Bernhard Masterson

- Artist
- Natural builder
- Teacher

www.bernhardmasterson.com

Photo from naturalhomes.org

One half of the world's population, approximately 3 billion people on six continents, lives or works in buildings constructed of earth.

Photo by Ruud Zwart via Wikimedia.

Photo Christian Science Monitor

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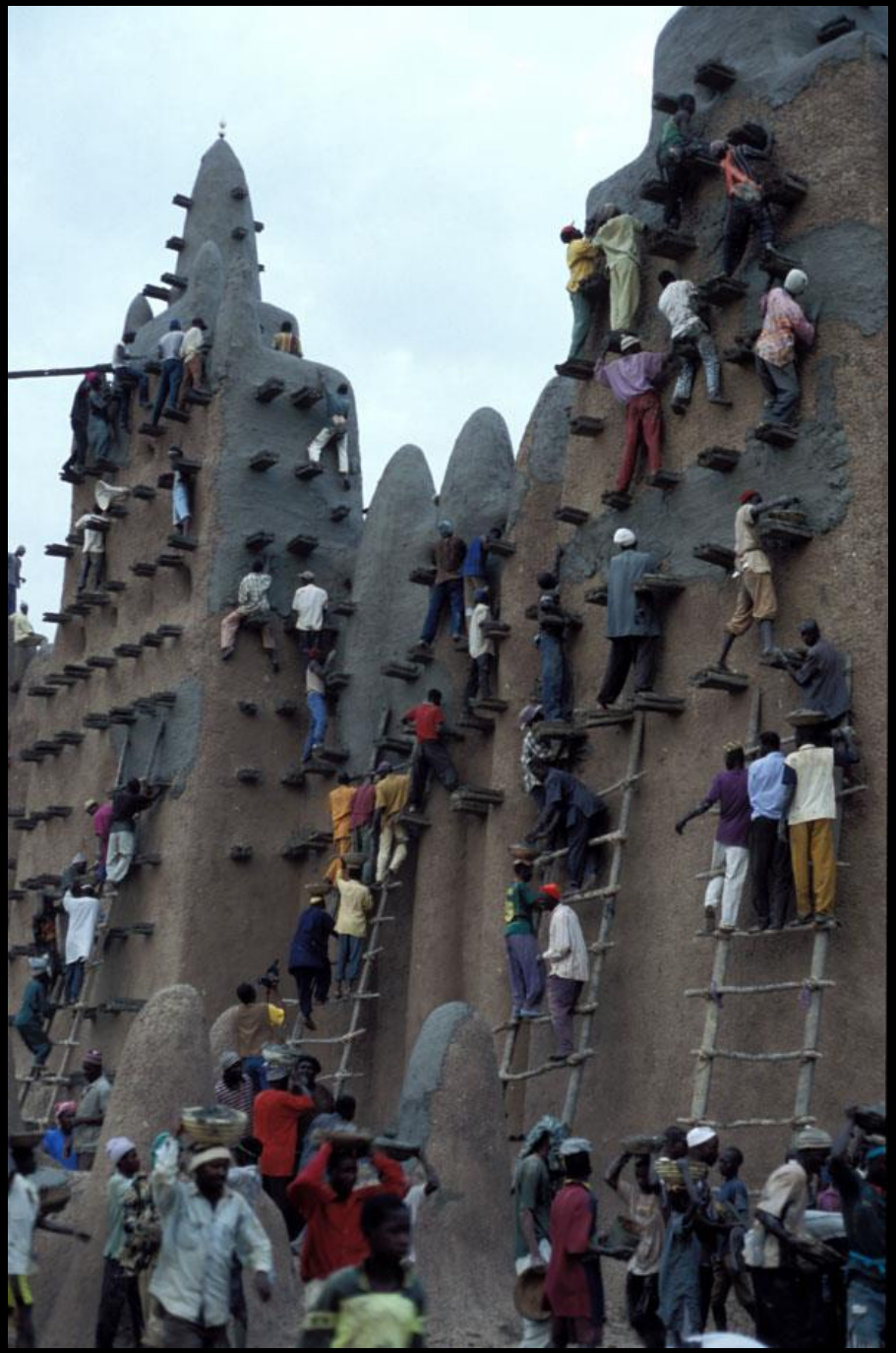
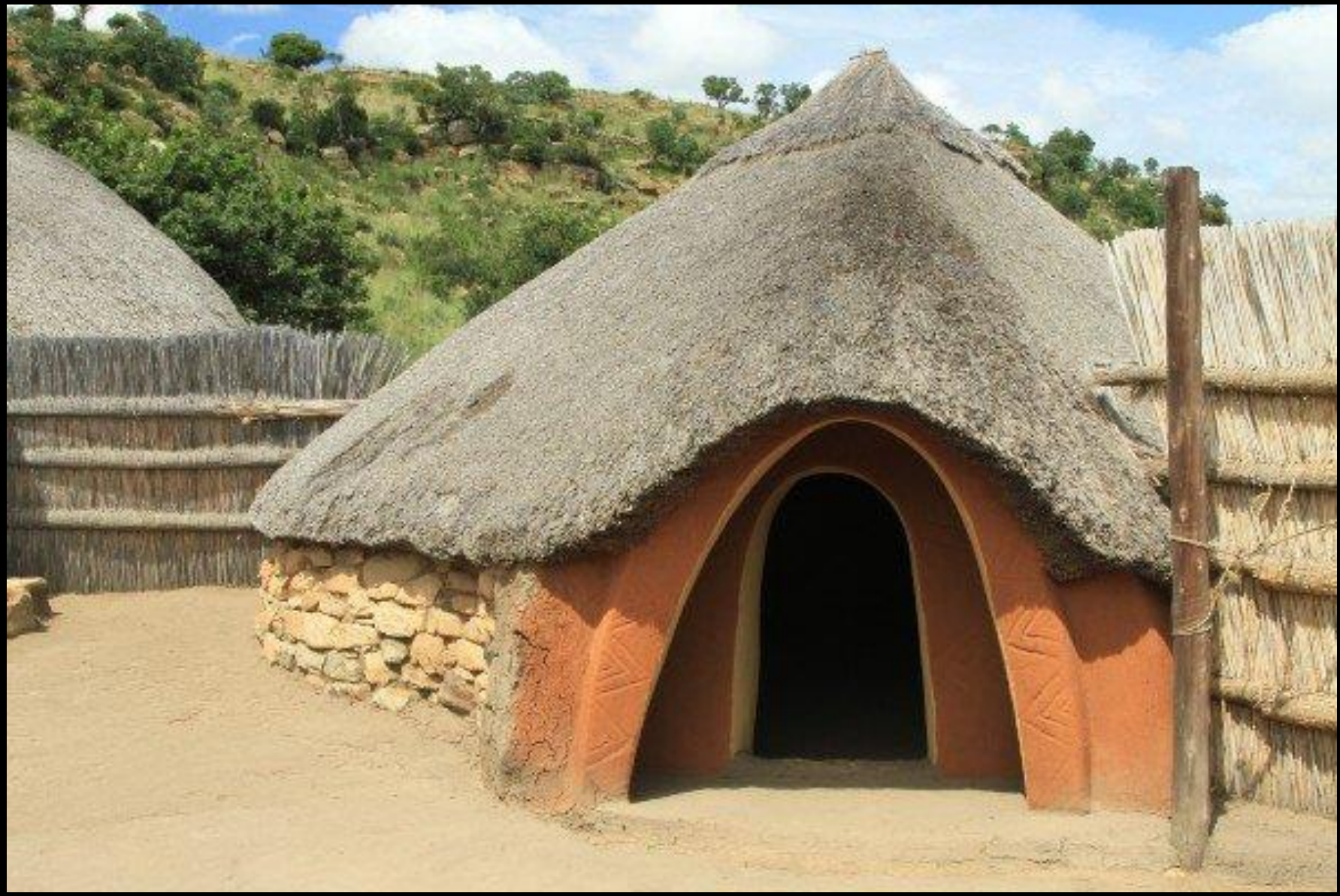


Photo Trevor Marshland
Smithsonian.com



Basotho, South Africa

Fujian Tuluo

Photo by Steffen A. Bass www.pbase.com/sabass1/taos_pueblo

What is natural building?

- Natural materials
- Locally sourced
- Minimally processed
- Sustainably harvested
- Non-toxic
- Design informed by nature

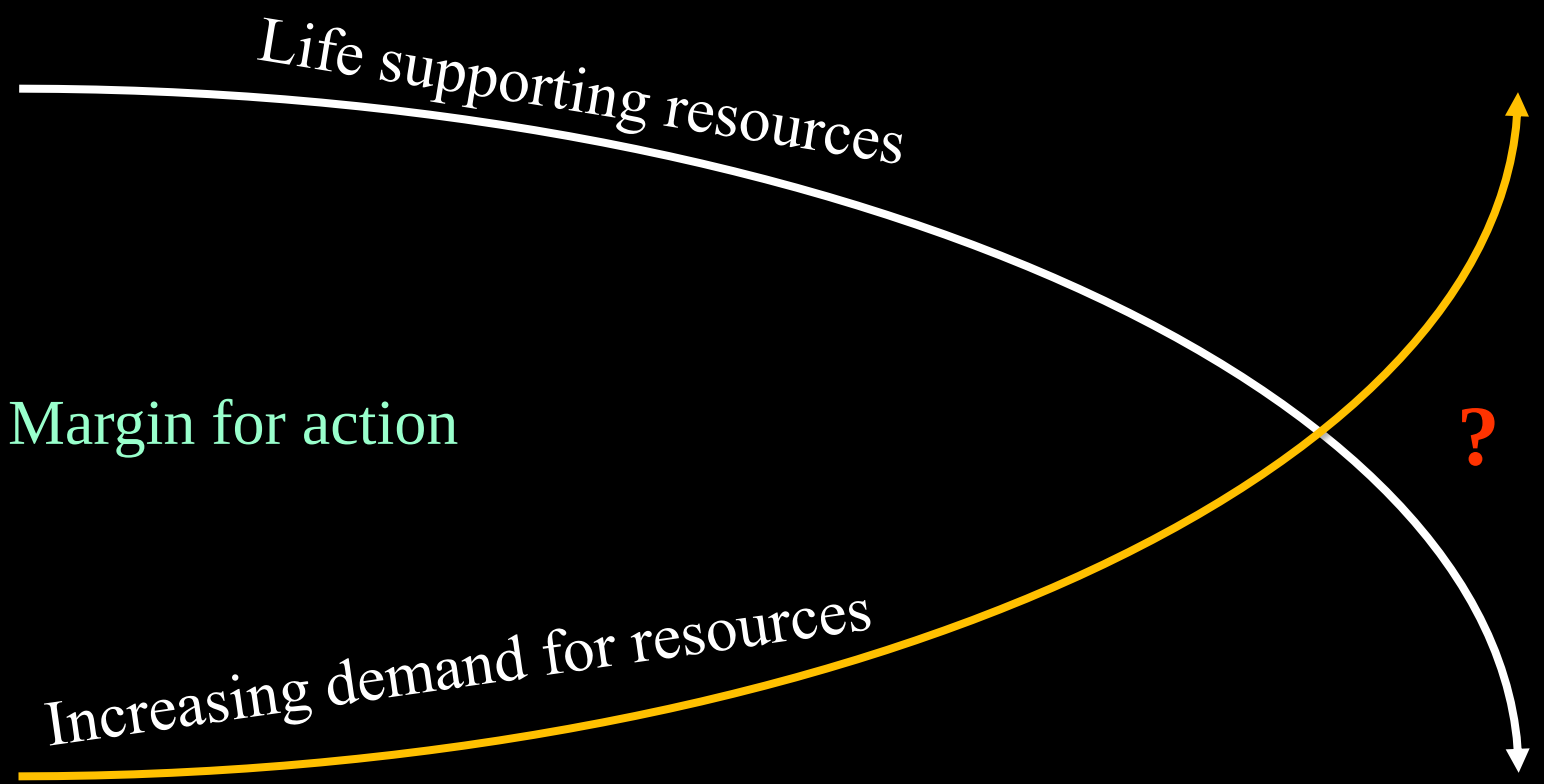
What are the materials?

- Clay
- Sand
- Stone
- Lime
- Straw/plant fibers
- Horse manure (fiber)
- Wood
- Reclaimed & recycled
- Starch pastes
- Casein, beer, blood
- Plant oils

What are the applications?

- Adobe
- Cob
- Straw-bale
- Slip straw
- Wood chip clay
- Clay & lime plasters
- Earthen floors
- Earthen ovens
- Clay paints
- and more.

What is Sustainable?



Demand = Population x Affluence x Technology

System Conditions of the Natural Step Framework

A scientific and Systems based approach:

1) Concentrations of substances cannot be extracted from the earth's crust faster than they naturally return.

2) No persistent and unnatural compounds are created.

3) The natural environment is not degraded by physical means.

4) People are not subject to conditions that systematically undermine their capacity to meet their needs.

* A leap beyond LEED

Karl Henrik Robèrt www.thenaturalstep.org

Drywall vs. natural lathe and plaster

1) Large mining operations extract calcium sulfate ($CaSO_4 \cdot \frac{1}{2} H_2O$).

2) Calcined - typically in a natural gas kiln

3) The fired product is mixed with water, fiber (typically paper and/or fiberglass), plasticizer, foaming agent, potash as an accelerator, EDTA, starch or other chelate as a retarder, various additives that increase mildew and fire resistance, wax emulsion for lower water absorption.

4) This is then formed by sandwiching a core of wet gypsum between two sheets of heavy paper or fiberglass mats.

5) After setting it is dried in a large drying chamber, typically using natural gas. To dry 1,000 square feet of wallboard, between 1.75-2.49 million BTU is required. 25% to 45% of drywall's cost is for energy.

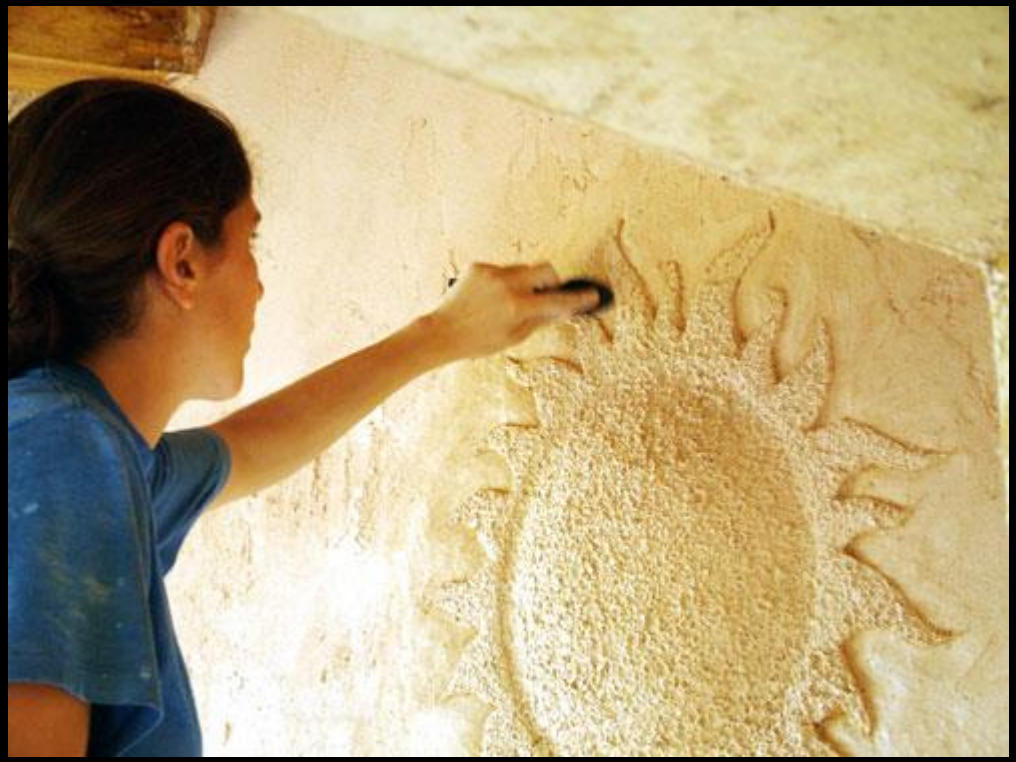
6) Delivery, often from China

7) Hanging, taping, painting

8) Disposal?

Natural plaster wall panels

1) Gather local willow, sticks, bamboo
2) Dig clay soil
3) Pick up sand
4) Gather fiber:
   chopped straw,
   paper pulp,
   manure, hair, etc.
5) Attach lathe to studs
6) Mix plaster
7) Apply

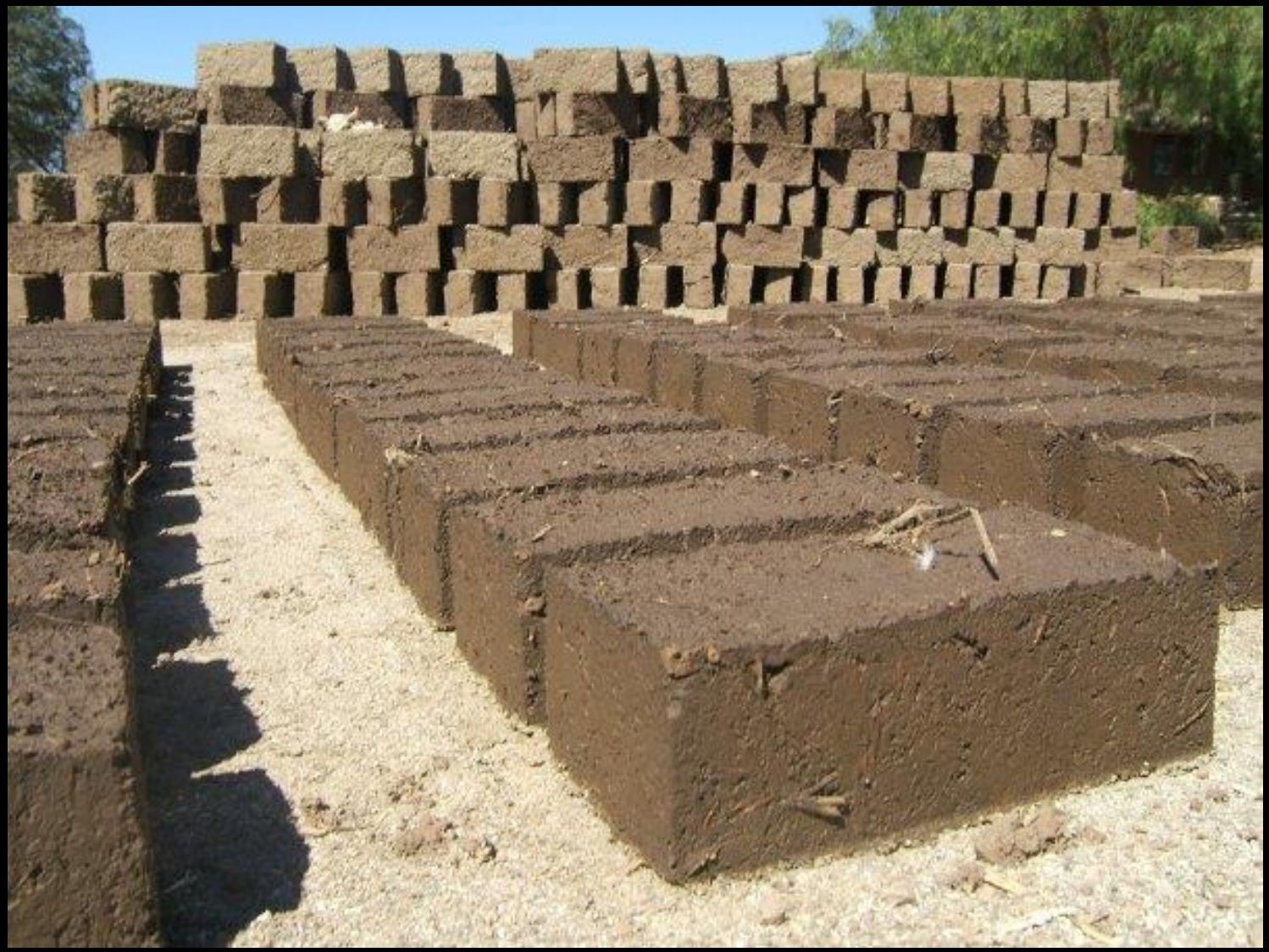


Why natural building?

- Brings people together through, physical labor, creative expression, and it creates culture.
- Sustainable.
- Accessible to all, relatively non-technical.
- Building with earth is in our blood, our genes.
- Inexpensive materials.

Natural building downsides:

- Labor is greater than conventional construction.
- Construction & maintenance methods unfamiliar.




02/11/2011


GAP


McFarland Cascade

Builder Responsibilities

- Ensures good structural design
- Ensures proper detailing of joints, plaster, roof
- Helps with materials lists and estimates
- Estimates number of volunteers/day and skills.
- May lead foundation and roof work parties
- Manages efficient construction during VBC
- Teaches/guides volunteers
- Ensures quality work
- Site safety

Site Responsibilities

- Comprehensive project plan and schedule
- Community involvement and support
- Volunteer recruitment
- Splashy Village Builder page
- Balanced budget
- Preparation as agreed upon with builder
- Representative on site each day
- Site safety

Tips for volunteer based construction projects:

Budget

Assets	Expenses
Cash	Materials
Material donations	Food
Items you can borrow (tools)	Tools
Organizational labor	
Skilled labor	Hired labor/instruction
Enthusiastic labor	Volunteer hours

Tips for volunteer based construction projects:

- Involve a skilled builder to ensure quality, durability, and expedite construction.

- have a clear plan for finishing if project hours are planned to extend beyond VBC, scheduled work-parties, etc.

- Develop a rain plan and if possible build the roof first.

Tips for volunteer based construction projects:

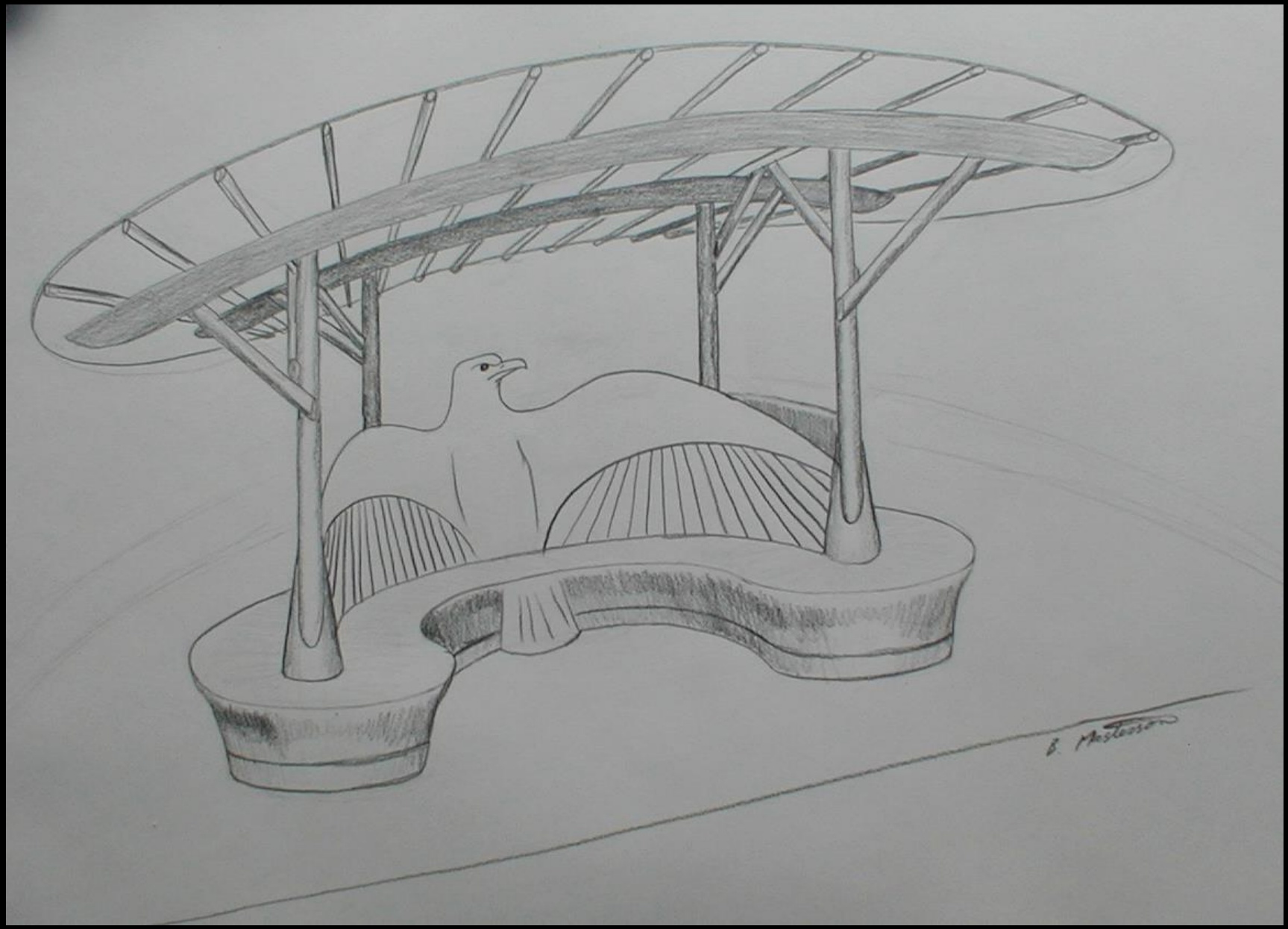
- Post a drawing of the finished project on site.
- Post construction docs at the building site.
- Consider a wider range of aesthetics than curvy sculpted cob. Any architectural style is an option and may win over reluctant parties.

Tips for cobbing in the rain:

- Keep materials dry
  - Store sand and soil on earth and not on asphalt
  - On tarp vs. on soil
  - Tarp in a way to prevent puddles on tarp
- Construct temporary or permanent roof over building site
- Canopy or cover for a mixing site or two
- Set super wet mixes aside or make adobes
- Ensure good air circulation around drying cob

Important Detailing:

- Robust foundation with drainage
- Proper attachment and sealing at connections of dissimilar materials
- Good roof overhangs, drip edges
- Build “horizontal” surfaces to drain, no ponding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Bernhard Masterson
www.bernhardmasterson.com