

# Strawbale vs Cob:

*Choosing the best natural building materials  
to build durably in cold and wet climates*



Presented by:

Sigi Koko

Down to Earth Design

[www.buildnaturally.com](http://www.buildnaturally.com)

*“Meet the present needs without compromising the ability of future generations to meet their own needs”*

--UN definition of “sustainable”



Down to Earth design





# WHAT are natural building materials?

- locally available
- rapidly renewable
- non-toxic
- use technology appropriately
- provide multiple benefits





**Inexpensive  
Materials**

**+**

**Simple  
Construction  
Techniques**

**+**

**Labor  
Intensive**

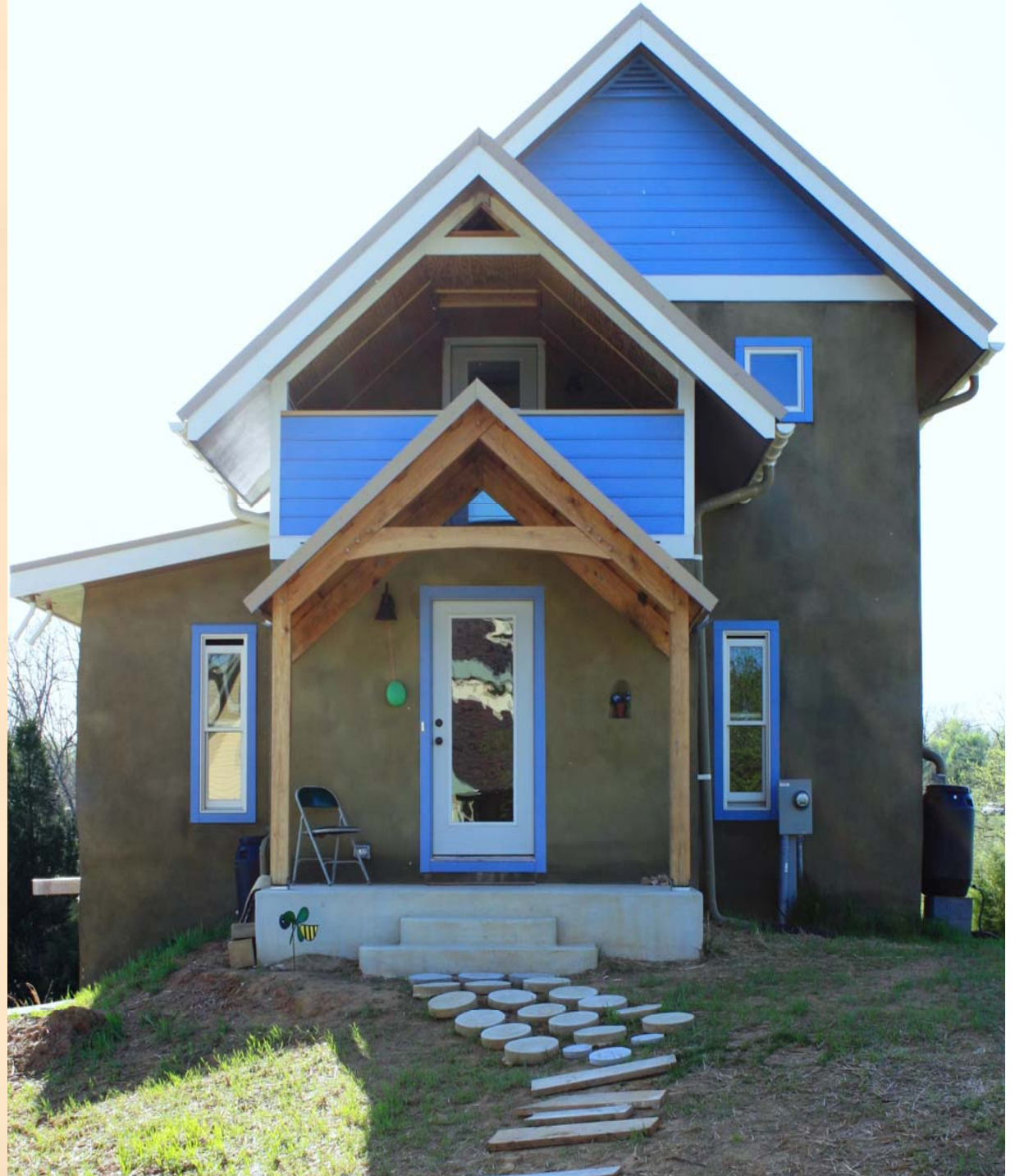
**=**

**Recipe for  
Community  
“Barn-  
Raising”**



# Understand Material Properties:

insulation vs.  
thermal mass

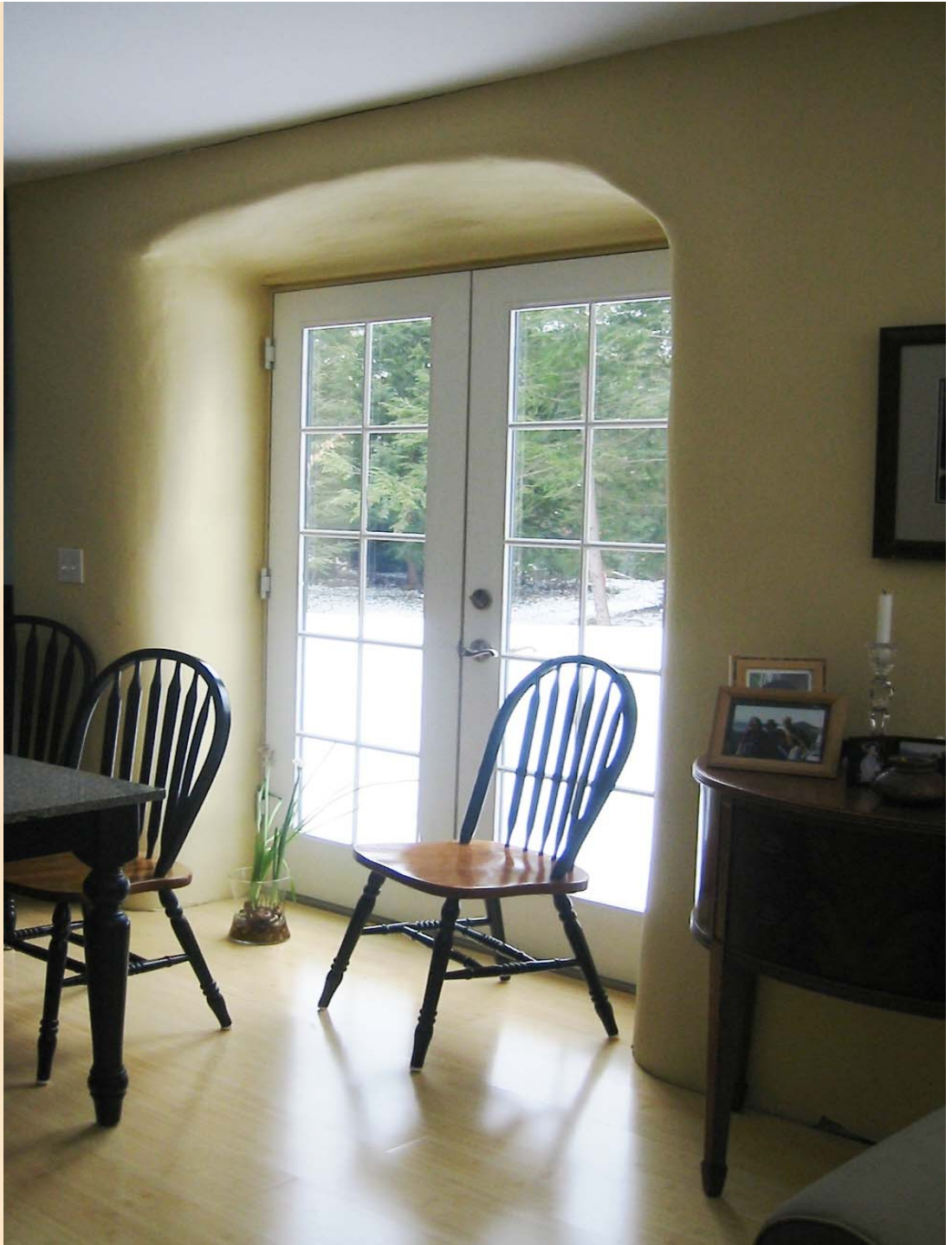


Down to Earth design



**INSULATION...**

**...slows down how  
fast heat flows**



Down to Earth design

# USE INSULATION WHEN...

...you have long  
periods of time  
where your desired  
temperature inside  
differs significantly  
from the  
temperature outside



Down to Earth design



**INSULATING  
MATERIALS  
INCLUDE:**

**straw**

**hemp**

**clay-slip straw**

**pumice**

**cotton**

**wool**

**air**



Down to Earth design





# INSULATION VALUES TO SHOOT FOR:

Below a slab = R-10

If slab is heated = R-15

Crawl space floor = R-24

Walls = R-30

Roof envelope = R-48



**Don't forget the  
detailing!**

**Seal air spaces  
to avoid  
leakage.**



Down to Earth design





# **THERMAL MASS IS...**

**...a battery that  
stores heat energy**



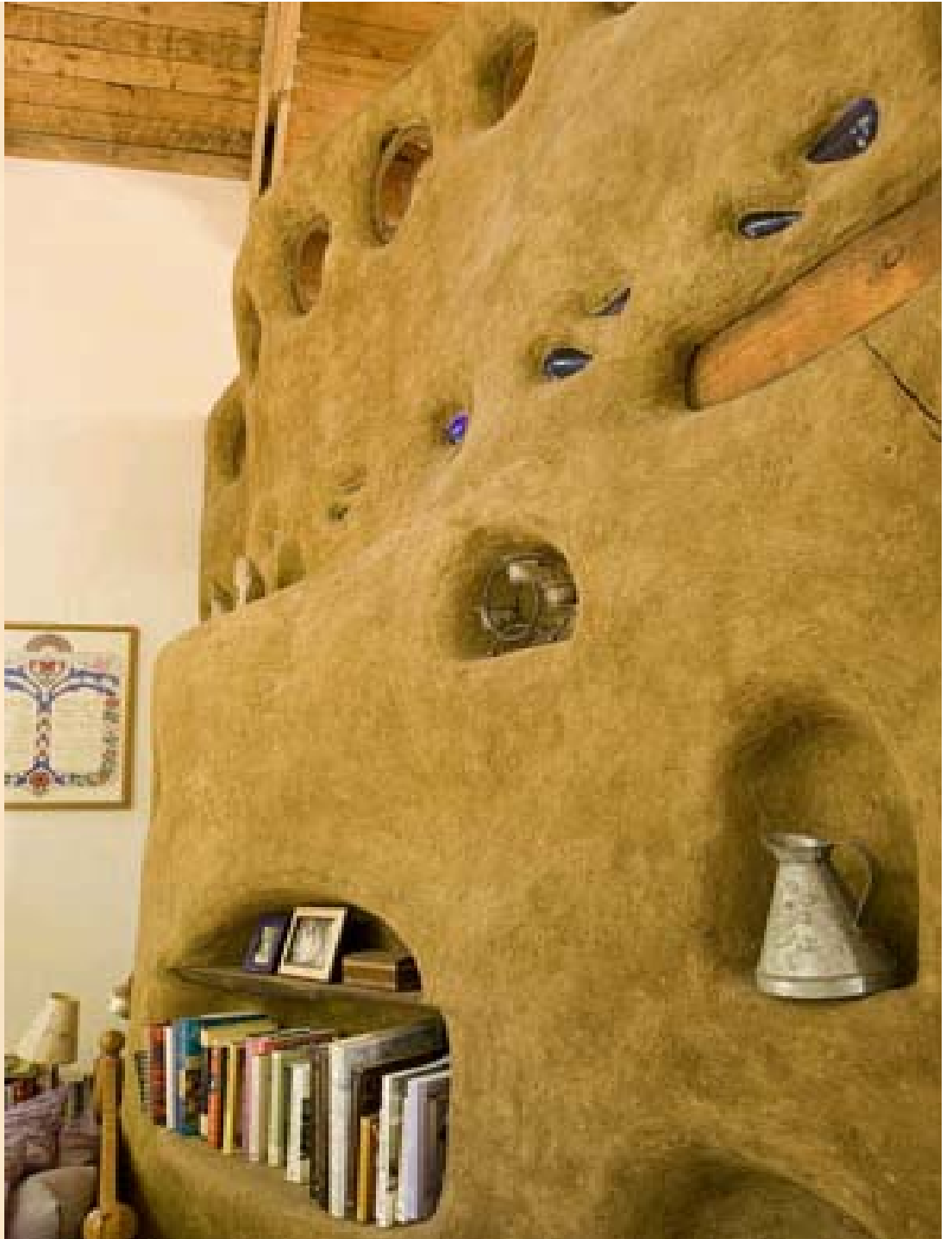
**THERMAL  
MASS** can be  
used to store heat



Down to Earth design



**THERMAL  
MASS** can be  
used to store  
coolness



Down to Earth design

# USE THERMAL MASS WHEN...

...you want to  
moderate rapid  
temperature swings  
**OR**  
to absorb & store  
heat or cool energy



Down to Earth design





# THERMAL MASS MATERIALS INCLUDE:

cob

adobe

clay plaster

lime plaster

rammed earth

earthen floors

stone

water

soil



**BEST BET IN  
OUR MIXED  
CLIMATE:**

**Use insulation  
& thermal mass  
TOGETHER**



Down to Earth design





**Effective use of  
thermal mass &  
insulation are  
essential to  
effective passive  
solar design**



Down to Earth design



**A quick note  
about thermal  
bridging...**

**...the  
performance of  
clay + straw  
mixed together  
depends on the  
amount of clay**



Down to Earth design

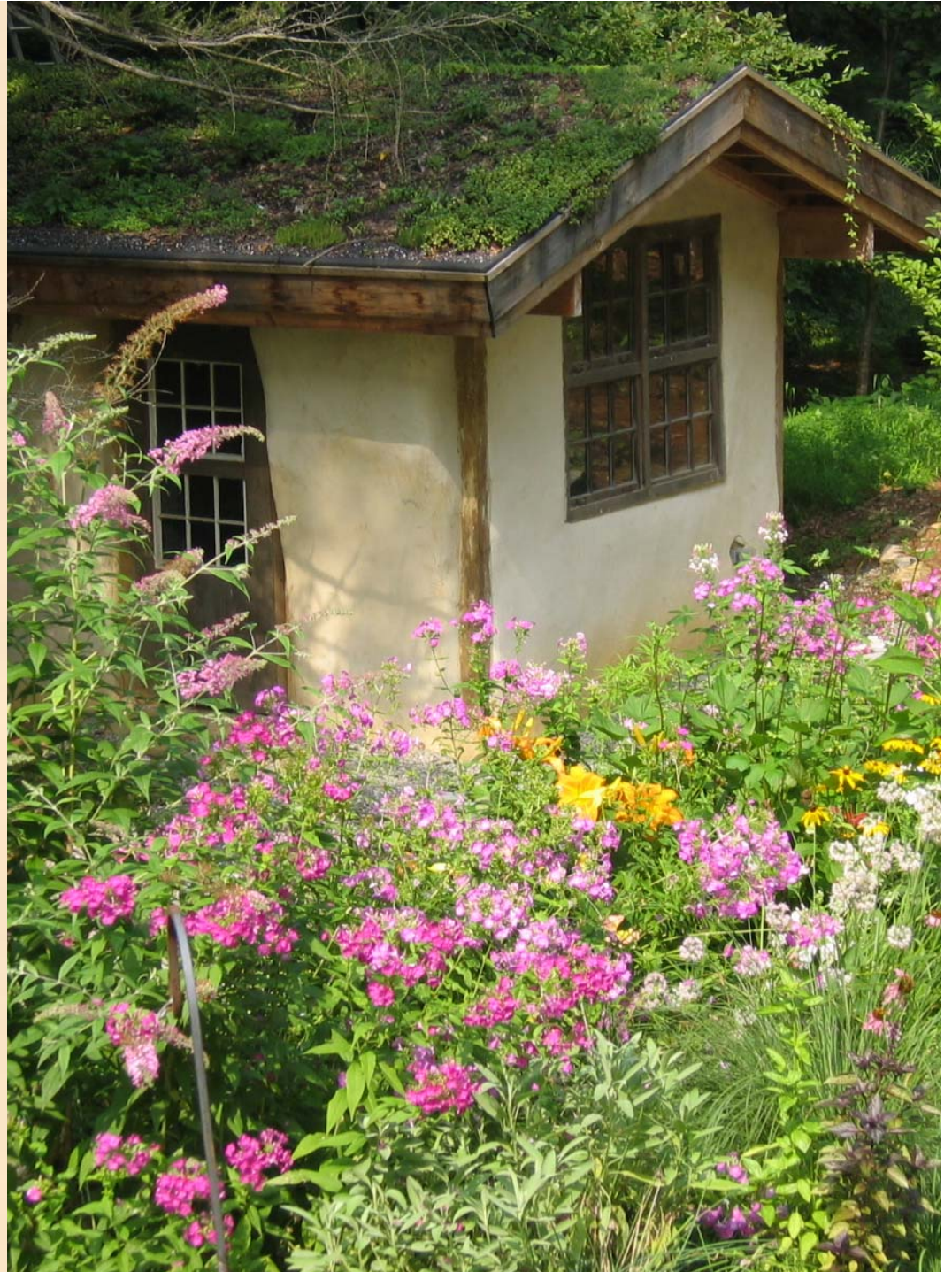




Understand

Water:

moisture vs.  
vapor



Down to Earth design



**IF YOU CAN  
BUILD WITH  
WOOD YOU  
CAN BUILD  
WITH STRAW**



Down to Earth design



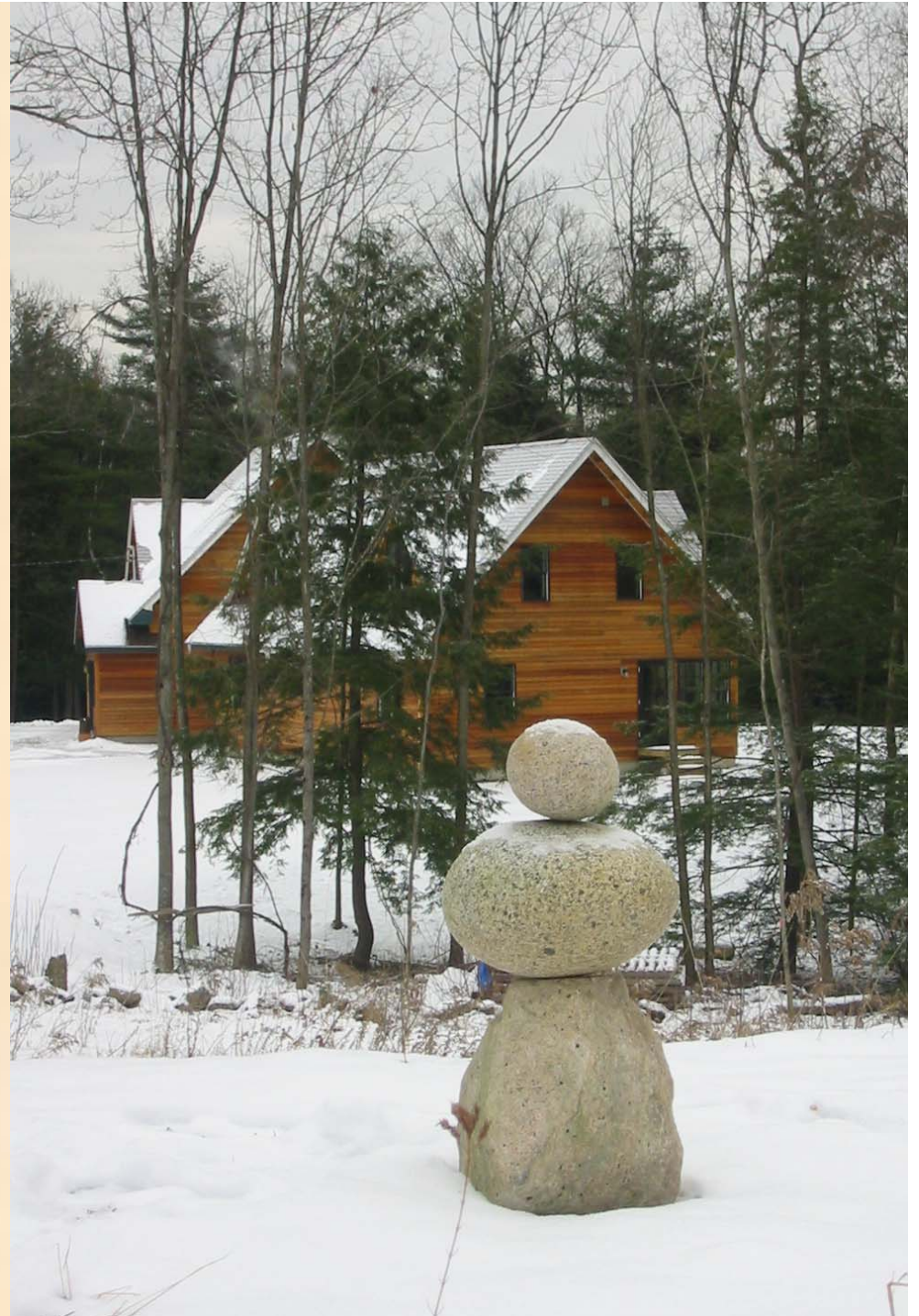
**MOISTURE IS...**

**...liquid water**

---

**VAPOR IS...**

**...water that is  
suspended in the air**



Down to Earth design



**FIRST**  
**MANTRA:**  
  
**KEEP**  
**LIQUID**  
**WATER OUT**



Down to Earth design



**RULE #1:**  
**Protect the**  
**base of the wall**

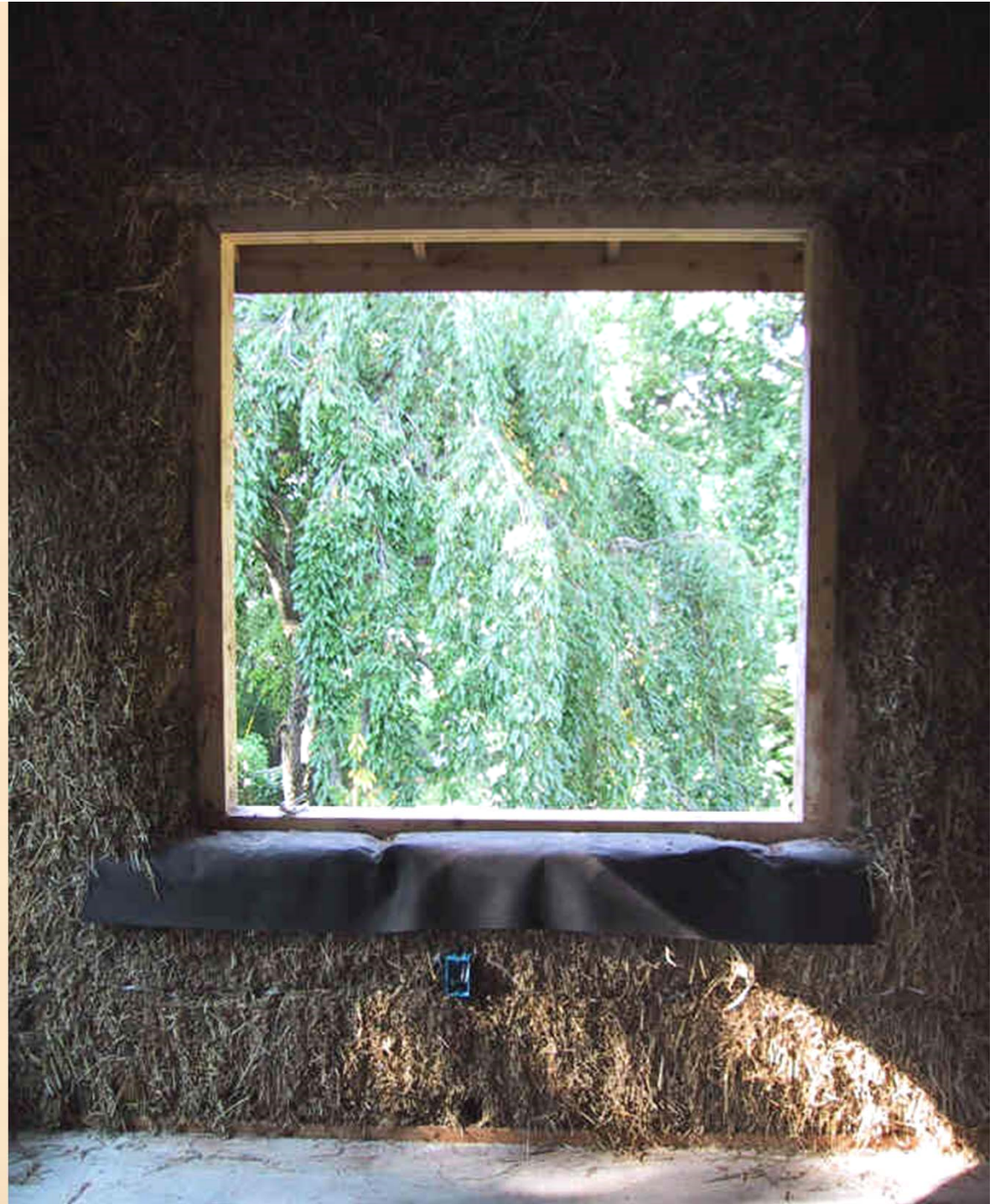


Down to Earth design



## **RULE #2:**

**Make sure all  
water sheds  
well at door &  
window  
openings**



Down to Earth design



## **RULE #3:**

**Provide deep  
roof overhangs**



Down to Earth design



**SECOND**  
**MANTRA:**  
**DON'T TRAP**  
**VAPOR**



Down to Earth design



## **RULE #4:**

**Avoid  
condensation  
points inside  
walls**

**NO METAL**



Down to Earth design

## **RULE #5:**

**Use breathable  
finishes  
(paints,  
plasters,  
sealers)**





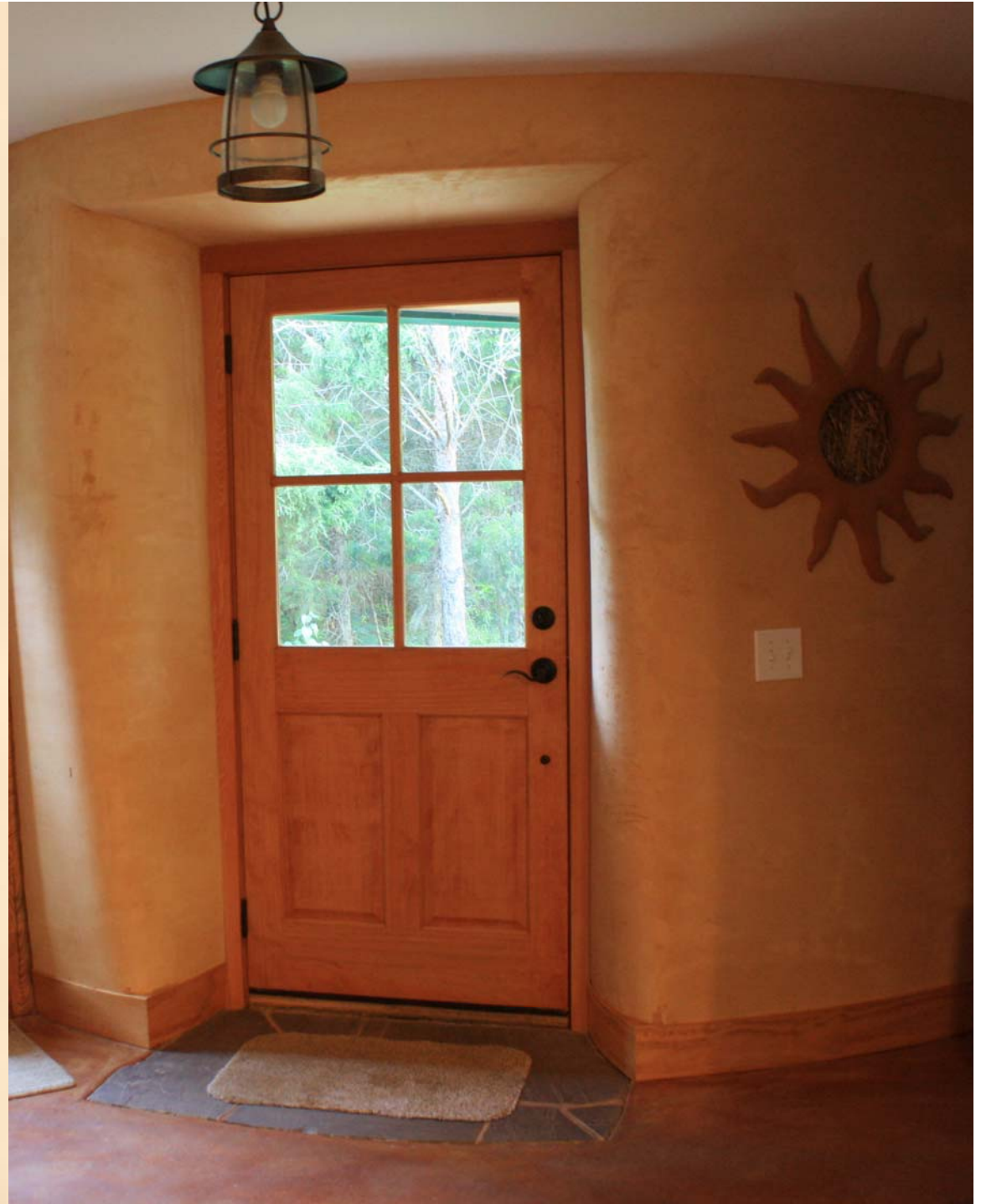
# USE CLAY TO:

## 1. absorb heat

*(from heat source in  
Winter; from air in  
Summer)*

## 2. moderate humidity

## 3. create a breathable finish



# USE STRAW TO:

1. insulate
2. insulate!
3. insulate!!!





“Be the change  
you wish to see  
in the world...”

--M. Gandhi



Down to Earth design