

# BUILDING TYPES AND MATERIALS

NANCY CHENG - ARCH 484

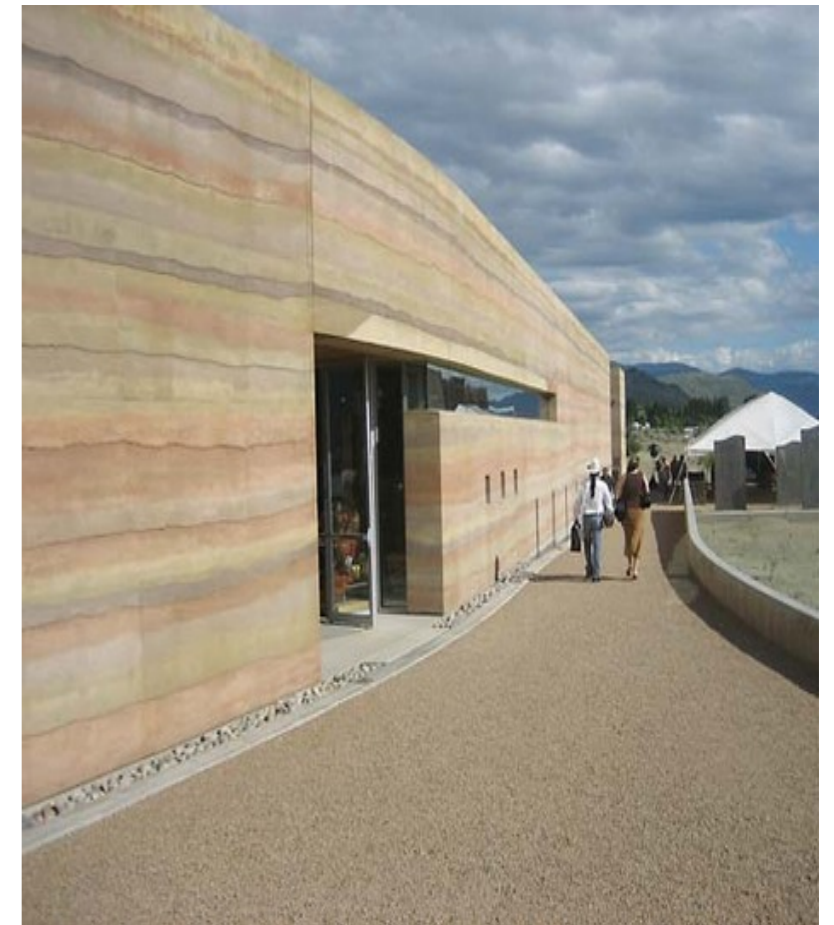
Our group researched alternative building materials that were cost efficient, environmentally safe, and sustainable



Structural Insulated Panels



Fly Ash Concrete



Natural Building Materials

# Structural Insulated Panels

Nancy Cheng - Arch 484

## Overview

Structural Insulated Panels or SIPs are an energy efficient alternative to stick built construction. SIPs are constructed in a factory by sandwiching rigid foam insulation between two OSB panels. They can be used to create structural members such as sub floors, walls and roofs. Unlike in stick built construction, SIPs allow insulation to run continuously throughout the wall and thus creates a very energy efficient space. Energy consumption can be cut by nearly 50% when compared to traditional structures.

## SIP Construction and Co-Housing



Wasatch Commons-Co-housing Utah

## Structural Insulated Panels:

- Are one of the most environmentally responsible building materials available
- Reduce job site waste
- Improve energy efficiency
- Can be used for subfloors, roofs, and walls
- Compatible with other building systems
- Manufactured locally, shipped to site
- Reduce construction time line
- Minimize subcontracting
- Reduce construction and labor costs

# FLY ASH CONCRETE

NANCY CHENG - ARCH 484

## Overview

Flyash is a small, fine, spherical shaped byproduct from the combustion of coal. Flyash is combined with lime and water to produce a compound like that of portland cement, however, it can only be substituted for 15-25% of the portland cement in concrete mixtures. The Flyash affects the plastic properties of concrete by improving workability, reducing water demand, and lowering the heat of hydration. These properties combined increase the strength, reduces permeability, reduces the corrosion of reinforced steel, and increases sulphate resistance. Flyash concrete has the same properties and applications as regular concrete.

## Green Affects of Fly Ash

- +Reuses the waste from burnt coals
- +Allows for the reduction of energy in the production of new products
- +Conservation of materials
- +Reduction of pollution and waste from coal burning plants

## Pros and Cons to Fly Ash

### Pro

- +Cheaper than portland-cement concrete
- +Better quality and performance
- +Requires less time to mix and set

### Con

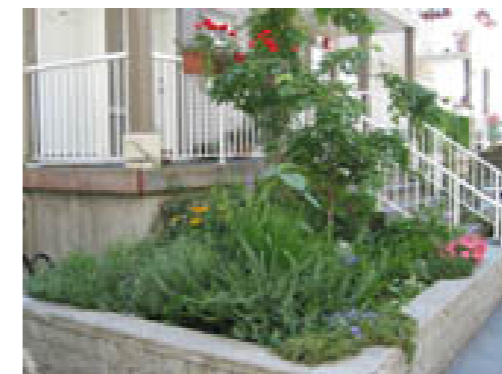
- Requires professional mixing and paving
- Availability
- Can produce an off brown tint



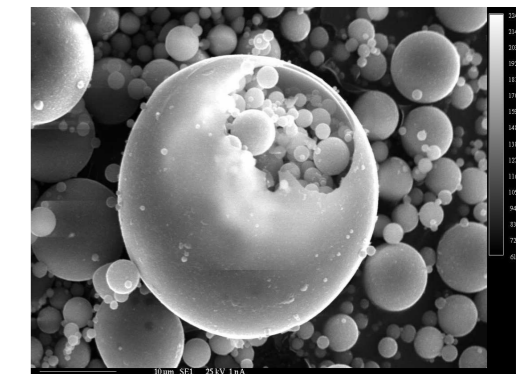
Berkeley Cohousing used a 15% fly ash concrete mixture as their foundation for all of their housing units, as well as their common house



Great Oaks Cohousing (Ann Arbor, MI) used fly ash concrete floors throughout



Fly ash concrete planter box



Fly ash raw spherical form

# NATURAL RESOURCE CONSTRUCTION

NANCY CHENG - ARCH 484

## Overview

Although there are numerous advancements in the technological field of building and construction, there still remain countless age-old processes that when used correctly can be very efficient and sustainable even by today's standards.

Adobe, cob, rammed earth, hay bale, poured earth, earthships and other processes can be very eco-friendly and requires much less technology than other options presented such as SIPs.

Since we are working with a small farming community, some of these simple, hands-on processes might be much more suited for this specific project.

## Examples

There are many examples of the use of all these techniques all across the world. After researching the topic however, I found that the use of a hybrid of straw and clay with wood framing has been very effective in numerous settings including climates with heavy rain and snow.



Straw/Clay Composite with Wood Structure



Rammed Earth Framework

## Pros

- Easy to work with
- Less Technical
- Inexpensive
- Cohousing community can help build
- All natural

## Cons

- Less Efficient
- Hard to pass building codes
- Less Structurally Reliable
- Specific soils needed

# BUILDING MATERIAL CHART

NANCY CHENG - ARCH 484

Scale 1-5 low to high

Material	Cost	Efficiency	Labor Intensive	Response to Climate
Sips	4	4	2	4
Flyash	3	3	4	3
Cob	1	2	4	3
Adobe	2	2	3	3
Strawbale	1	4	2	2
Rammed Earth	2	2	4	3
Earthship	1	3	2	4
Poured Earth	2	2	4	3
Timber	4	3	4	4

# Resource List

Nancy Cheng - Arch 484

- <http://www.sips.org/content/about/>
- <http://www.pbssips.com/>
- <http://www.econ.utah.edu/~ehrbar/coho/>
- <http://www.greenhomebuilding.com/>
- [http://greenerbuildings.com/topics.cfm?topic=bldng\\_mtrls](http://greenerbuildings.com/topics.cfm?topic=bldng_mtrls)
- <http://www.gocoho.org/blog/?m=200610>
- <http://www.flyash.com/flyashconcrete.asp>
- [www.cohousingco.com](http://www.cohousingco.com)
- [http://directory.cohousing.org/us\\_list/?action=view&page=view&record\\_id=3889](http://directory.cohousing.org/us_list/?action=view&page=view&record_id=3889)
- <http://lists.cohousing.org/pipermail/cohousing-l/msg06025.html>
- <http://www.greenbuilder.com/sourcebook/Flyash.html>
- [http://www.concretedecor.net/All\\_Access/601/CD601-Fly\\_Ash.cfm](http://www.concretedecor.net/All_Access/601/CD601-Fly_Ash.cfm)