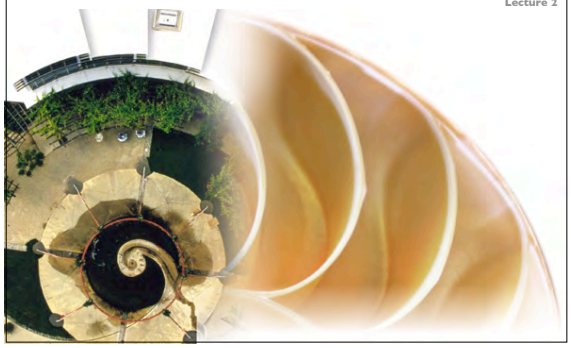
Environmental Adaptation

Place Responsive Design

ARCH 331/431 Spring 2008
Lecture 2



announcements 4/3/08

course website:

http://courses.washington.edu/arch3431/index.shtml

Course materials (readings, assignments, lectures, references and website links) will be posted on this site - soon.

lecture slides:

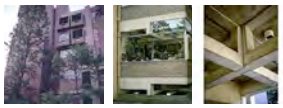
PowerPoint lecture slides will be posted on the course website following lecture. They will be posted as PDF documents in two versions: 6 slides per page (for printing); 2 slides per page for viewing on your computer.

A1: Case Study of Climate Responsive Design

Send your proposed case study proposals to your discussion section instructor for approval.

Factors & Forces that Shape Buildings

and influence the quality of human experience in the built environment

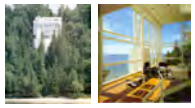


USE

program, size, scale

PLACE

site, context, climate



EXPRESSION

Image, spatial experience, aesthetic preference

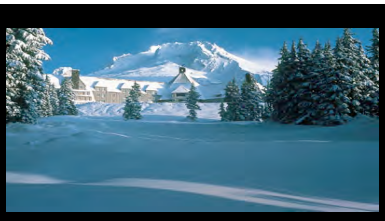
Thermal Building Types

ENVELOPE DOMINATED

- typically small buildings
- low internal heat gains
- space heating determined by heat loss through the envelope.
- relatively high balance point temperature

INTERNAL LOAD DOMINATED

- typically larger buildings
- high internal heat gains
- space cooling requirements determined by heat gains from people, lights and equipment within the building
- relatively low balance point temperature

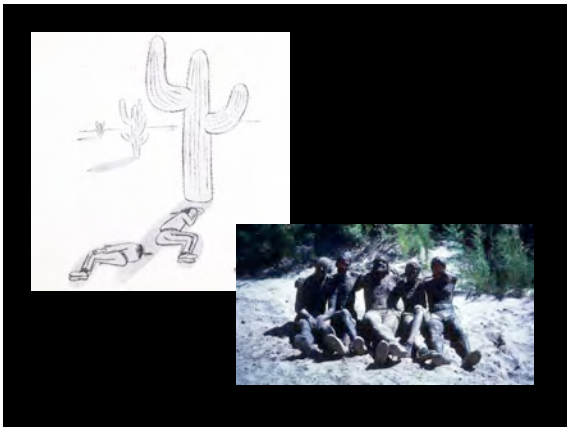


Timberline, Oregon

Tulum, Mexico

Mechanisms for Environmental Adaptation

1. **LOCATION**
   - orientation
   - juxtaposition
   - migration
2. **FORM**
   - shape
   - surface-to-volume ratio *(susceptibility to environmental stress)*
   - envelope & openings
3. **METABOLISM (chemical conversion)**
   - fire
   - evaporation



Greece

Africa

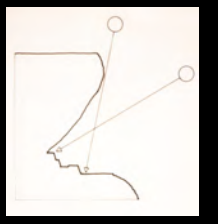
LOCATION

Orientation
Juxtaposition
Migration

Cliff Palace
Mesa Verde, Colorado

LOCATION

Orientation
Juxtaposition
Migration

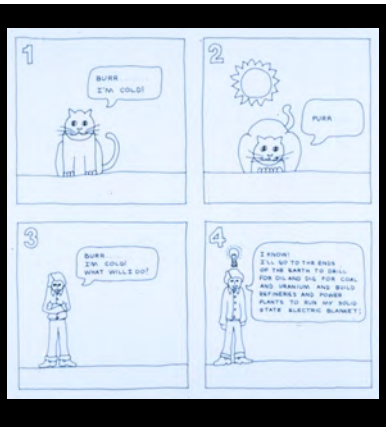


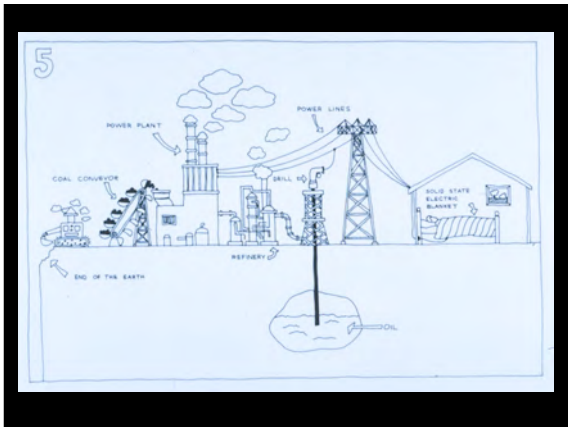
LOCATION (dominant paradigm)

Orientation?
Juxtaposition?
Migration?

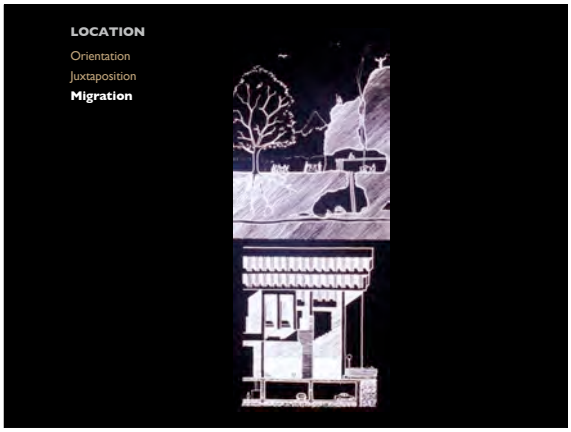
FORM (dominant paradigm)

shape?
surface-to-volume ratio?
envelope & openings?



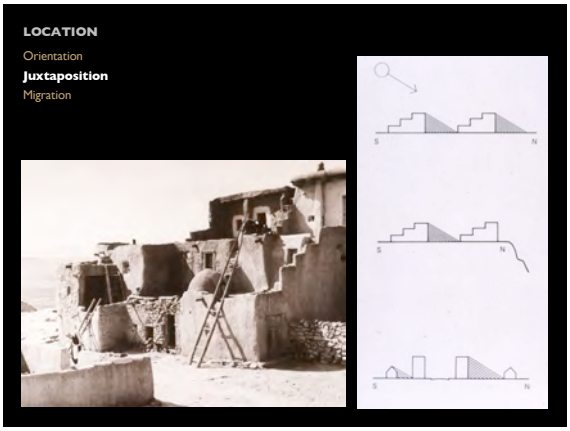

5
POWER PLANT
POWER LINES
COAL CONVEYOR
DRILL HQ
SOLID STATE ELECTRIC BLANKET
REFINERY
END OF THE EARTH
OIL


LOCATION
Orientation
Juxtaposition
Migration
FORM
Shape
surface-to-volume ratio
envelope & openings

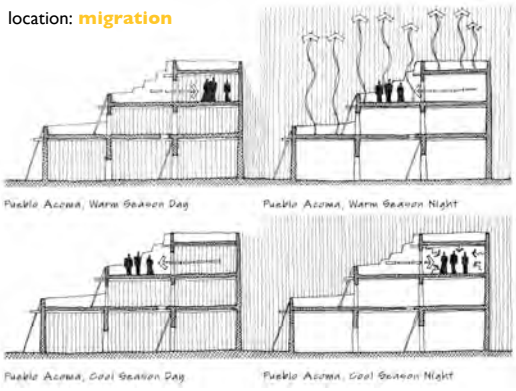

LOCATION
Orientation
Juxtaposition
Migration


Acoma Pueblo, New Mexico

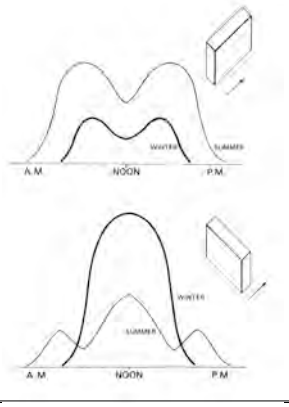

LOCATION
Orientation
Juxtaposition
Migration


LOCATION
Orientation
Juxtaposition
Migration

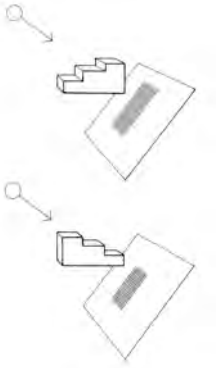
location: **migration**



location: **orientation**

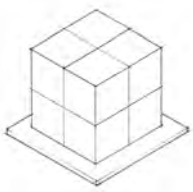


location: **orientation**



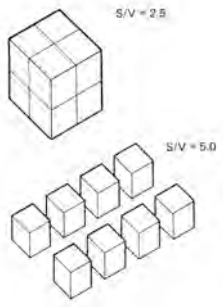
form: **surface-to-volume ratio**

Area = 1 x 1 x 5 = 5
Volume = 1 x 1 x 1 = 1
Surface/Volume = 5/1 = **5**

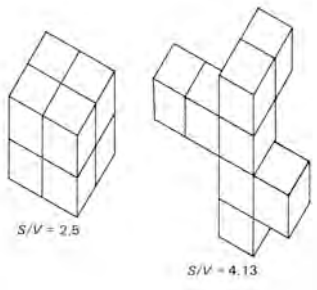


Area = 2 x 2 x 5 = 20
Volume = 2 x 2 x 2 = 8
Surface/Volume = 20/8 = **2.5**

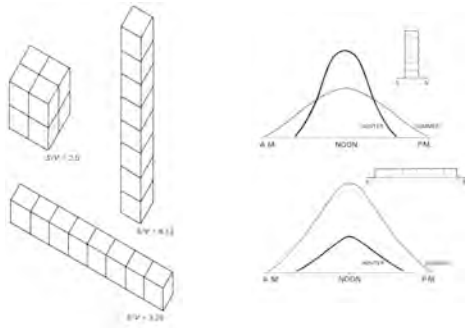
form: **surface-to-volume ratio**



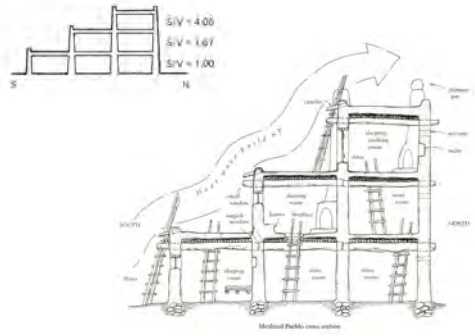
form: **shape**



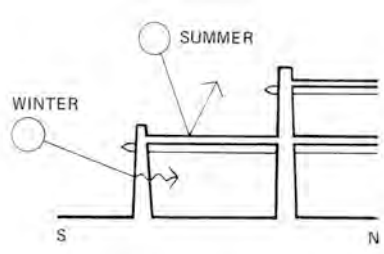
form: **surface-to-volume ratio**



form: **surface-to-volume ratio**



form: **envelope and openings**



OPEN FRAME

Sioux Tipi: Hailey, Idaho

Airport Terminal at Riyadh, Saudi Arabia
SOM Architects

American Heritage Center,
Laramie, Wyoming
Antoine Predock

CLOSED SHELL

La Vereda: Santa Fe, New Mexico
Mazria Architects

Taos Pueblo: Taos, New Mexico

Pueblo Bonito, Chaco Canyon
Northwestern New Mexico

Presbyterian Heart Clinic
Albuquerque, NM
Antoine Predock

The Beach, Albuquerque, NM
Antoine Predock