



**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.

**AI: 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*



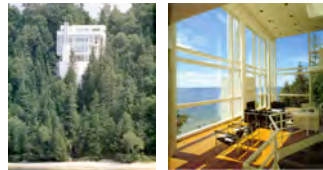
### USE

program, size, scale



### PLACE

site, context, climate



### EXPRESSION

Image, spatial experience, aesthetic preference

## Thermal Building Types

### ENVELOPE DOMINATED

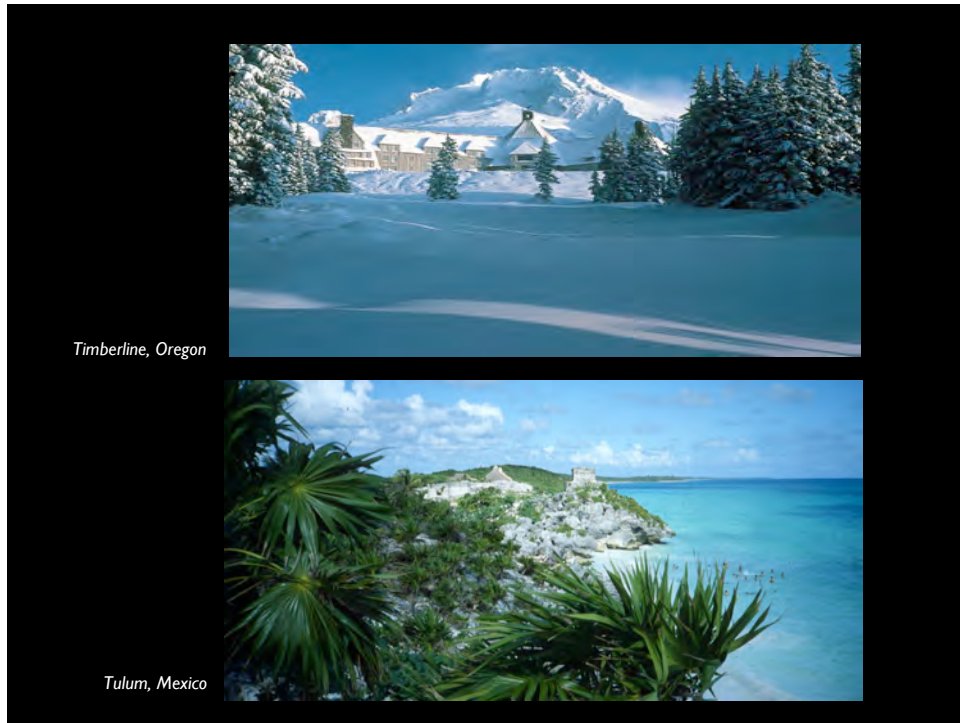
- typically small buildings
- low internal heat gains
- space heating determined by heat loss through the envelope.
- relatively high balance point temperature



### 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





## **Mechanisms for Environmental Adaptation**

### **1. LOCATION**

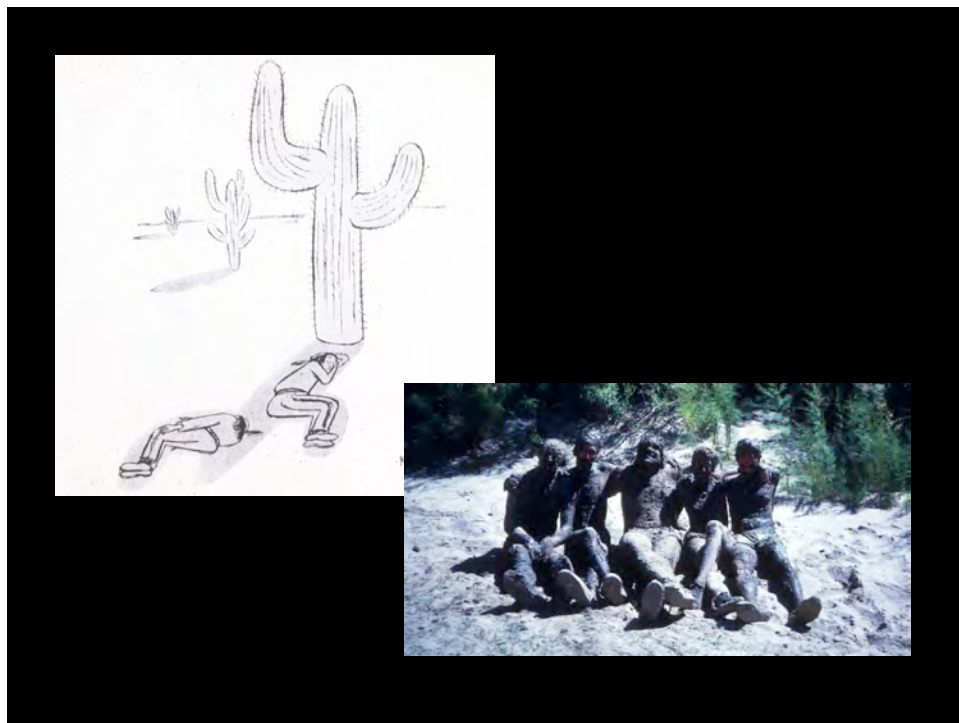
- orientation
- juxtaposition
- migration

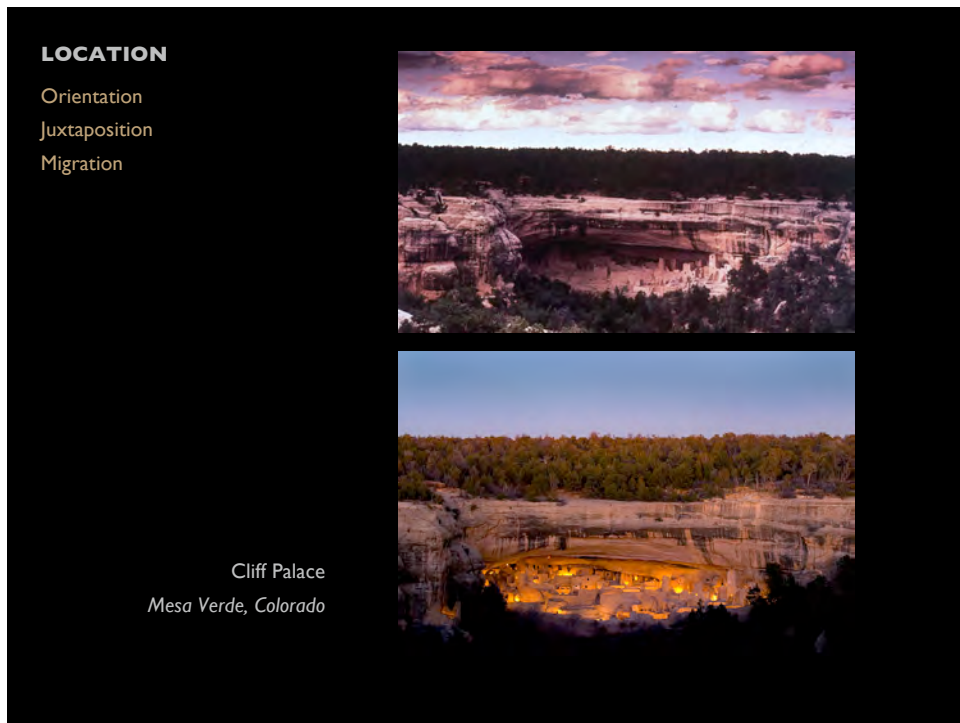
### **2. FORM**

- shape
- surface-to-volume ratio (*susceptibility to environmental stress*)
- envelope & openings

### **3. METABOLISM (chemical conversion)**

- fire
- evaporation





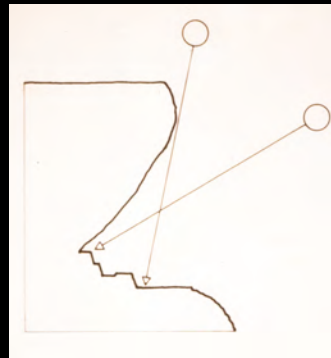


**LOCATION**

**Orientation**


Juxtaposition

Migration



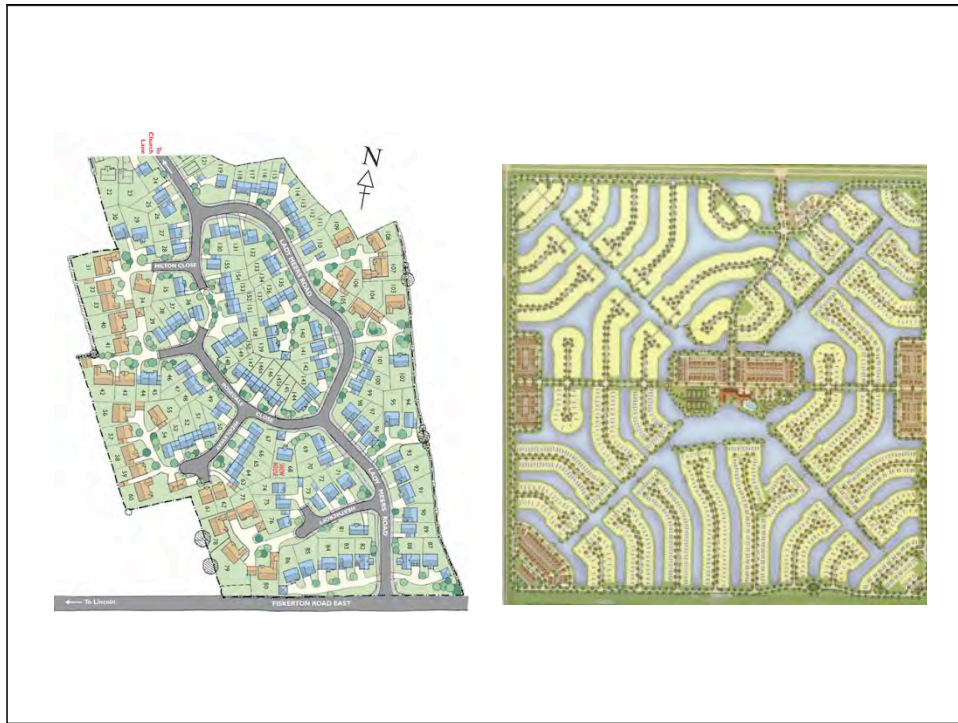
**LOCATION** (dominant paradigm)

Orientation?  
Juxtaposition?  
Migration?



The top section of the slide features a black background with white text. The text asks three questions: 'Orientation?', 'Juxtaposition?', and 'Migration?'. Below the text are three small, square aerial photographs. The first photo on the left shows a complex highway interchange with multiple overpasses and ramps. The middle photo shows a dense urban grid with many small buildings and narrow streets. The third photo on the right shows a suburban street pattern with larger lots, wider roads, and some greenery.





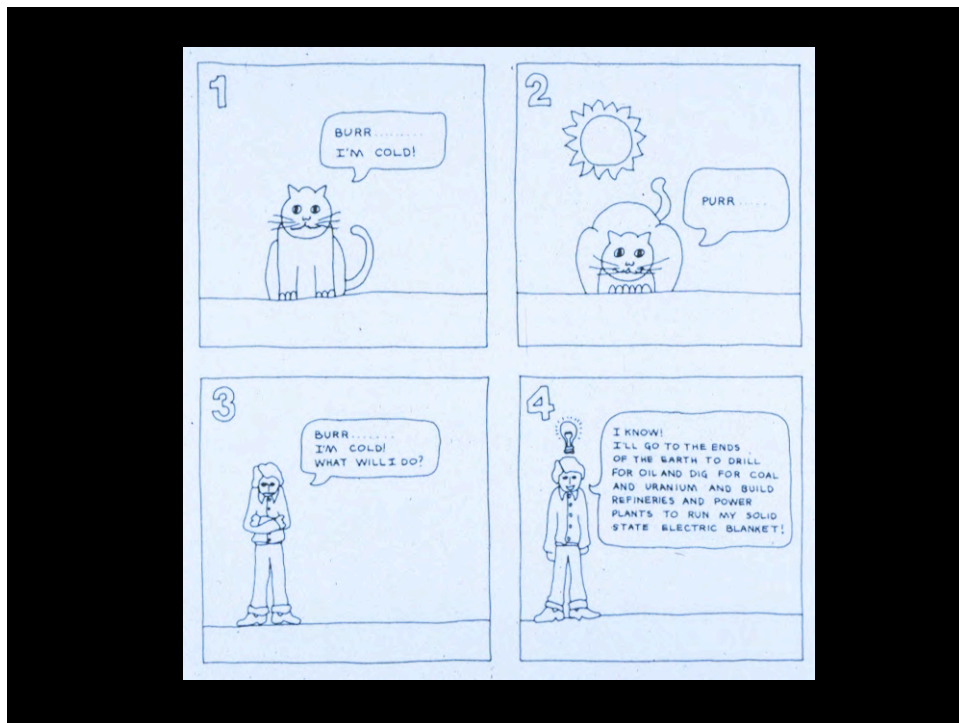
**FORM** (dominant paradigm)

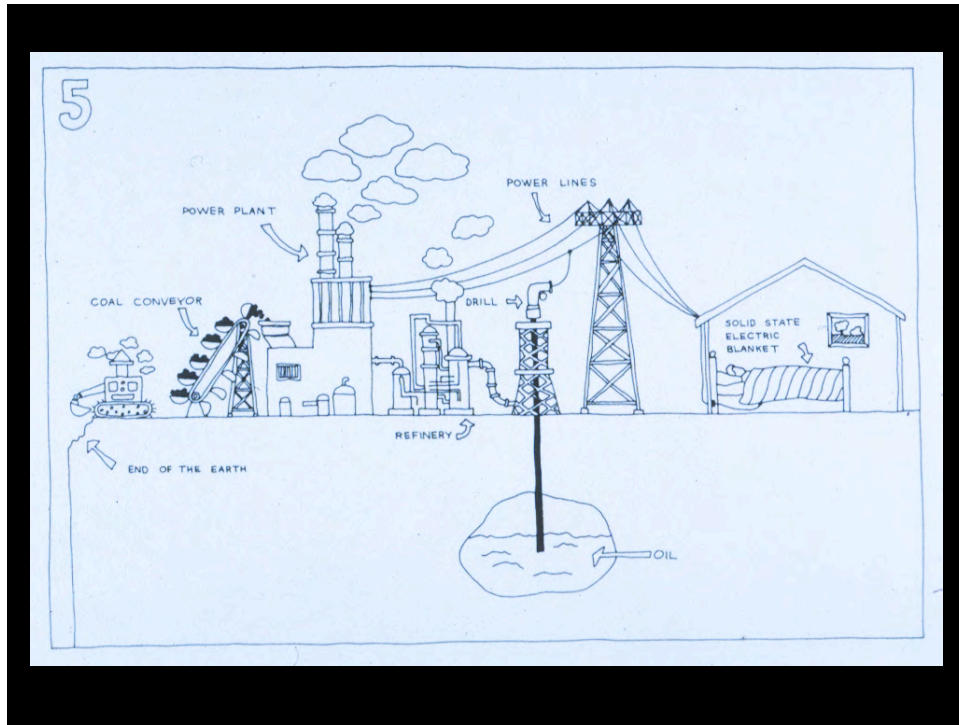
shape?

surface-to-volume ratio?

envelope & openings?







**LOCATION**

Orientation  
Juxtaposition

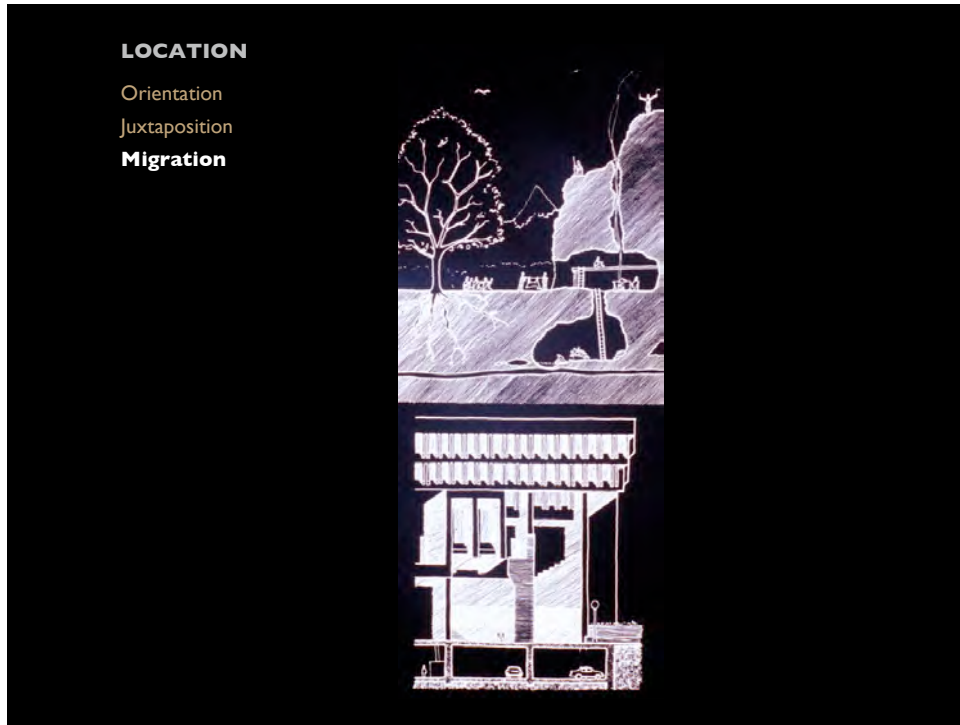
**Migration**

**FORM**

**Shape**

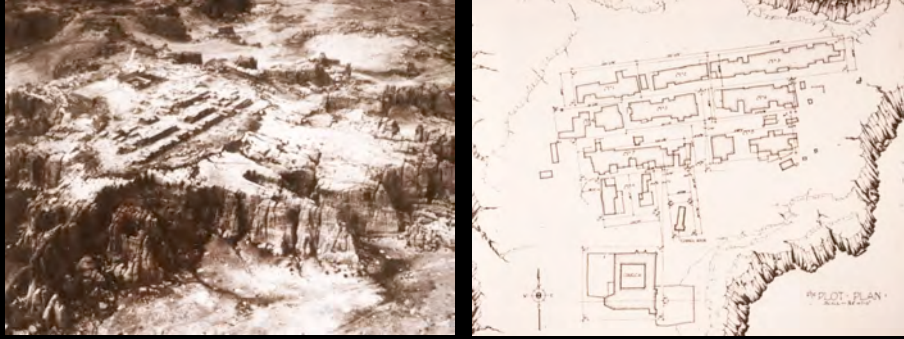
surface-to-volume ratio  
envelope & openings





**LOCATION**

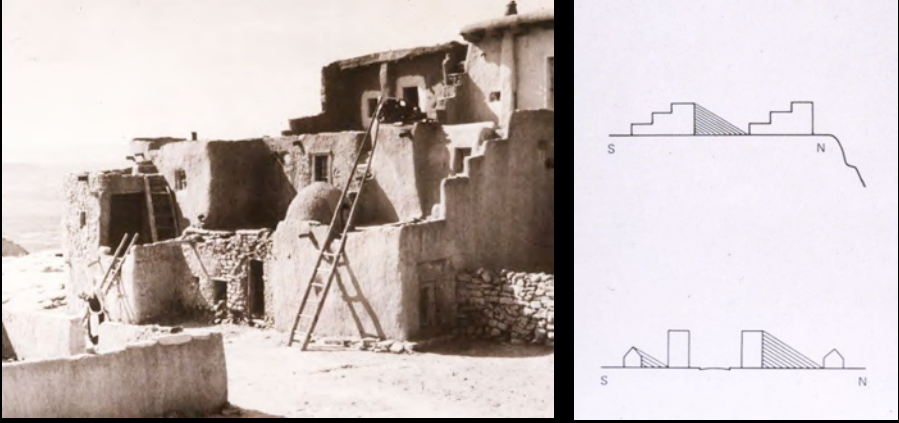
**Orientation**  
Juxtaposition  
Migration



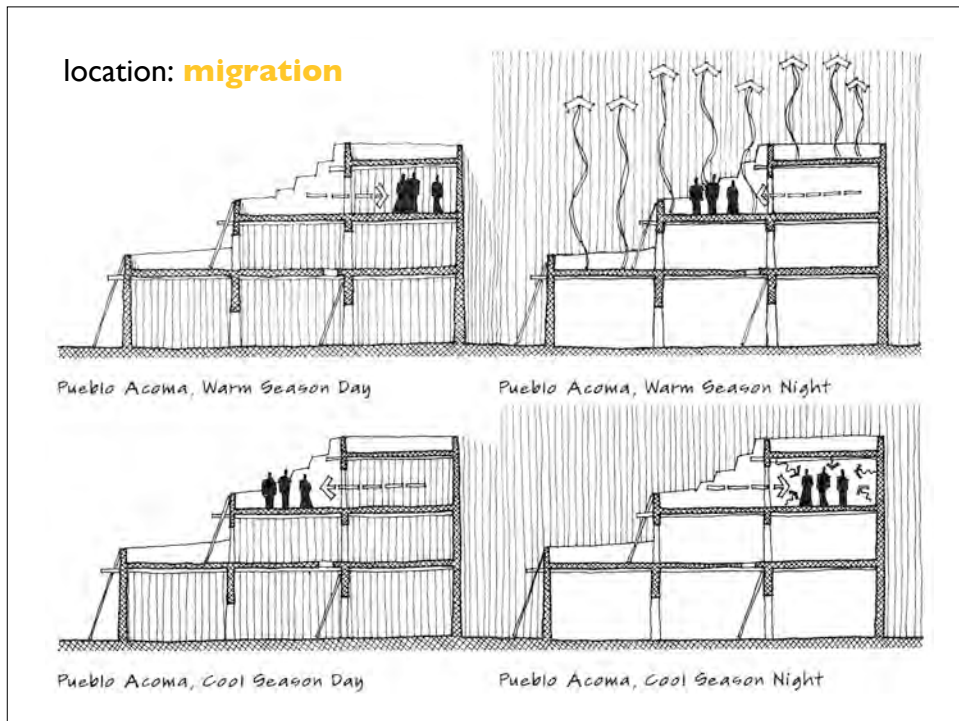
The image contains two side-by-side panels. The left panel is an aerial photograph showing a settlement built on a steep, rocky cliffside. The buildings are clustered together, following the natural contours of the rock. The right panel is a detailed architectural site plan of the same settlement, showing the layout of individual buildings, courtyards, and the overall structure of the cliffside. A north arrow is visible in the lower-left corner of the plan, and the text 'SITE PLAN' is written in the lower-right corner.

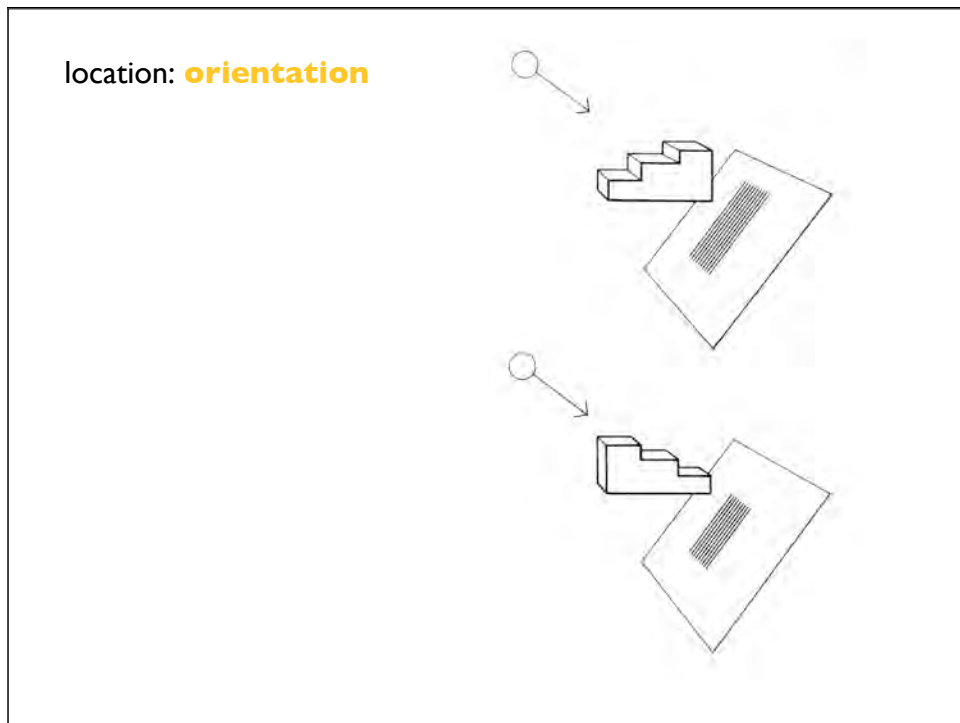
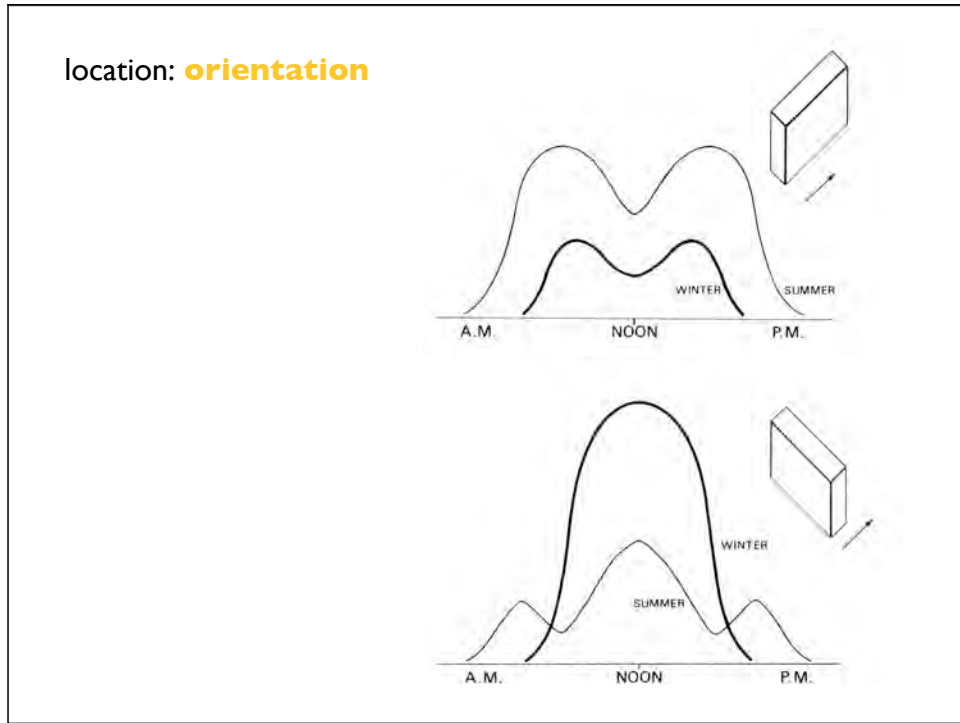
**LOCATION**

Orientation  
**Juxtaposition**  
Migration

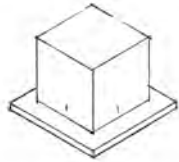


The image contains a photograph on the left and three architectural diagrams on the right. The photograph shows a multi-story building under construction on a cliffside. Scaffolding and ladders are visible, indicating ongoing work. The right side features three cross-section diagrams of buildings. The top diagram shows two rectangular buildings on a level ground line, with a sun symbol and arrow above them. The middle diagram shows a similar arrangement but with a sloped ground line on the right side. The bottom diagram shows a different building arrangement with a sloped ground line on the right side.





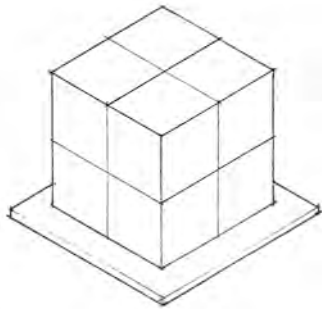
form: **surface-to-volume ratio**



$$\text{Area} = 1 \times 1 \times 5 = 5$$

$$\text{Volume} = 1 \times 1 \times 1 = 1$$

$$\text{Surface/Volume} = 5/1 = \mathbf{5}$$

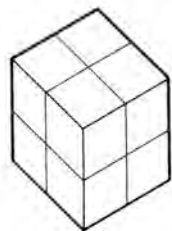


$$\text{Area} = 2 \times 2 \times 5 = 20$$

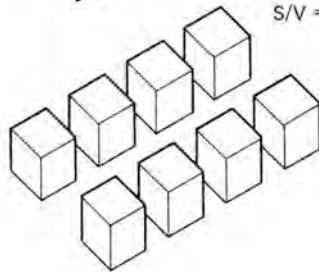
$$\text{Volume} = 2 \times 2 \times 2 = 8$$

$$\text{Surface/Volume} = 20/8 = \mathbf{2.5}$$

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

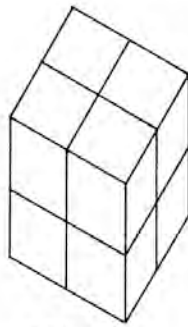


$$S/V = 2.5$$

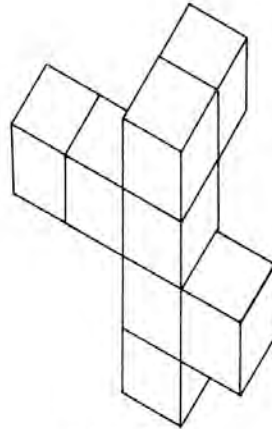


$$S/V = 5.0$$

form: **shape**



$$S/V = 2.5$$



$$S/V = 4.13$$

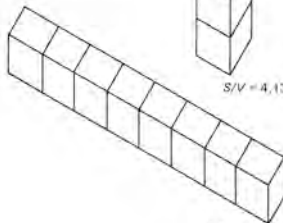
form: **surface-to-volume ratio**



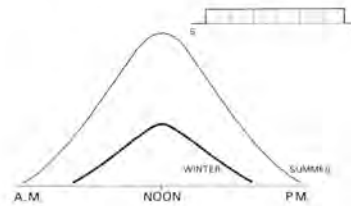
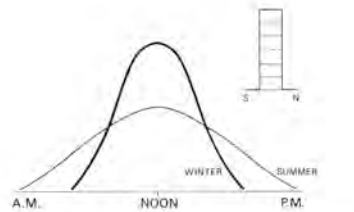
$$S/V = 2.5$$



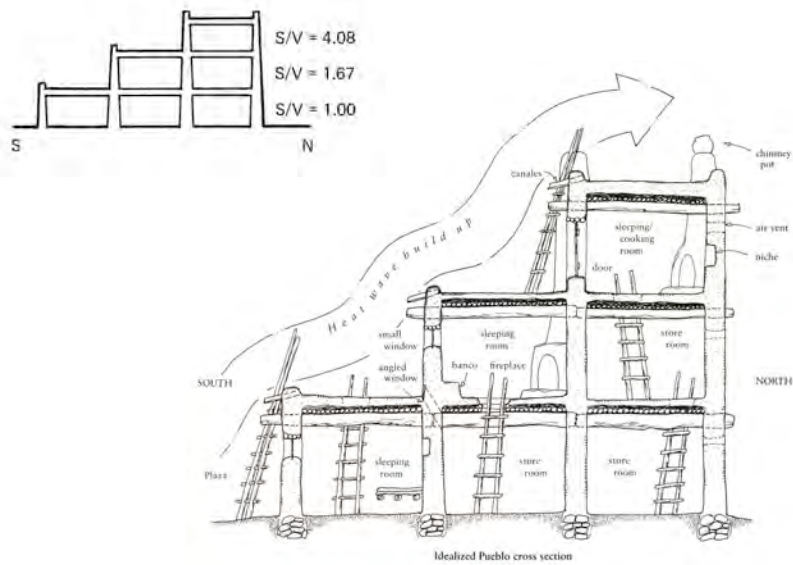
$$S/V = 4.13$$



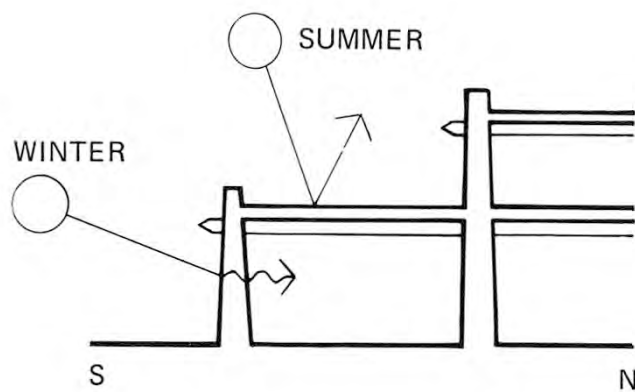
$$S/V = 3.25$$

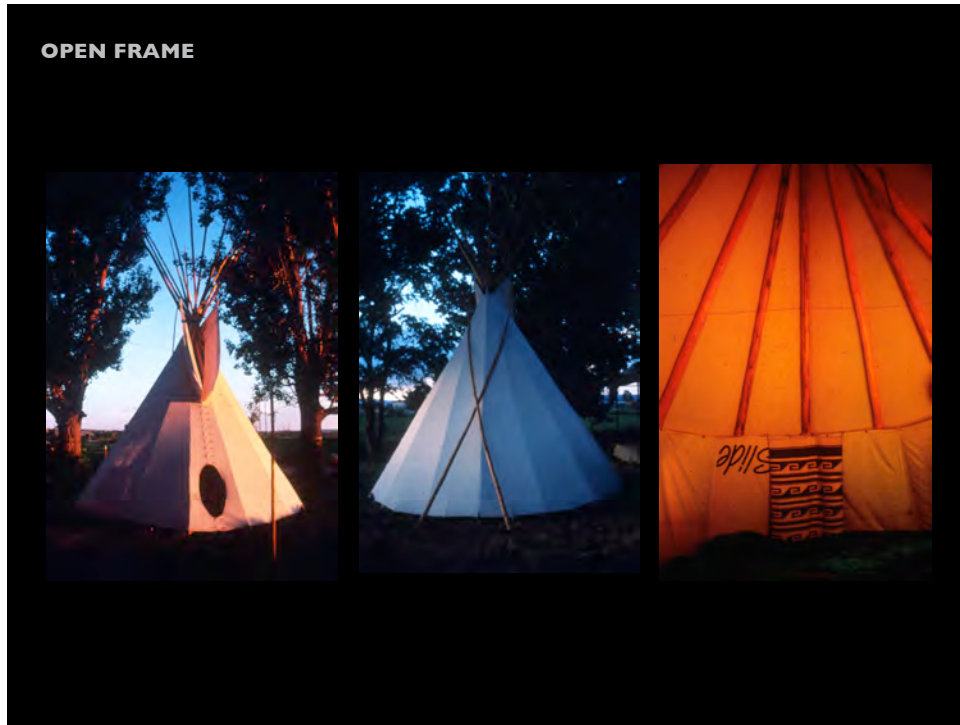


form: **surface-to-volume ratio**

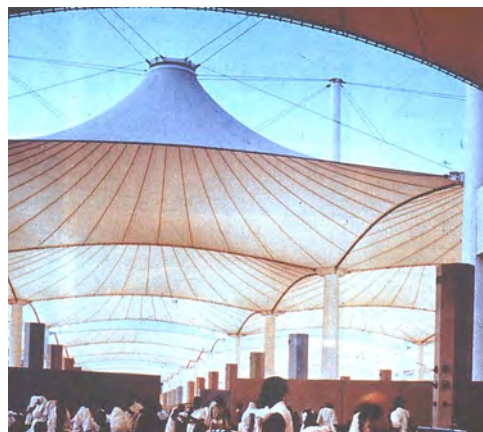


form: **envelope and openings**

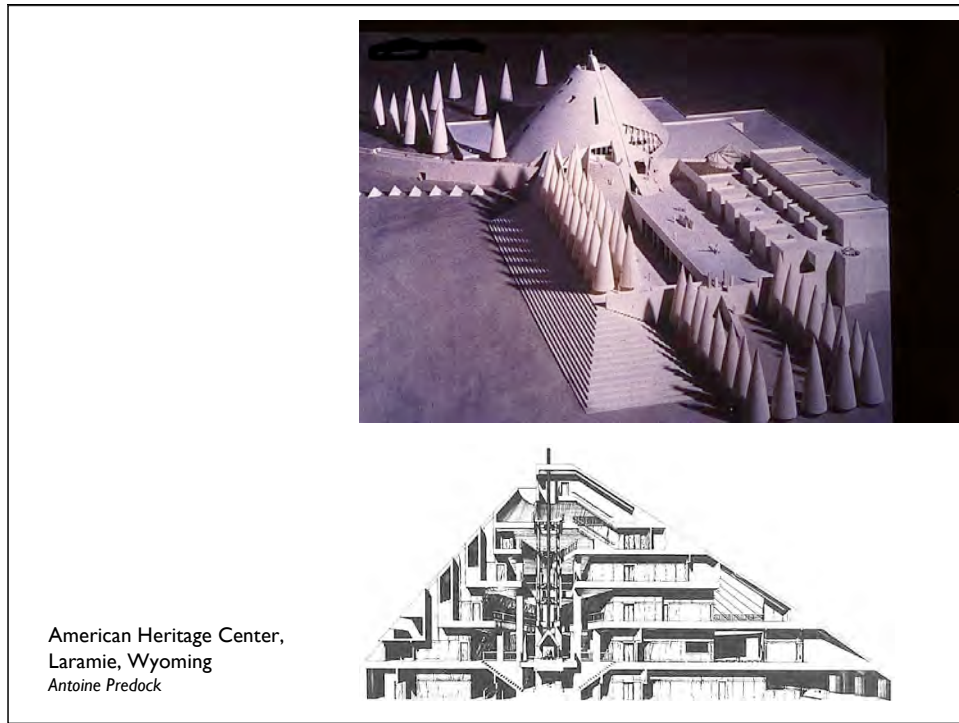




Sioux Tipi: Hailey, Idaho



Airport Terminal at Riyadh, Saudi Arabia  
SOM Architects





La Vereda: Santa Fe, New Mexico  
*Mazria Architects*



Taos Pueblo: Taos, New Mexico

Pueblo Bonito, Chaco Canyon  
Northwestern New Mexico



