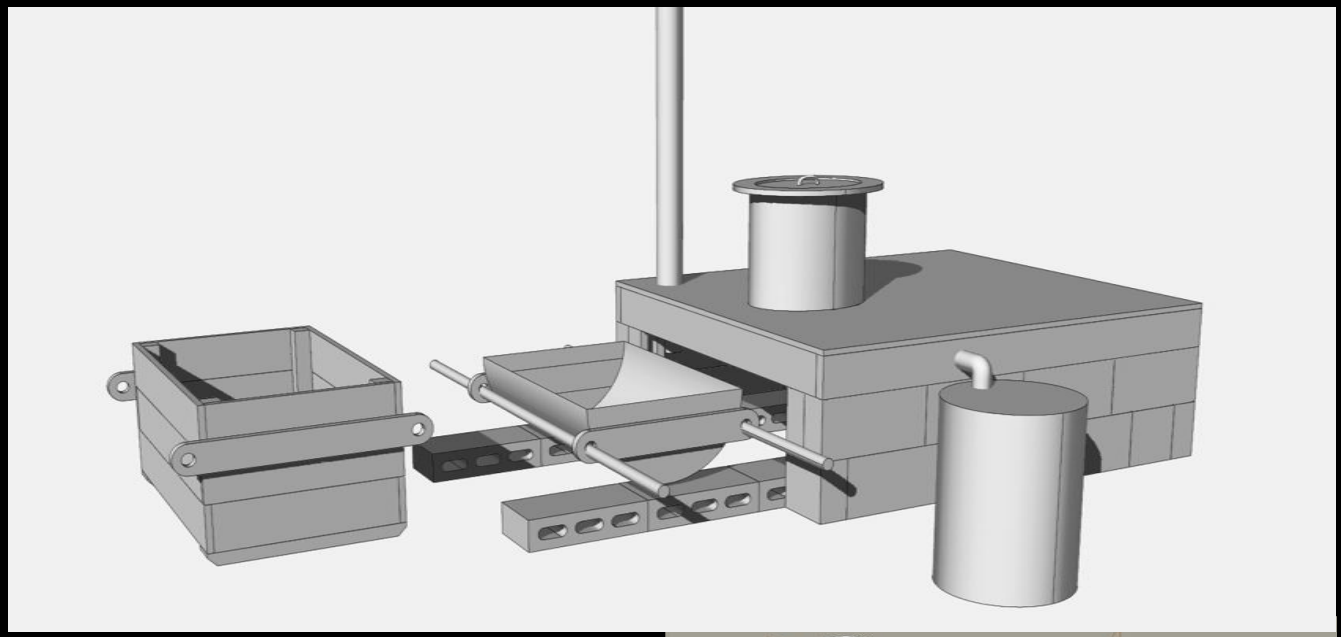
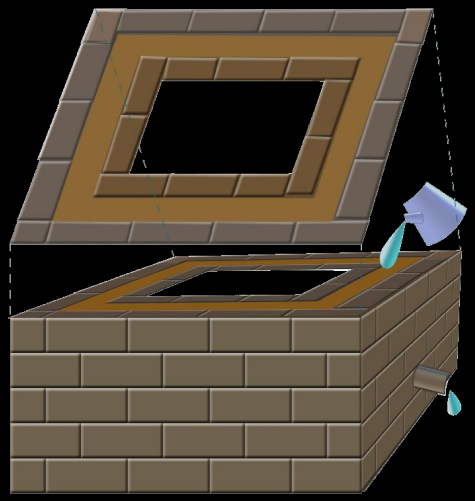
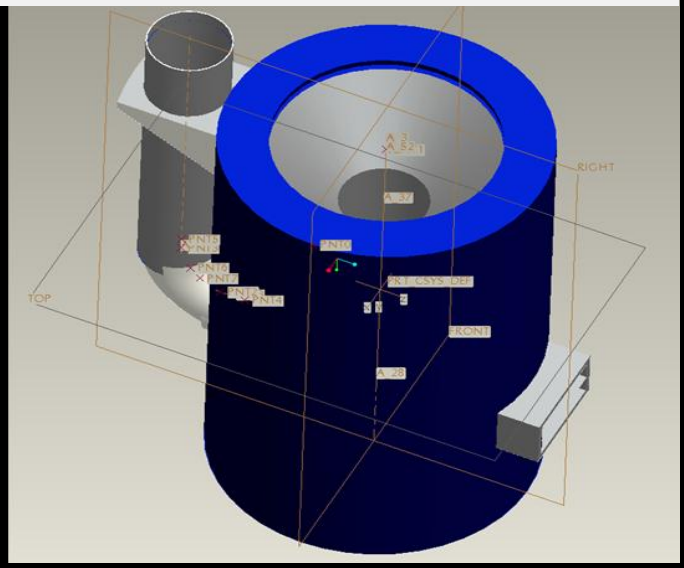
Three simple projects







Create Lasting Change