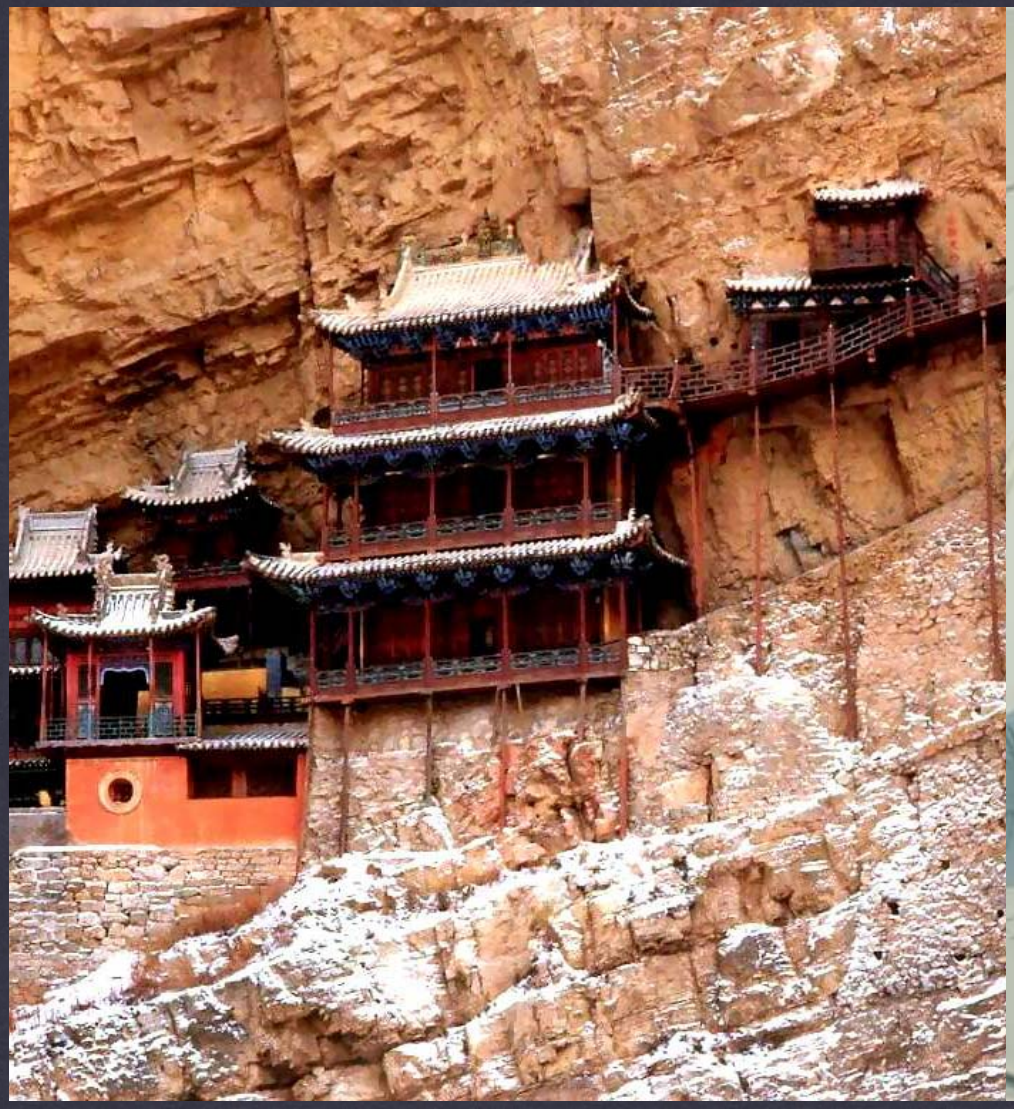
ARCH 1230

BUILDING TECHNOLOGY II

Professor Friedman

FALL 2012

New York City College of Technology
Dept. of Architectural Technology

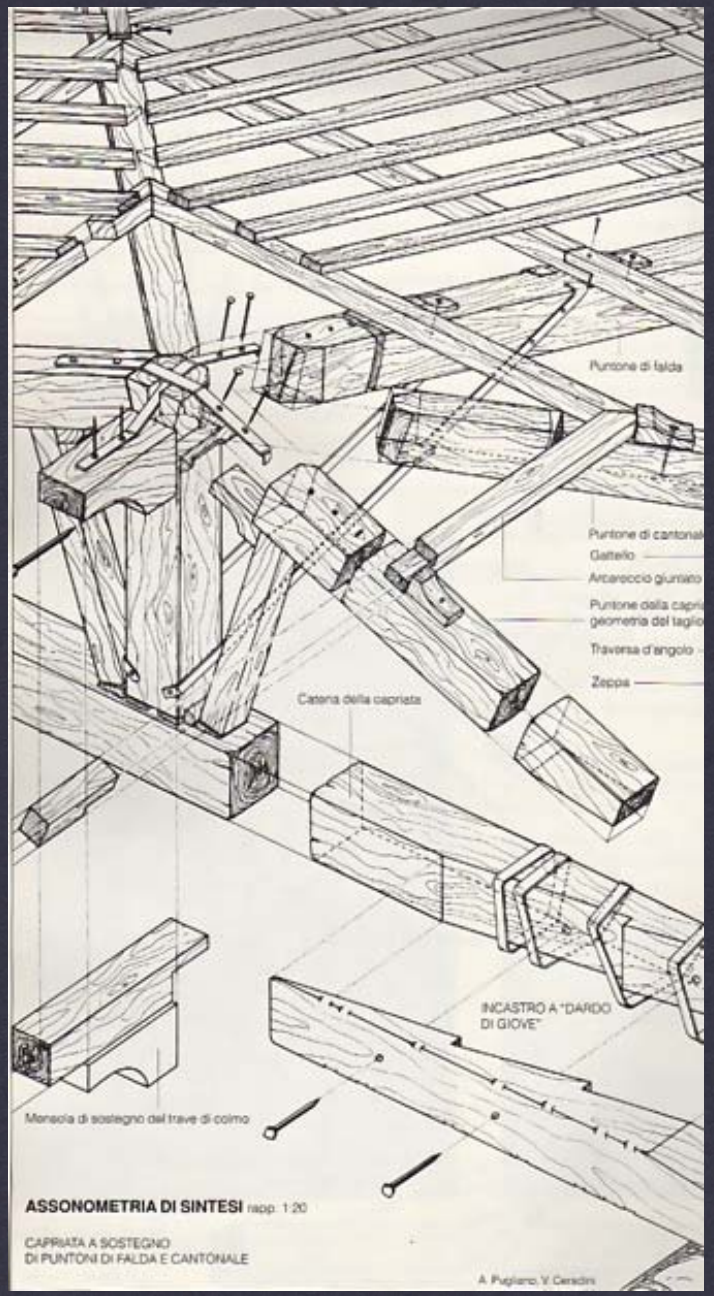


SUBJECT

building technology II

course overview

DATE	PROFESSOR
Fall 2012	Friedman

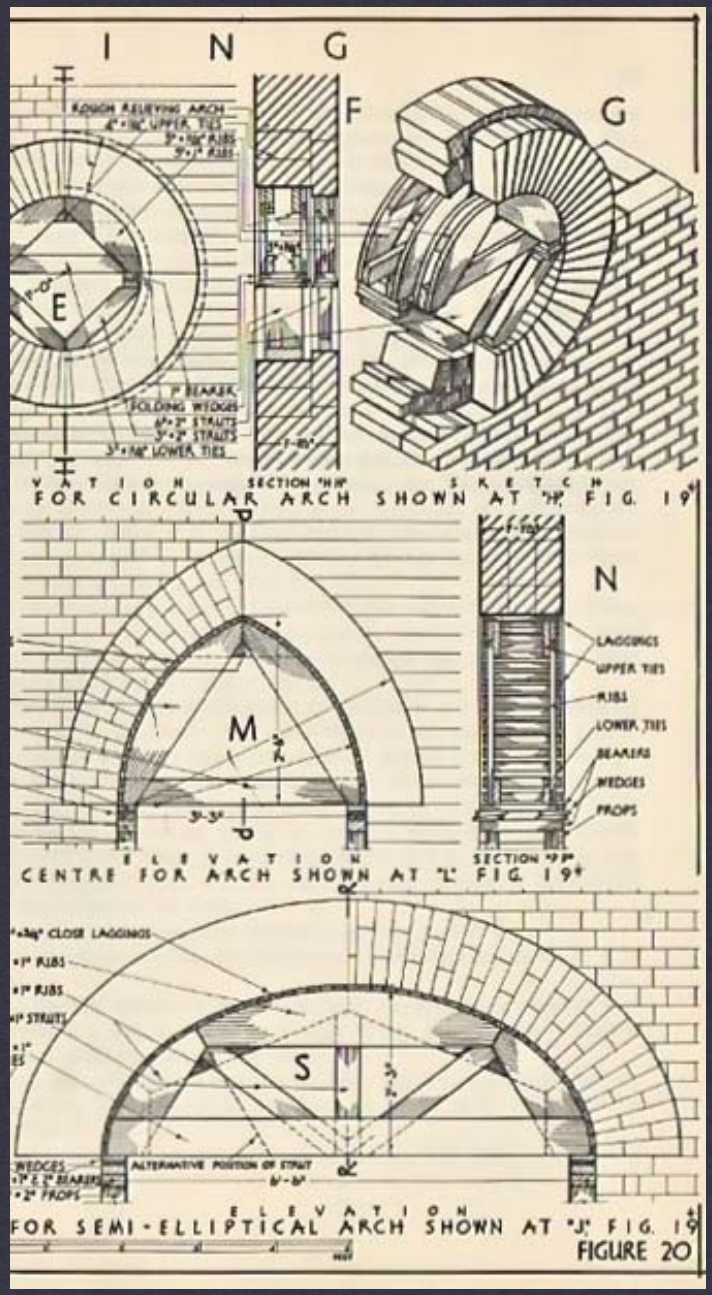


Building Technology

materials + assembly + drawing

Professor Friedman

ARCH 1230

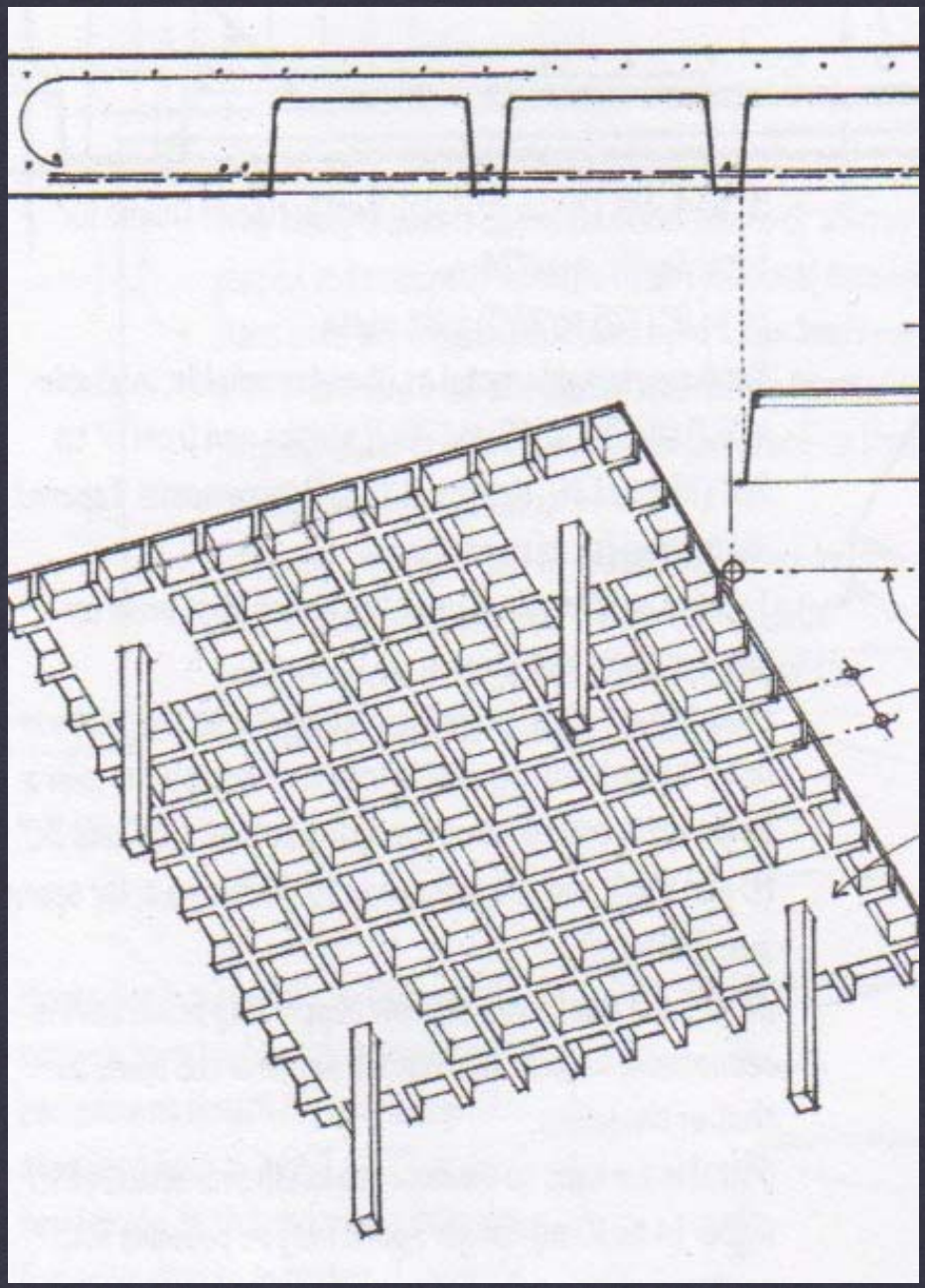


Building Technology

materials + assembly + drawing

Professor Friedman

ARCH 1230



Building Technology

materials + assembly + drawing

Professor Friedman

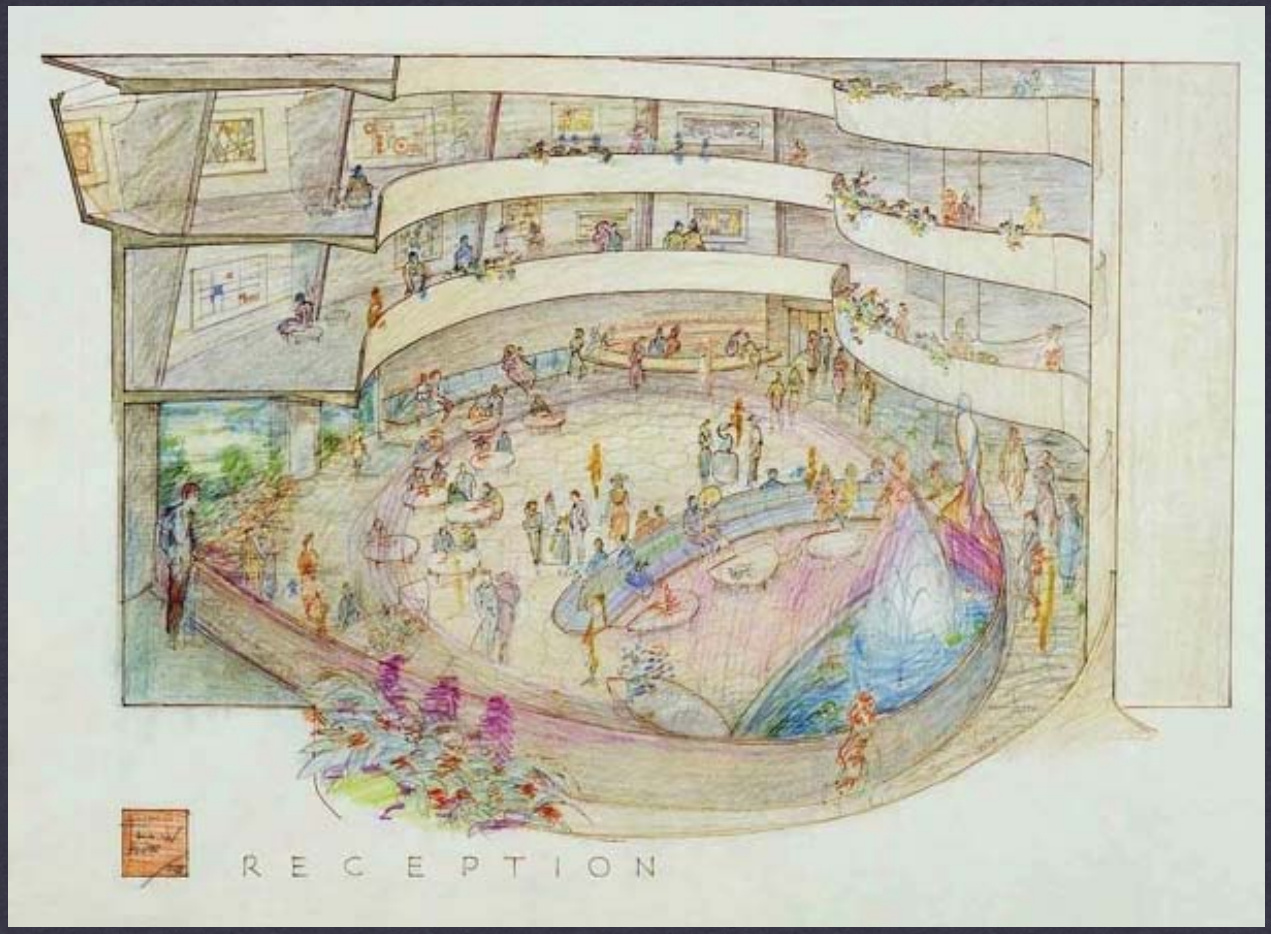
ARCH 1230

Building Technology

materials + assembly + drawing

Professor Friedman

ARCH 1230



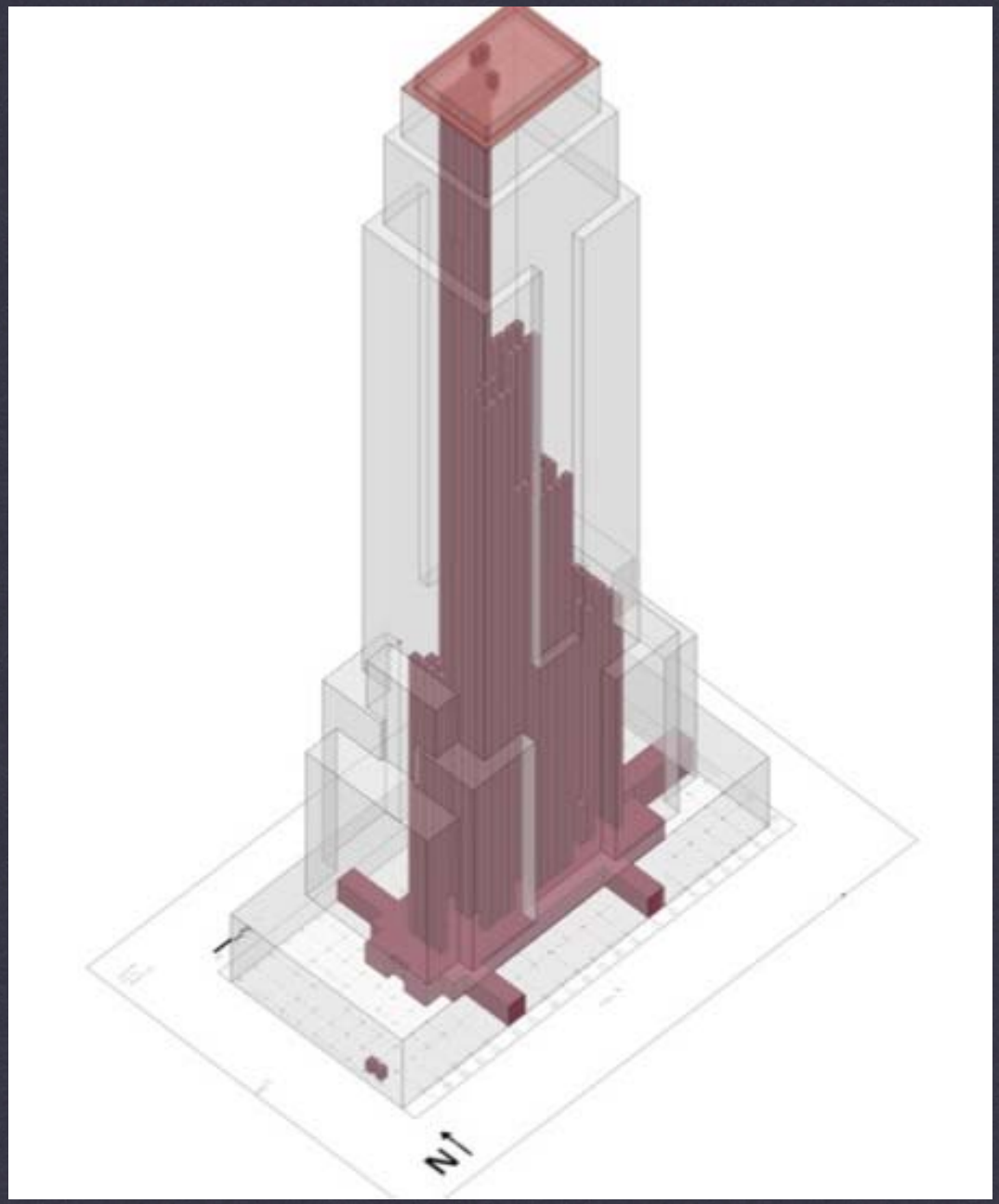
form + space + materiality + structure + assembly

Building Technology

Professor Friedman

exploration + investigation

ARCH 1230

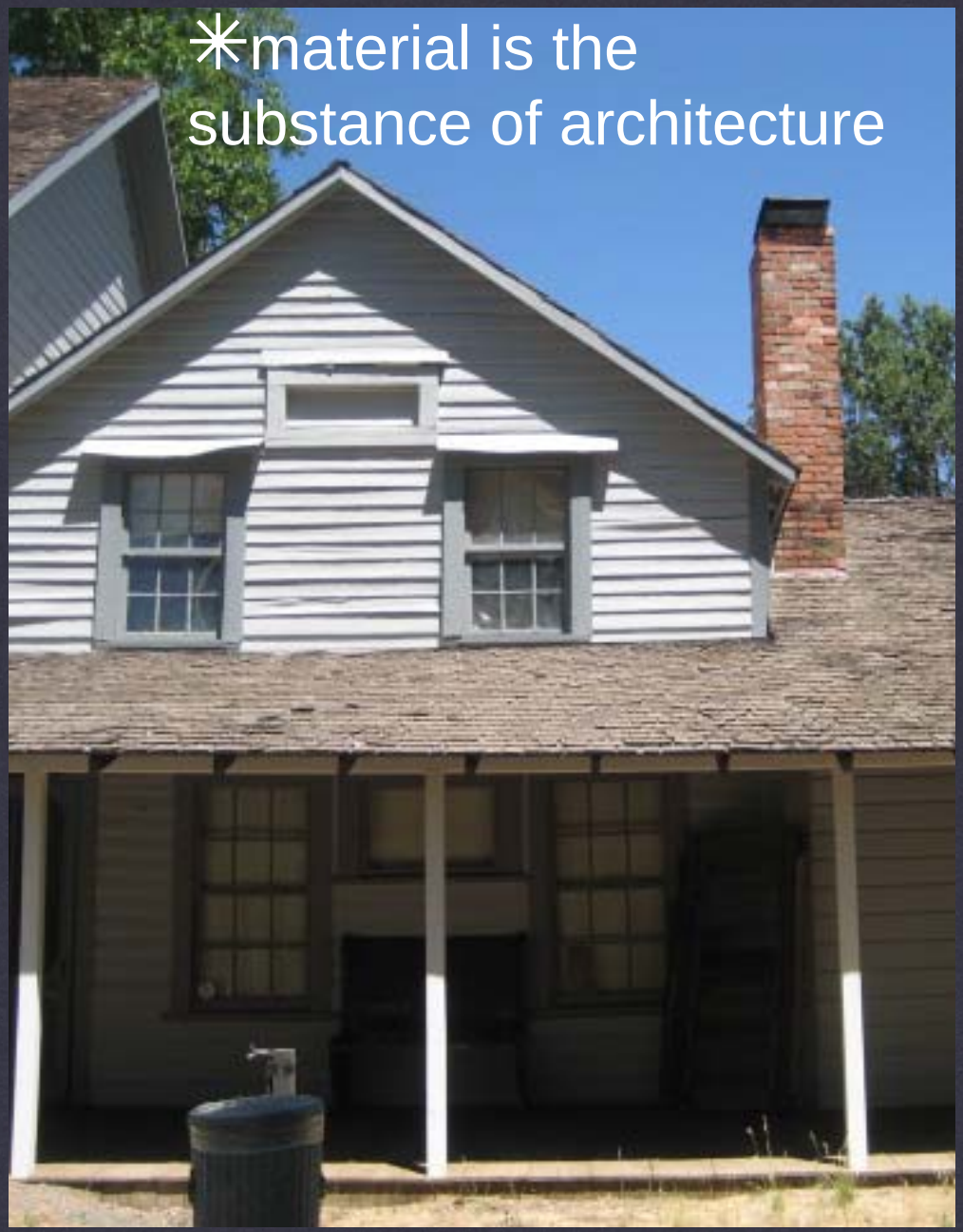


Building Technology

Professor Friedman

working in three dimensions

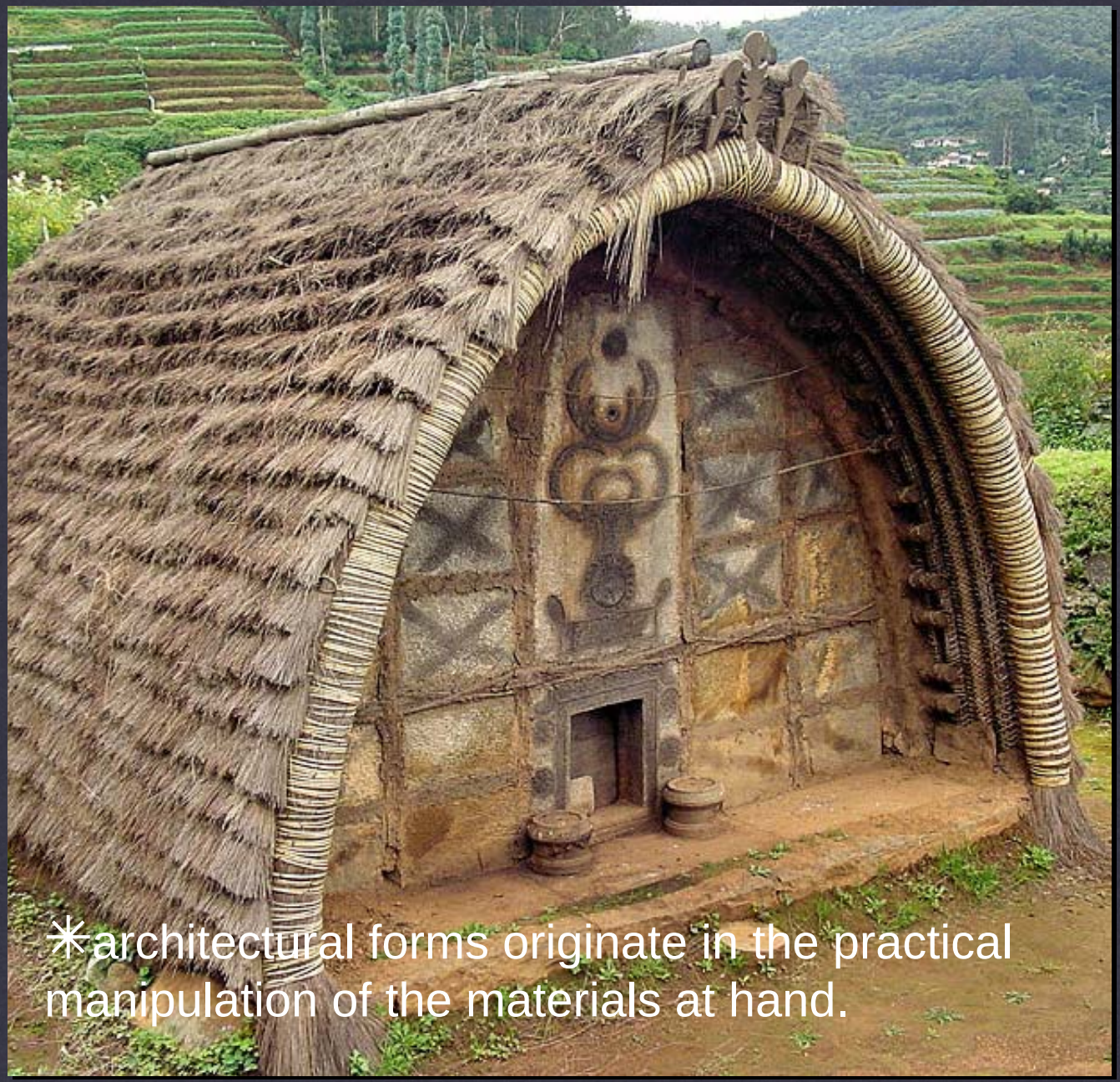
ARCH 1230



RELATION OF MATERIAL TO ARCHITECTURE

Professor Friedman

ARCH 1230



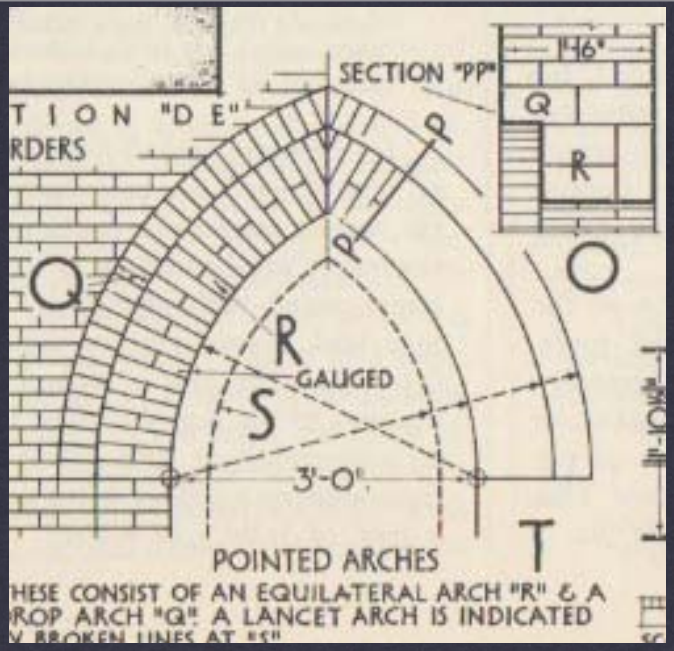
✳architectural forms originate in the practical manipulation of the materials at hand.

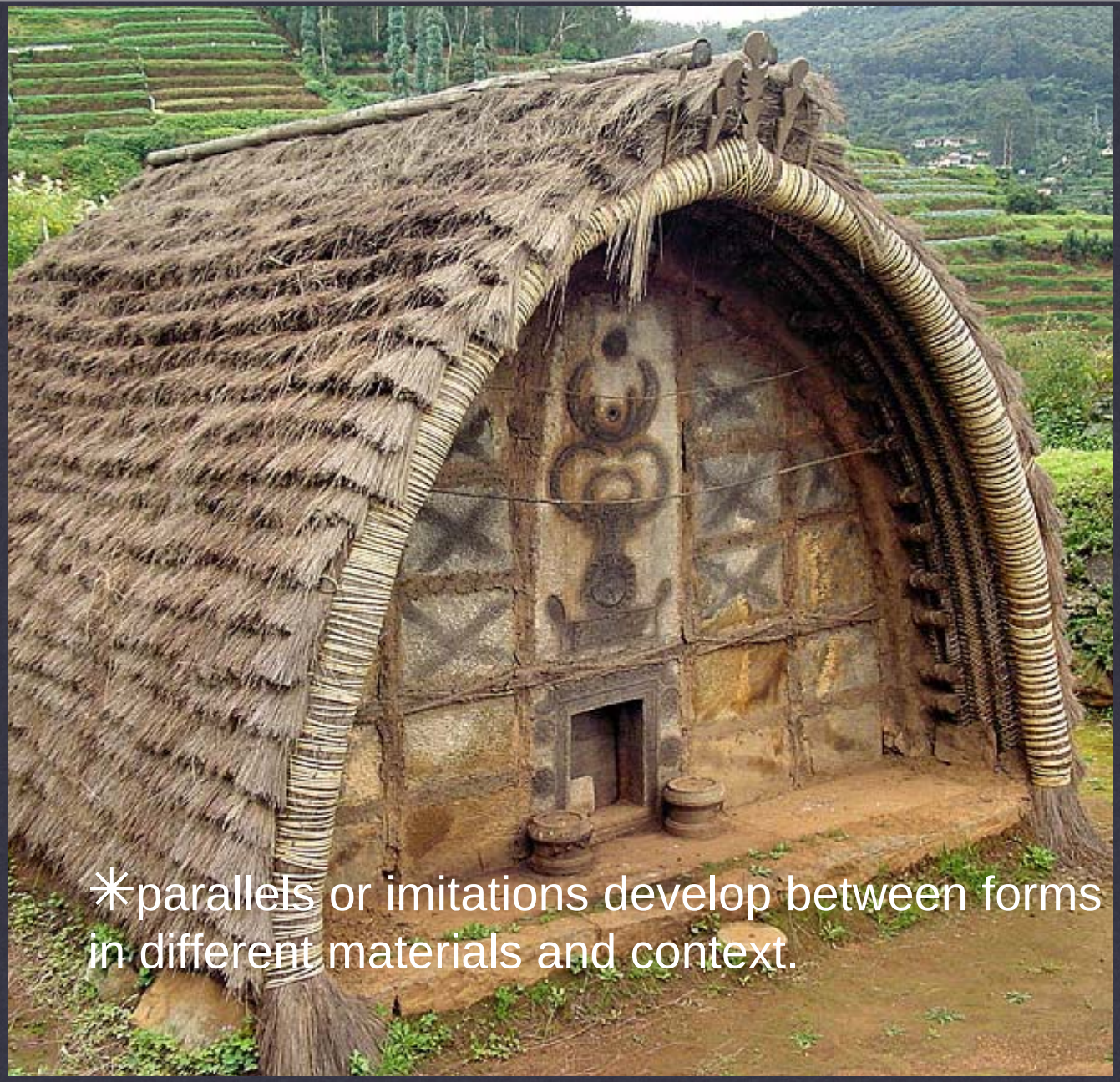
origins of architecture

Professor Friedman

the primitive hut

ARCH 1230





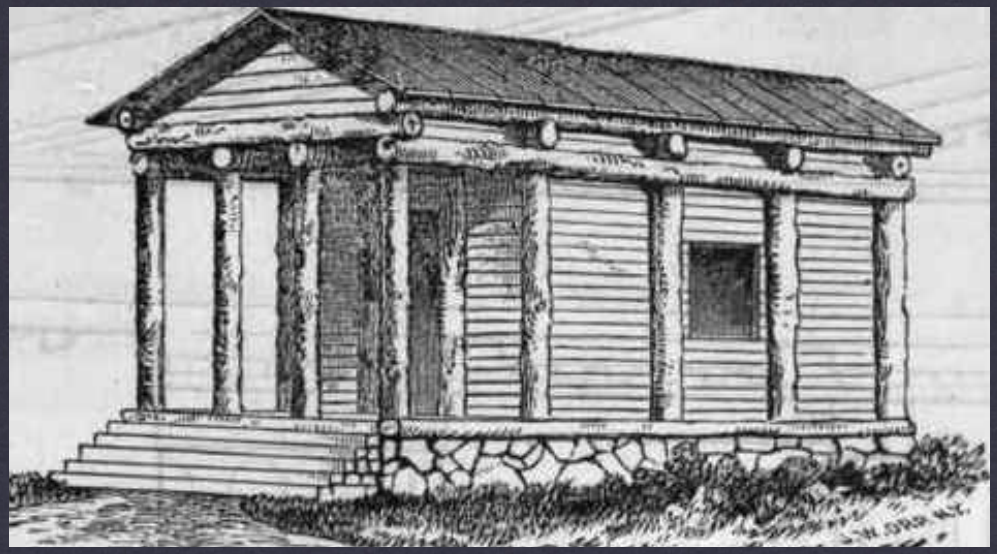
✳parallels or imitations develop between forms in different materials and context.

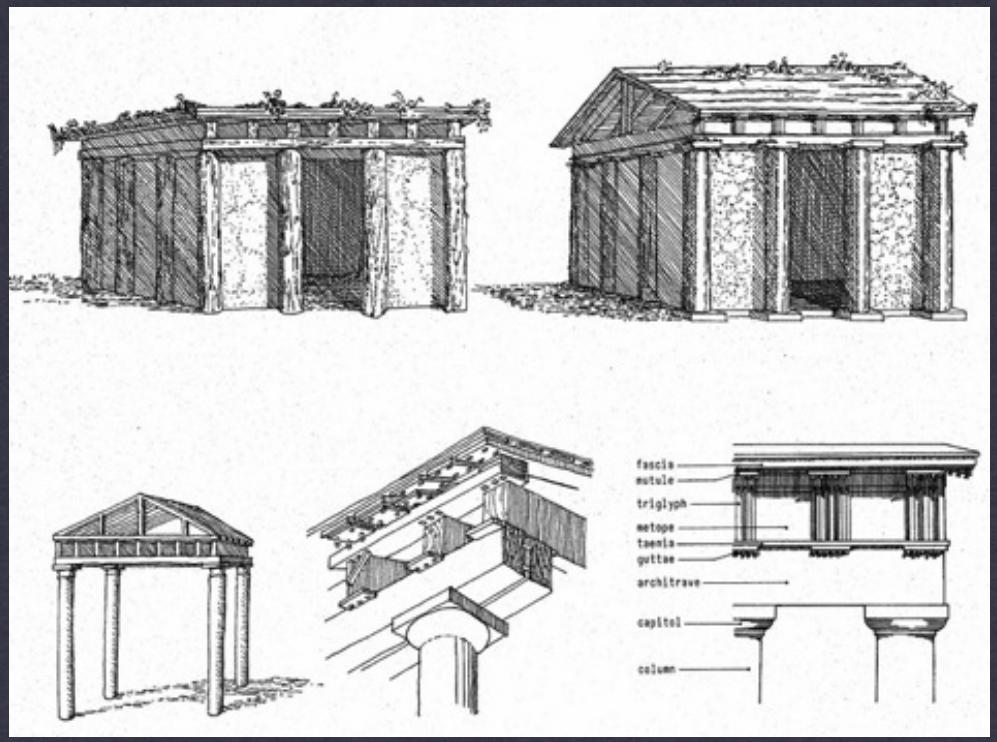
origins of architecture

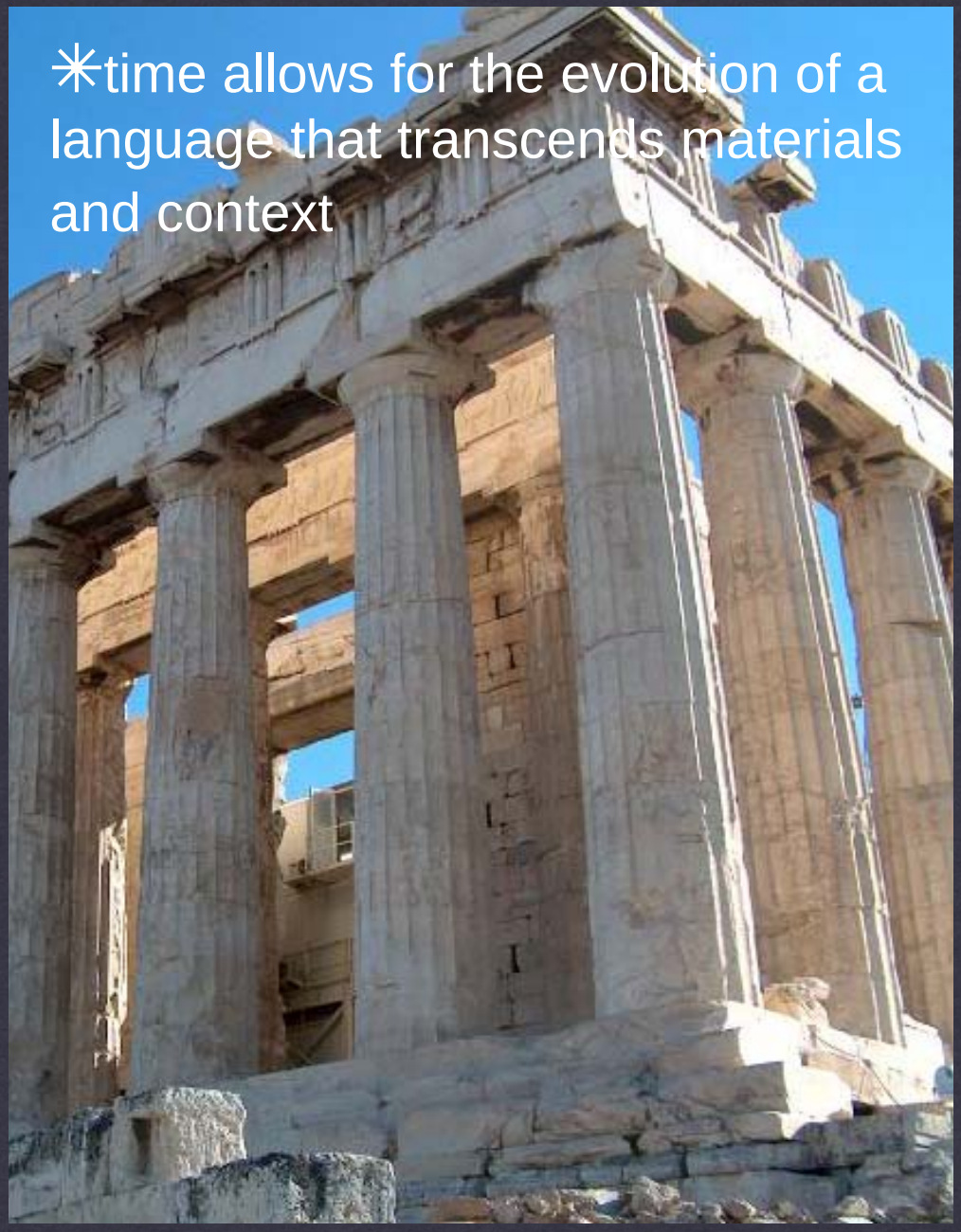
Professor Friedman

transformation

ARCH 1230



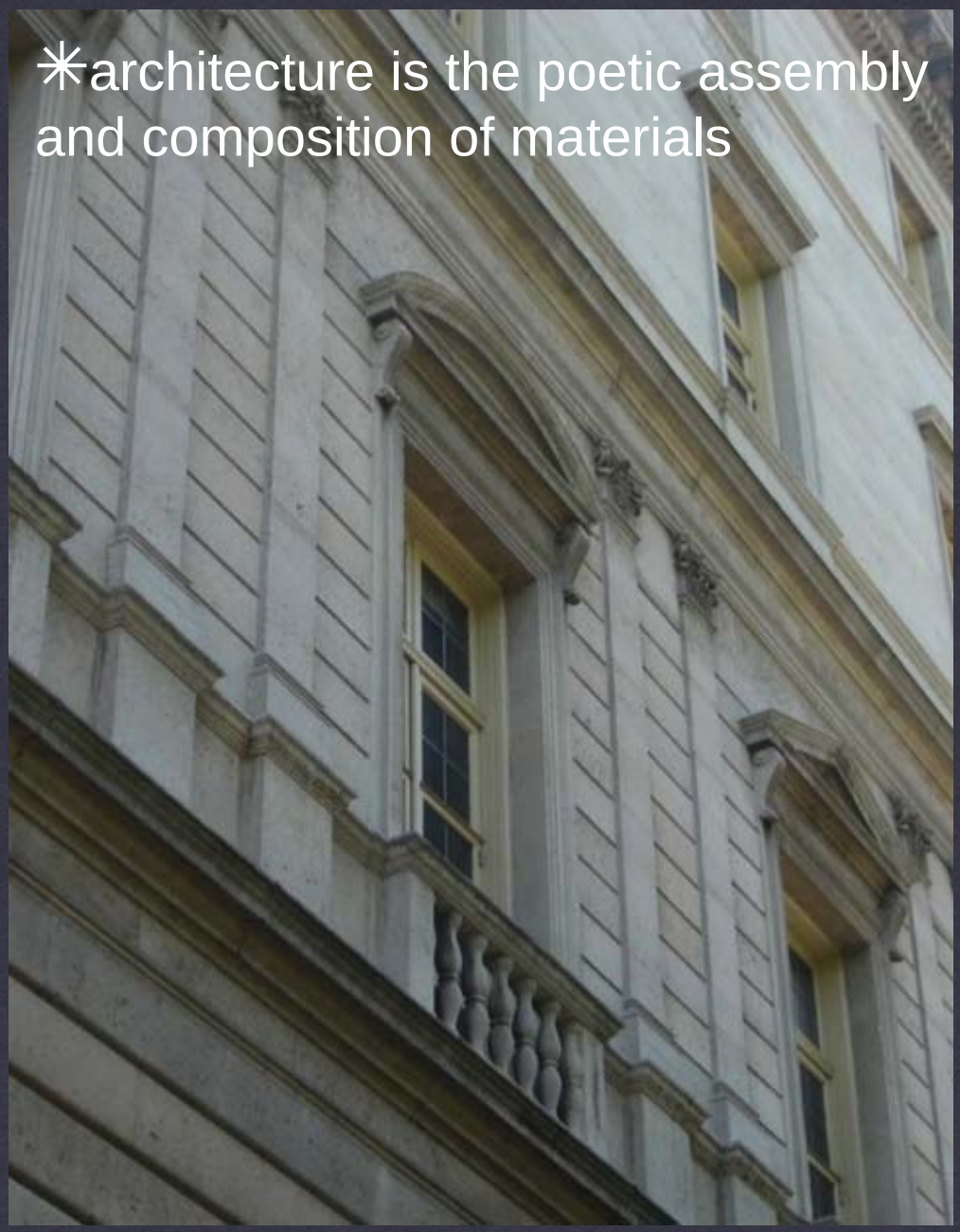




RELATION OF MATERIAL TO ARCHITECTURE

Professor Friedman

ARCH 1230



✳architecture is the poetic assembly and composition of materials

RELATION OF MATERIAL TO ARCHITECTURE

Professor Friedman

ARCH 1230

TECTONICS:
the exploration of form making through the poetic crafting, assembly, and composition of materials, their connections, and their structural role

transformation and adaptation

post and beam

Professor Friedman

ARCH 1230

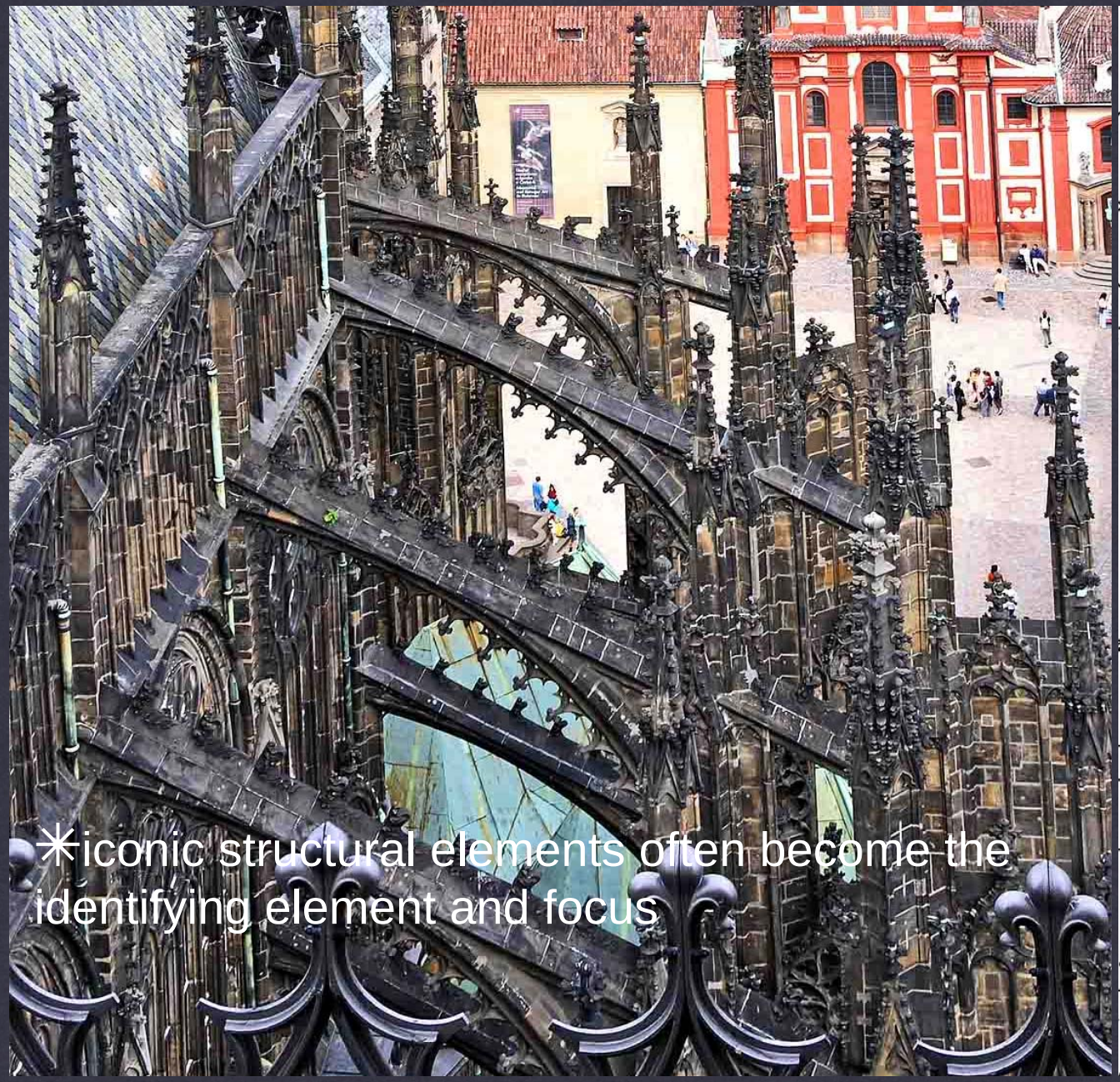
✳structural elements become “detached” from or “stretched” beyond their primary role as a practical structural element, becoming iconic.

tectonics

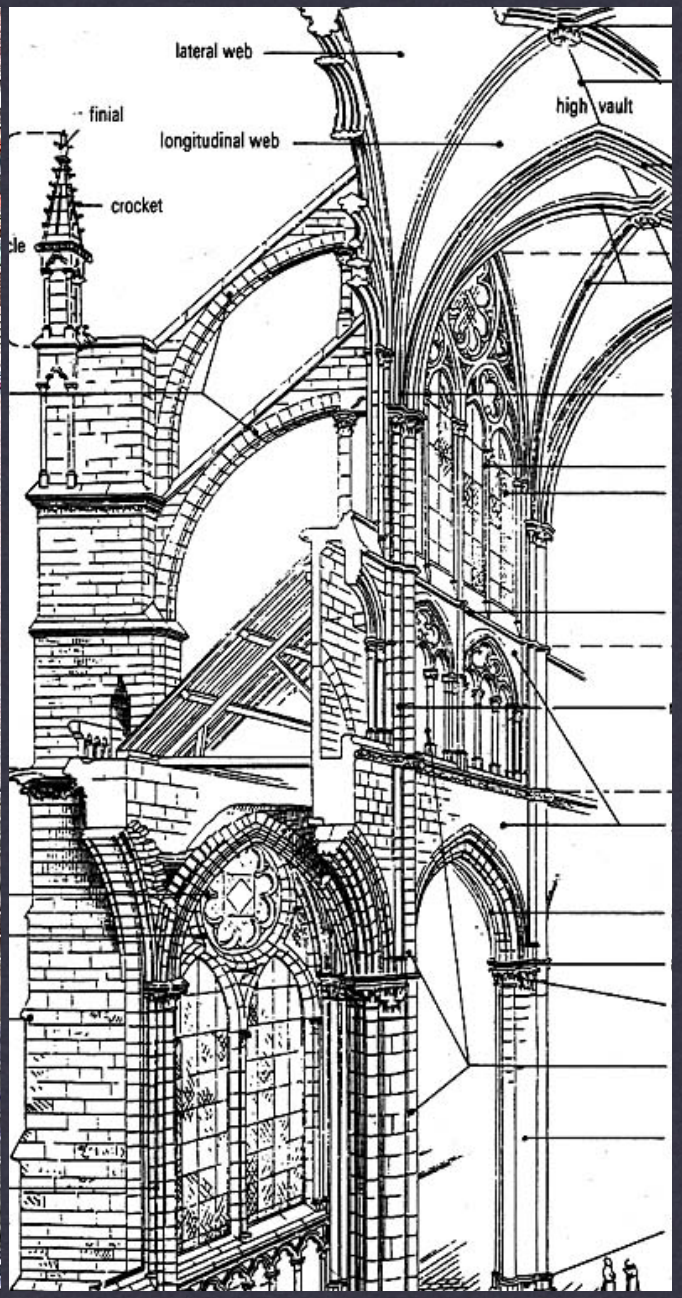
Professor Friedman

the arch as icon

ARCH 1230



✳iconic structural elements often become the identifying element and focus

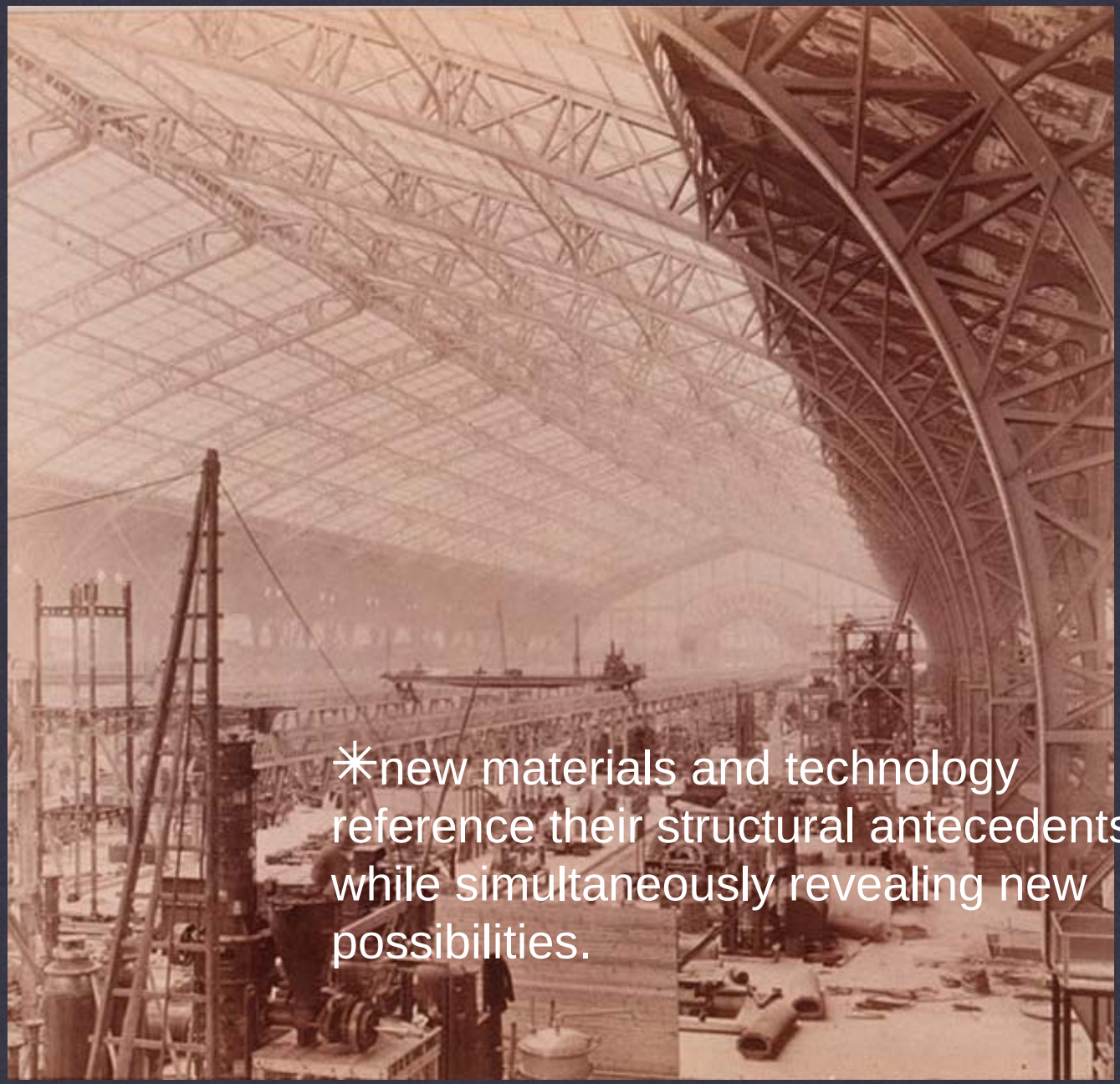


tectonics

tracing the line of forces

Professor Friedman

ARCH 1230



✳new materials and technology reference their structural antecedents while simultaneously revealing new possibilities.

tectonics

Professor Friedman

bold structural innovation

ARCH 1230

✳architecture revisits nature frequently searching for pure inspiration.

✳Bio-mimicry

Nautilus Half Shell

tectonics

Professor Friedman

transformation

ARCH 1230

materials

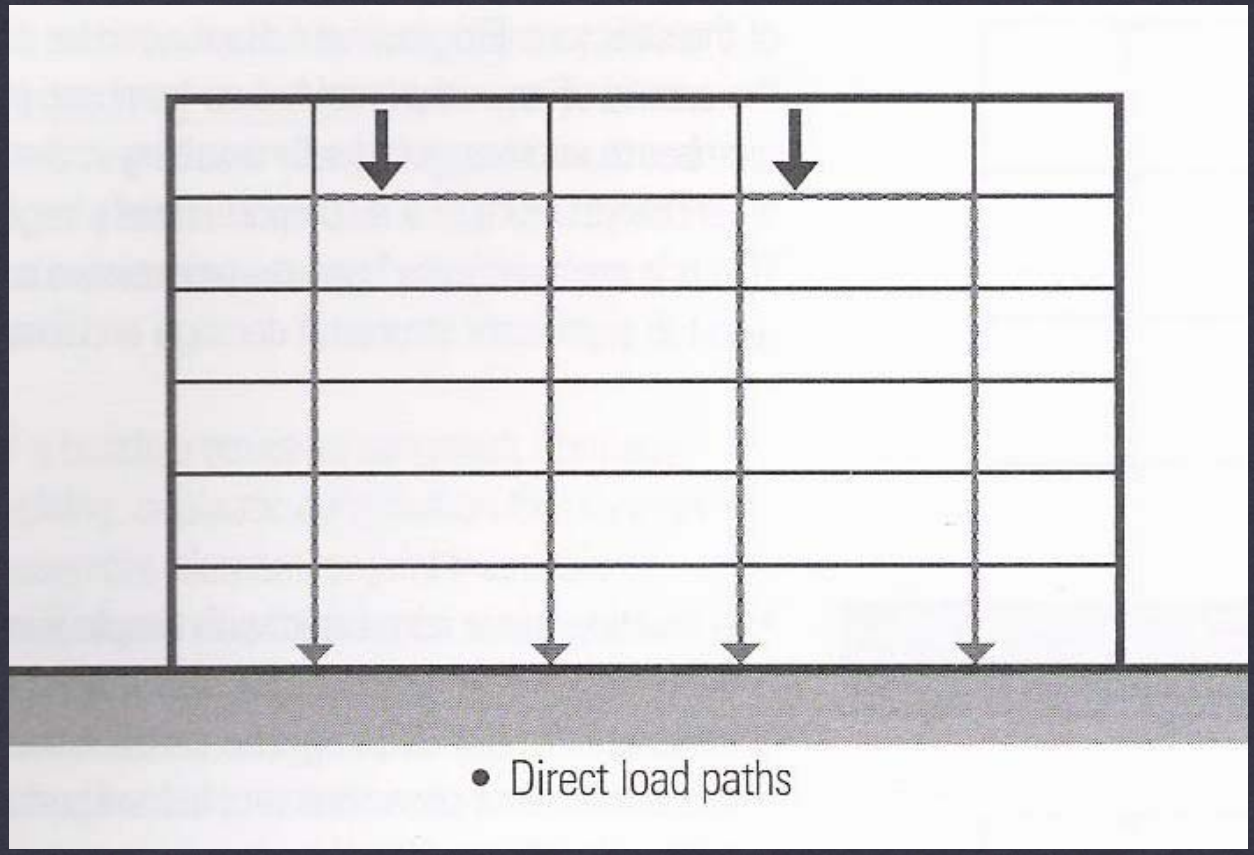
the starting point in crafting space

Professor Friedman

ARCH 1230

Structural Forces

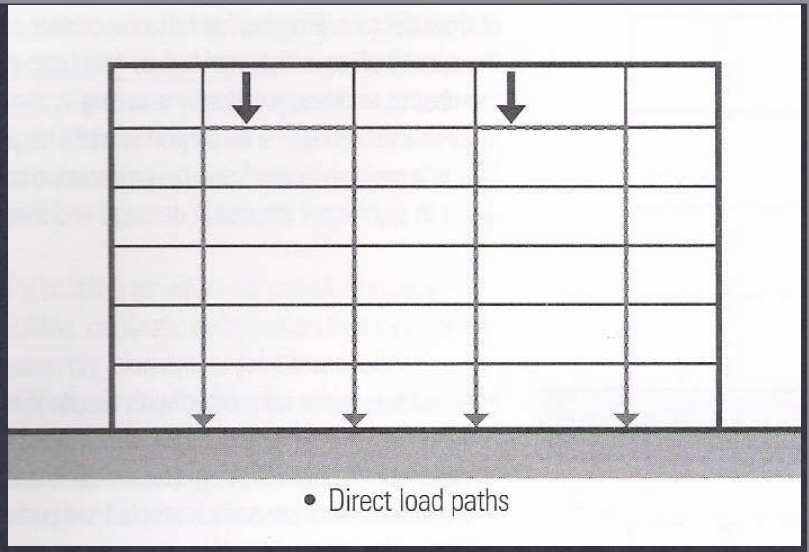
The Structural System in a building, consists of a stable assembly of structural elements designed and constructed to support and transmit applied loads safely to the ground without exceeding the allowable stresses in the members.

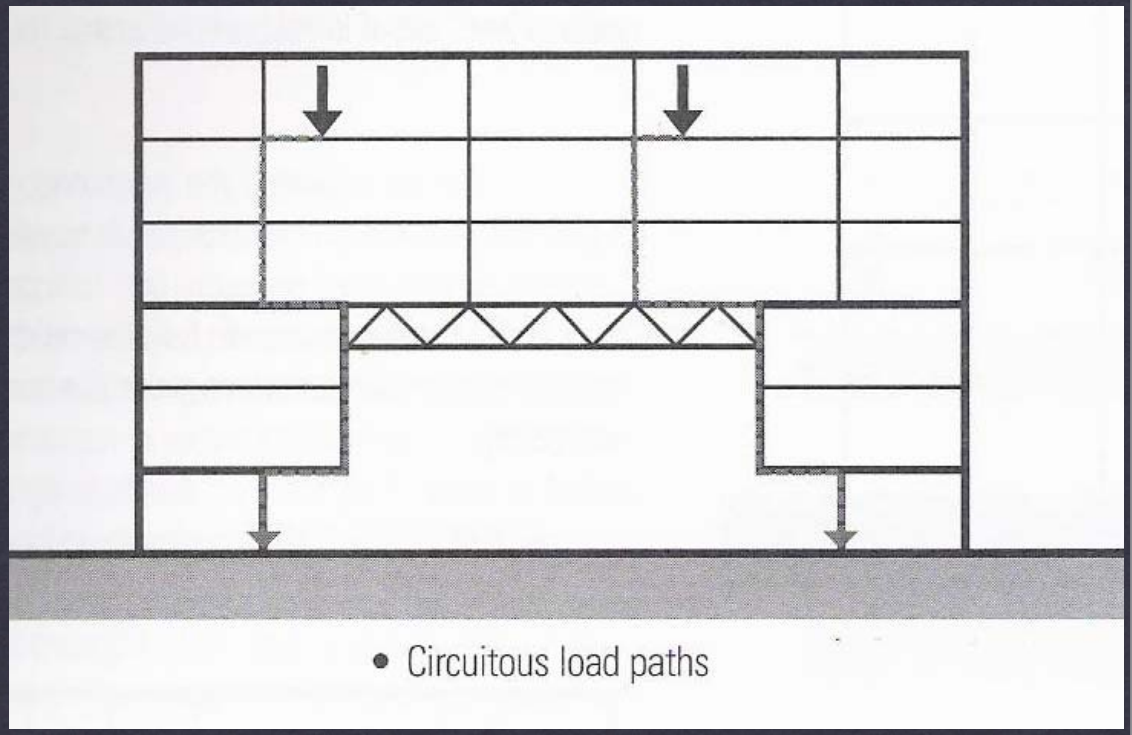


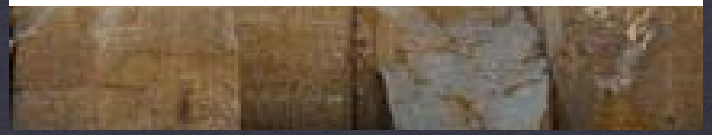
forces on buildings

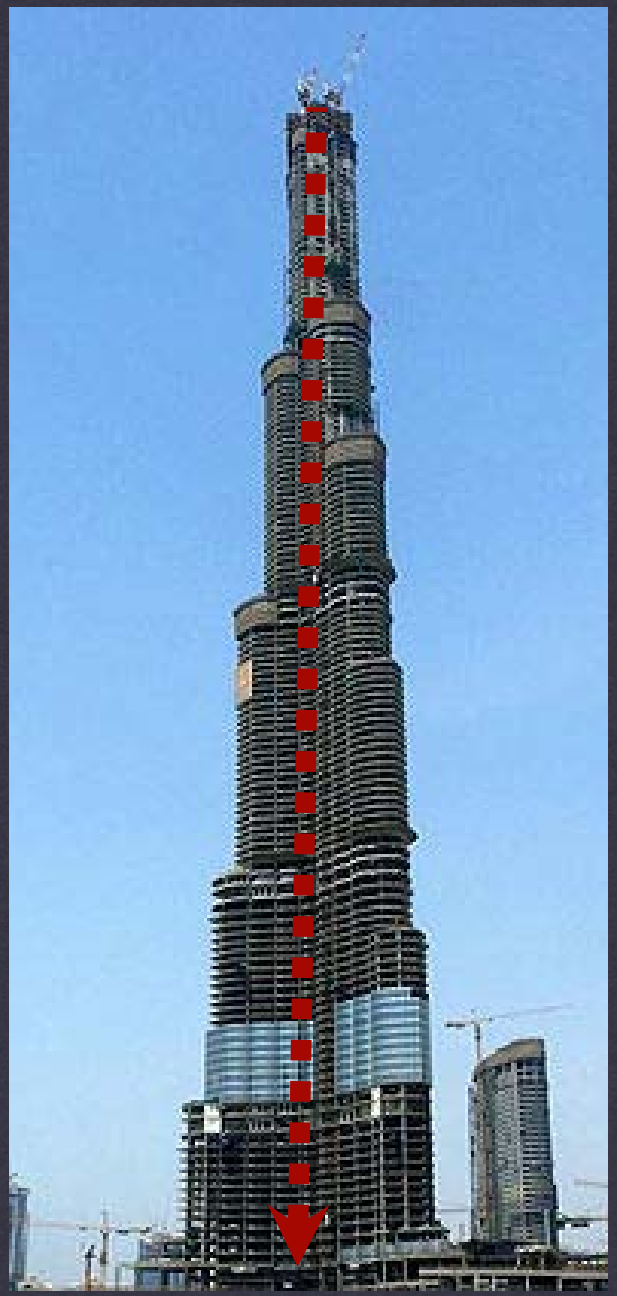
transferring dead loads to the earth

When an opening breaks up the normal vertical load flow to the earth, we need to redistribute it.
The increased load then adds more weight to the remaining members…







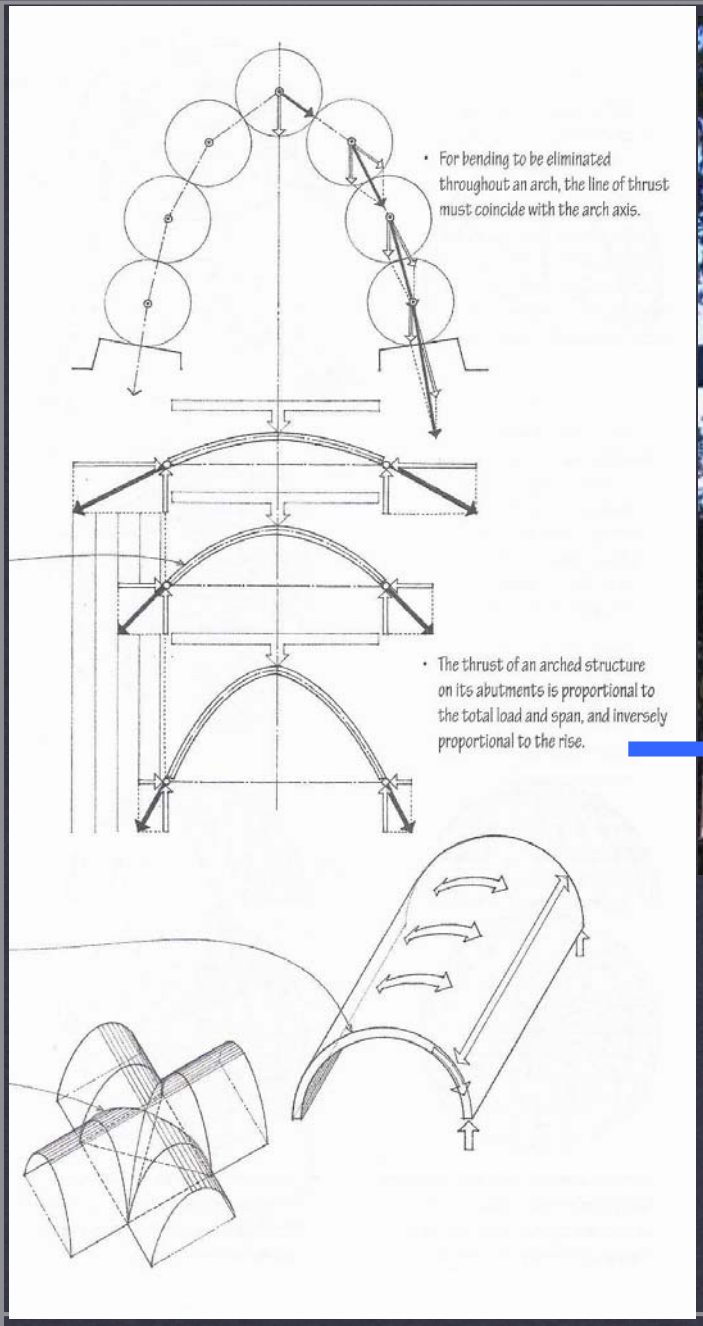


forces on buildings

transferring dead loads to the earth

Professor Friedman

ARCH 1230



To distribute the load, Arches introduce both a downward force and an outward pushing force. These must be counteracted with both an upward force and an inward force.

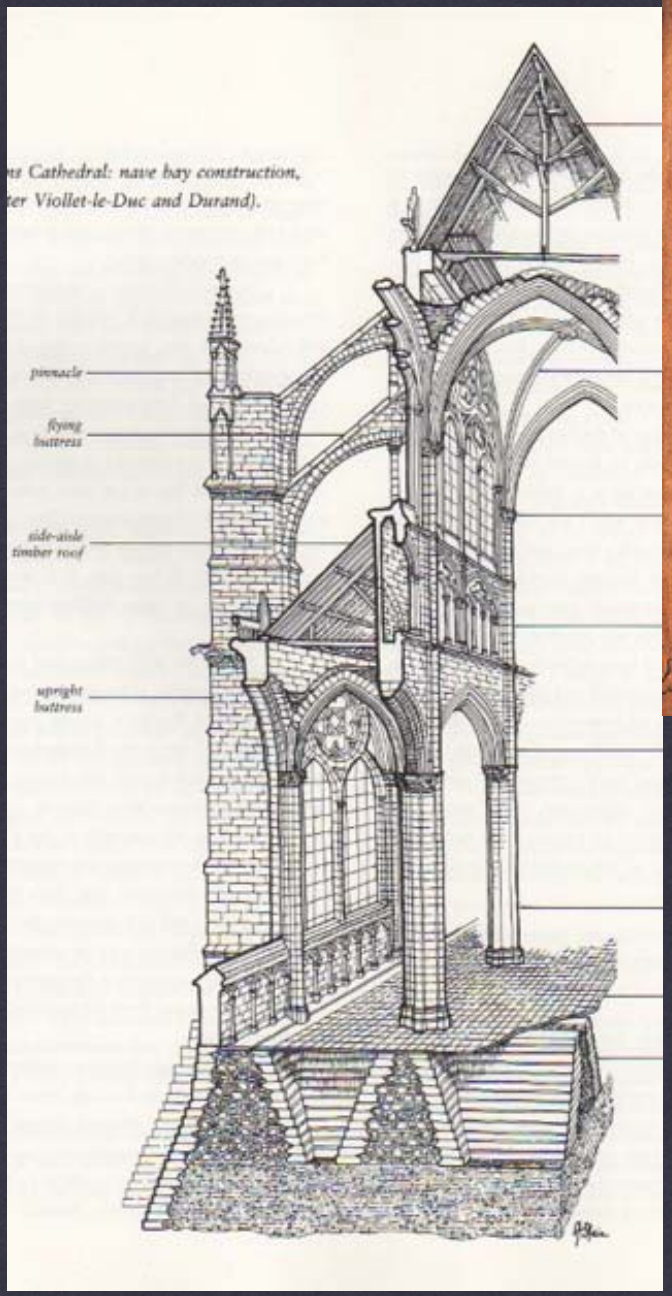
Note: the shallower the slope of the arch the more outward force is exerted…

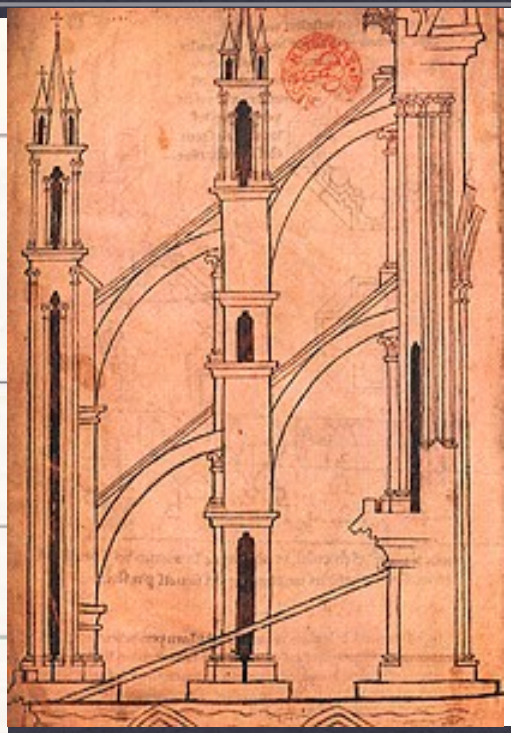
forces on buildings

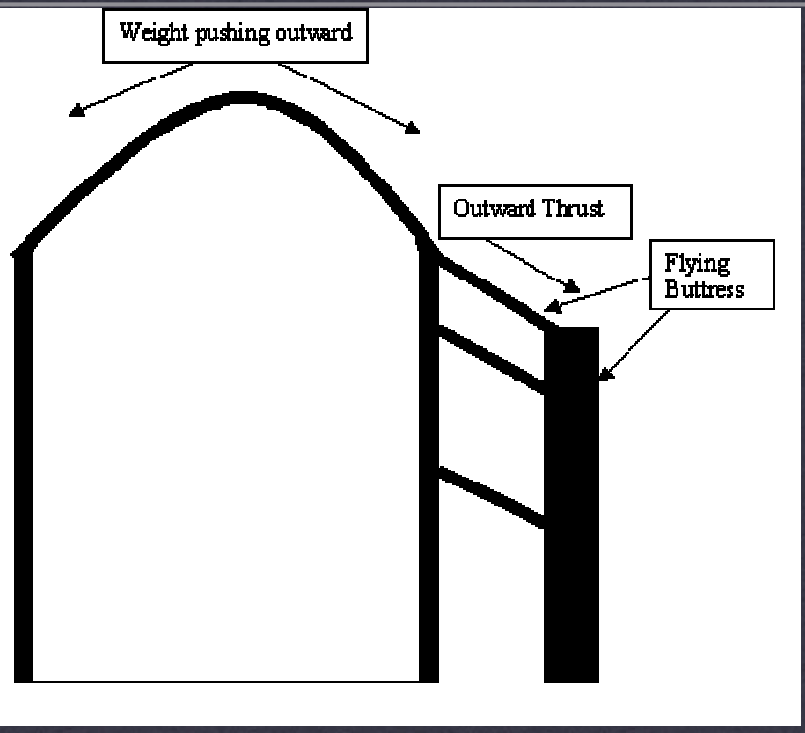
path of loads from roof to foundation

Professor Friedman

ARCH 1230







Gothic cathedrals are able to achieve great vaulting heights and open interiors by using a system of “Flying buttresses” to contain the outward thrust of the roof and the tall perimeter walls.

forces on buildings

path of loads from roof to foundation

forces on buildings

Professor Friedman

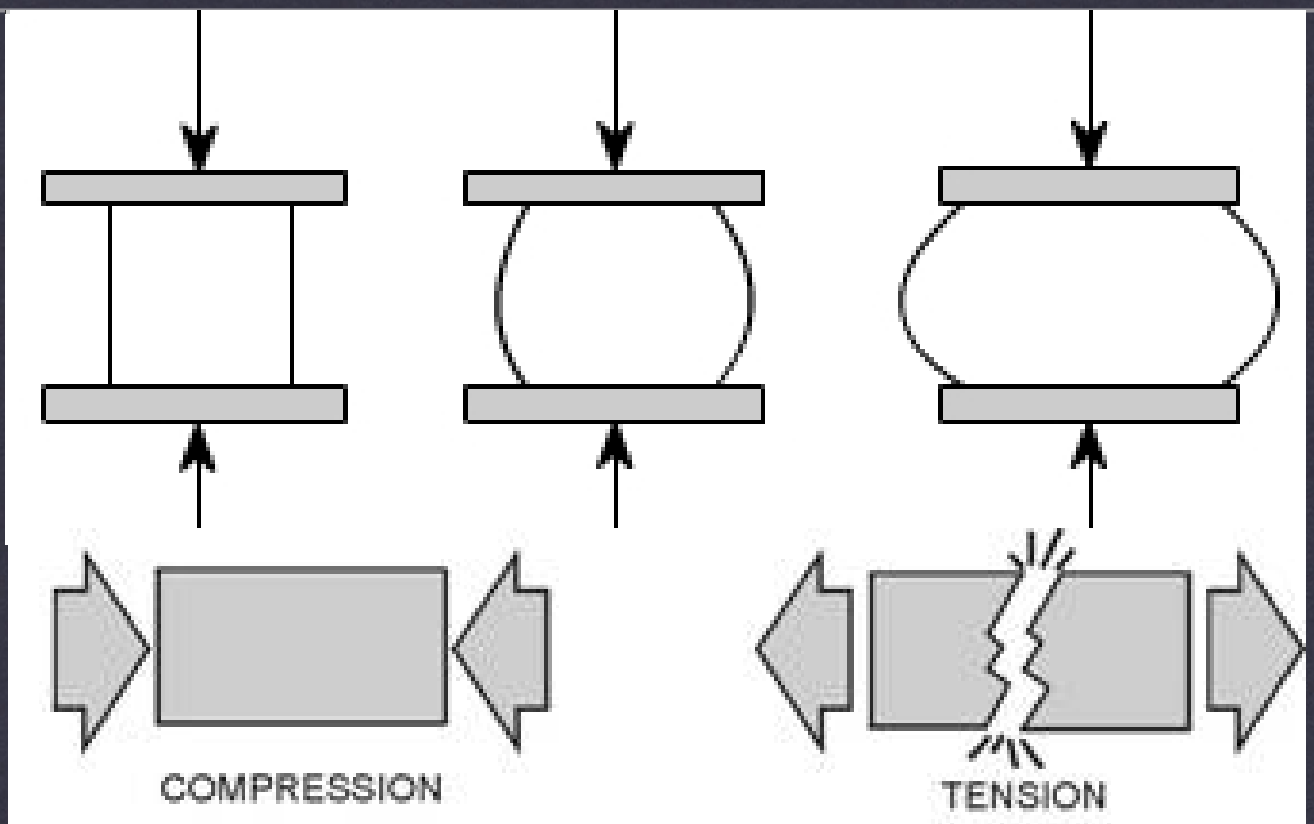
path of loads from roof to foundation

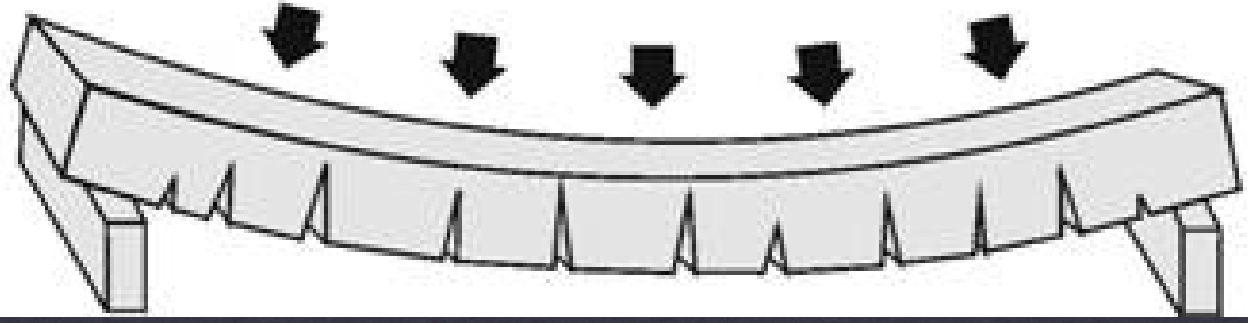
ARCH 1230

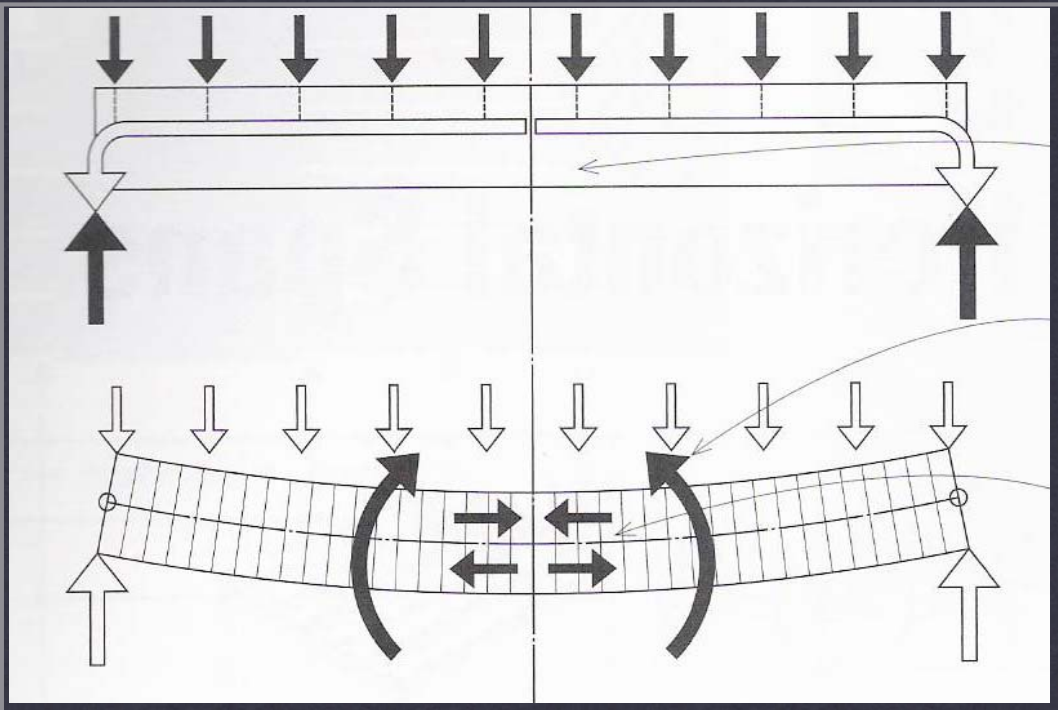
COMPRESSION:
CRUSHING FORCE

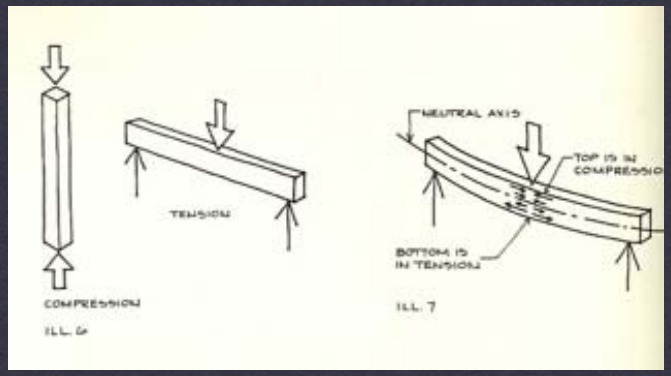
TENSION:
STRETCHING/PULLING FORCE

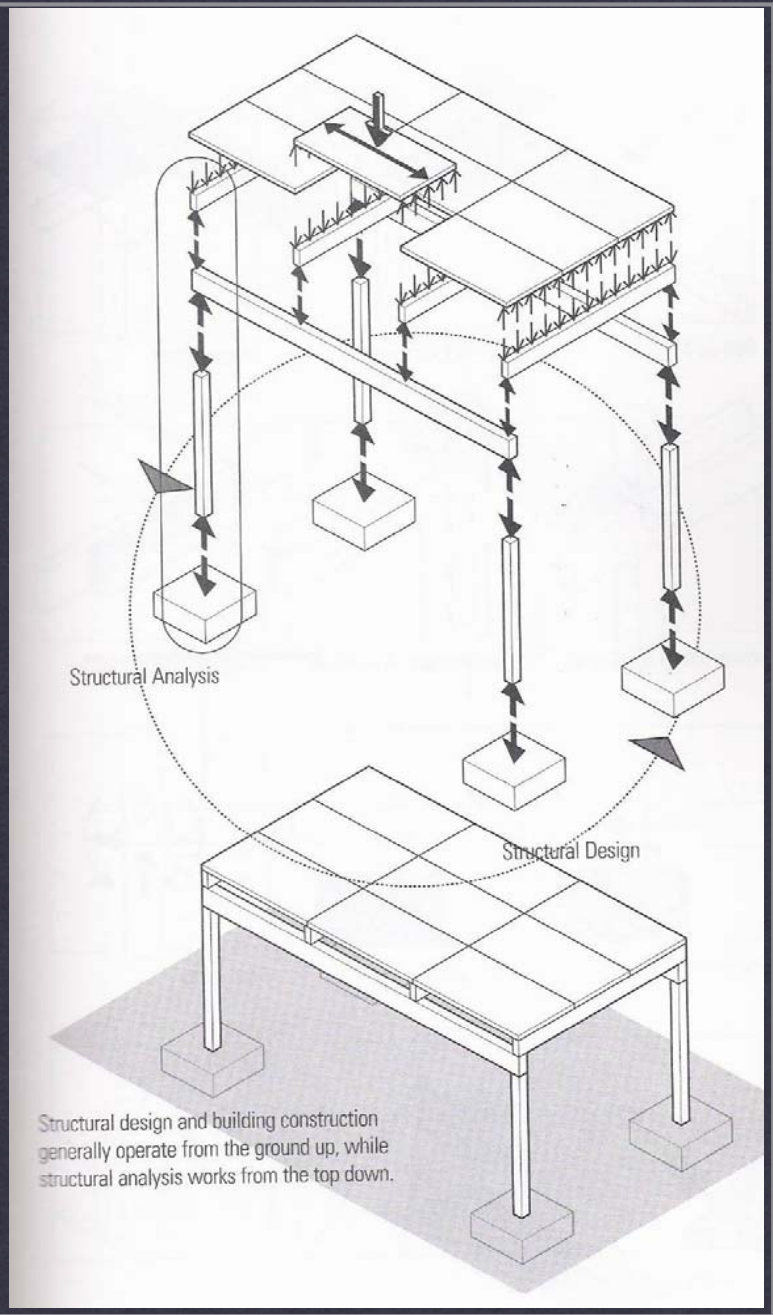
BOTH COMPRESSION & TENSION ARE ACTING ON MOST STRUCTURAL ELEMENTS











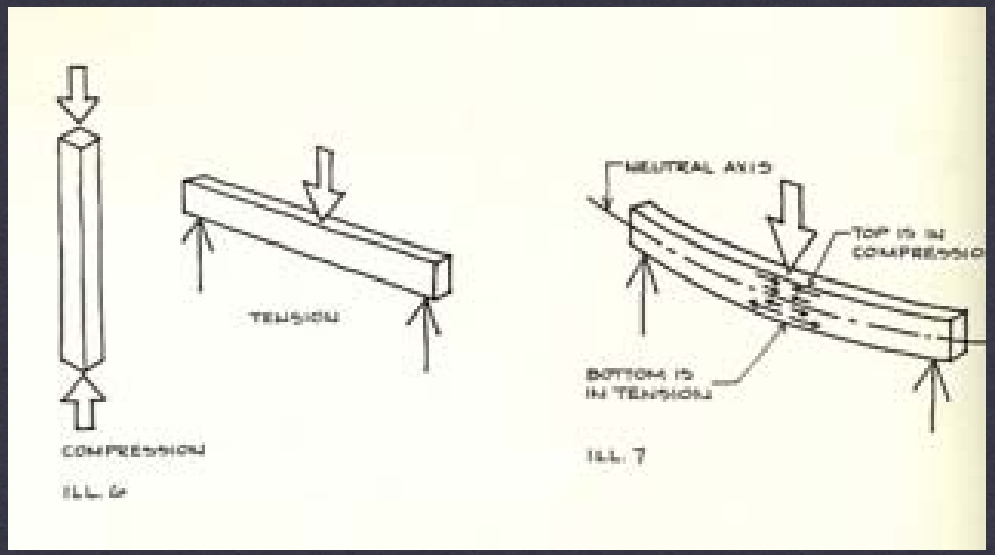
forces on buildings

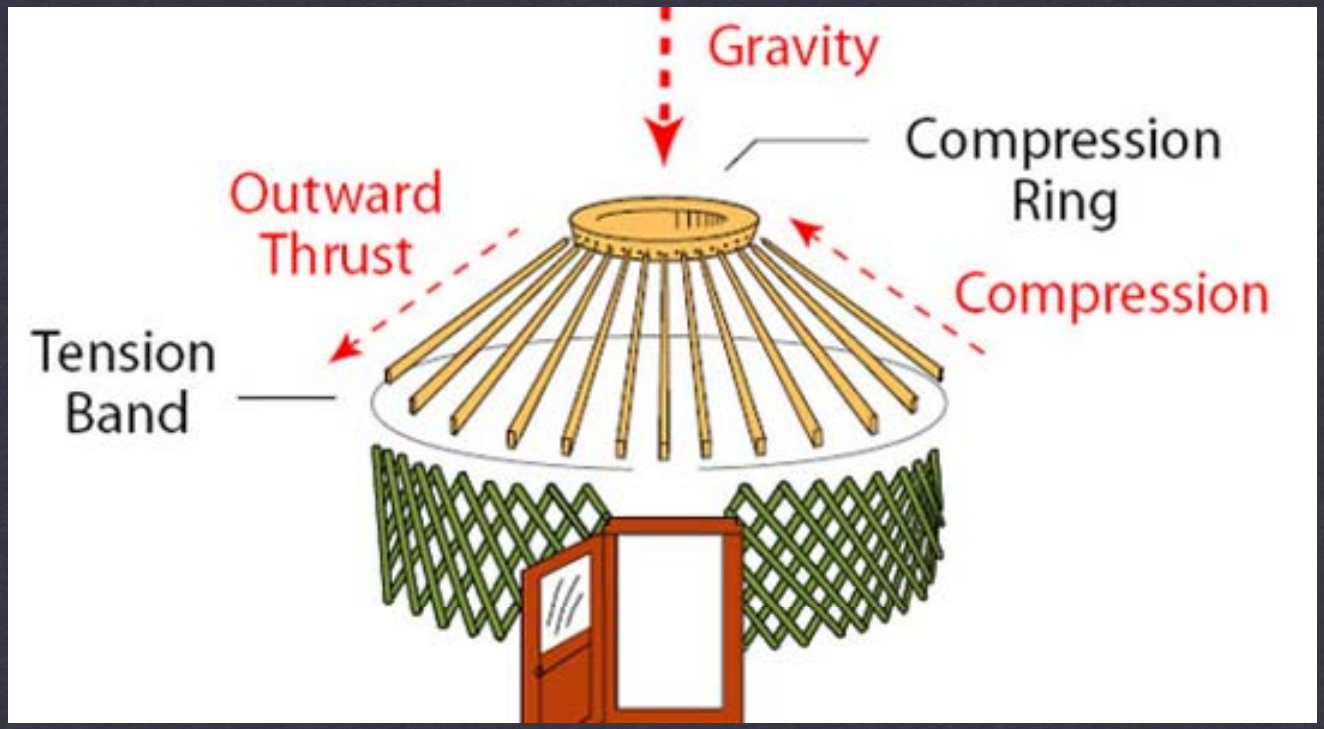
Professor Friedman

loads + stresses

ARCH 1230

✳tectonic architecture embraces the force and stress on the material. Entasis is the classic expression of the deformation due to compression.



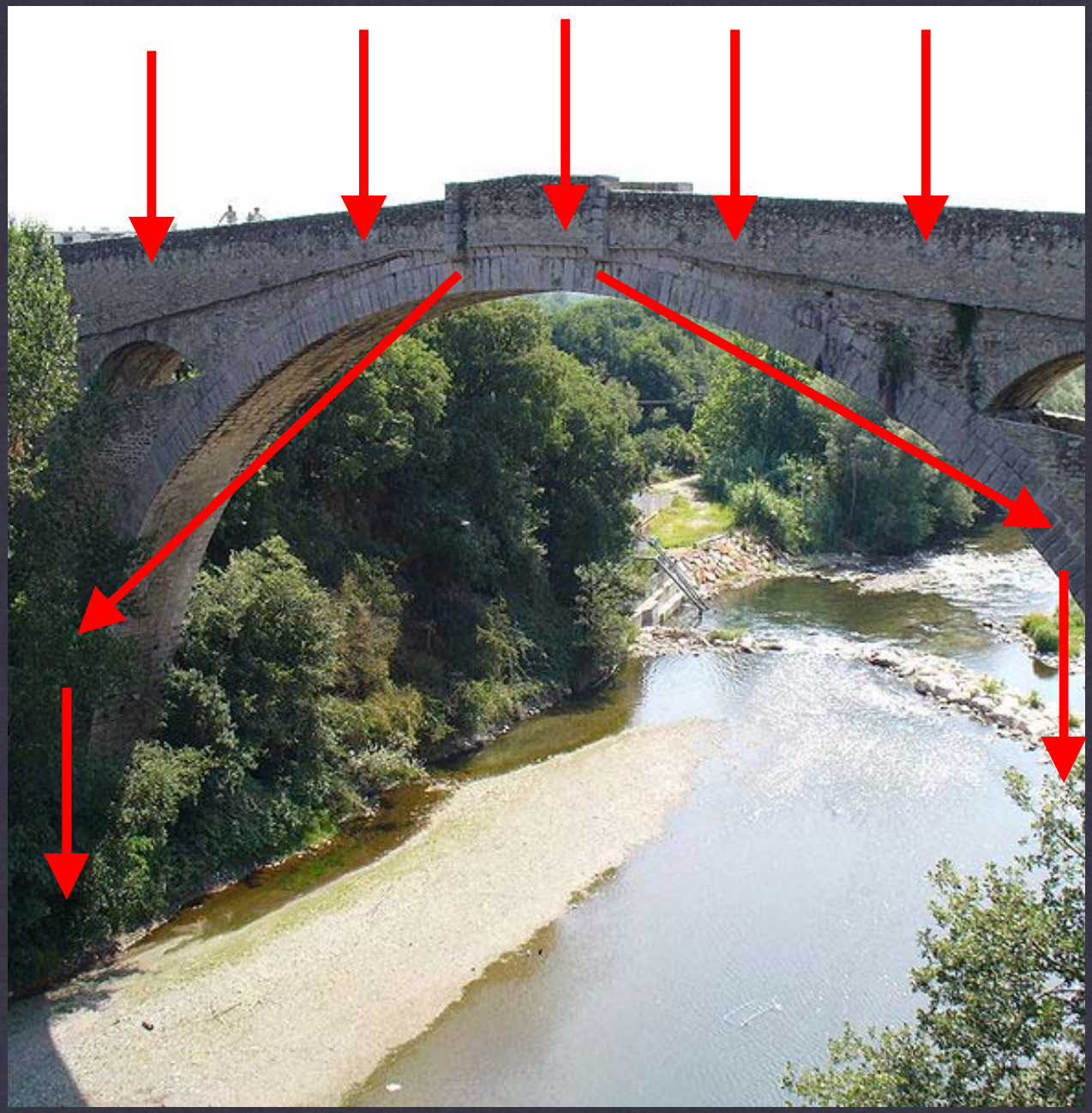


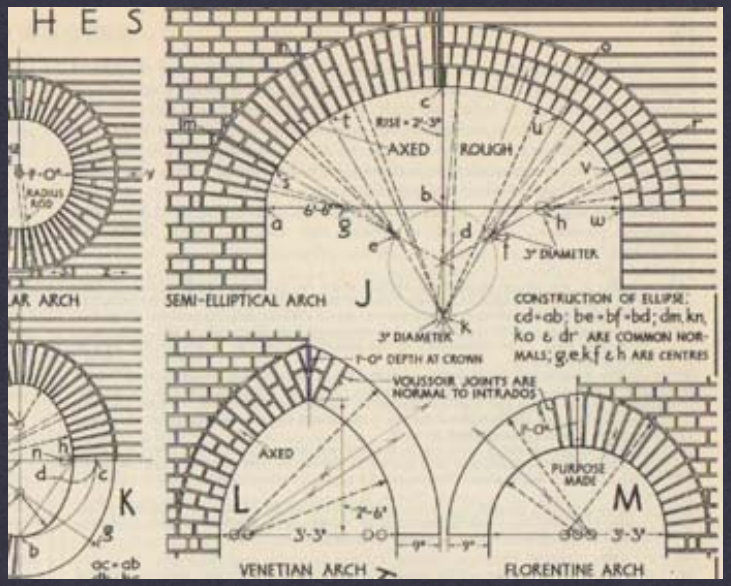
forces on buildings

loads + stresses

Professor Friedman

ARCH 1230



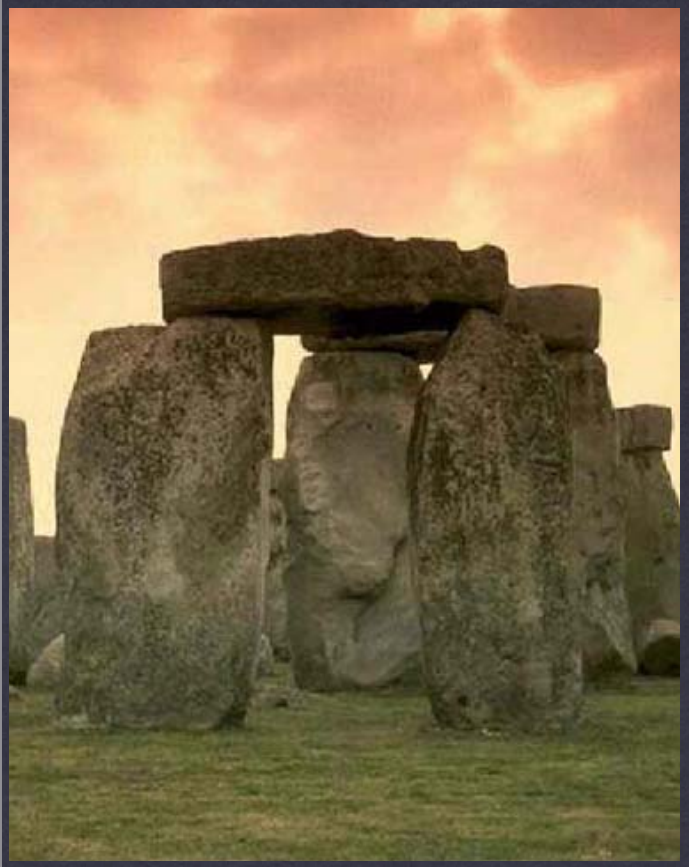


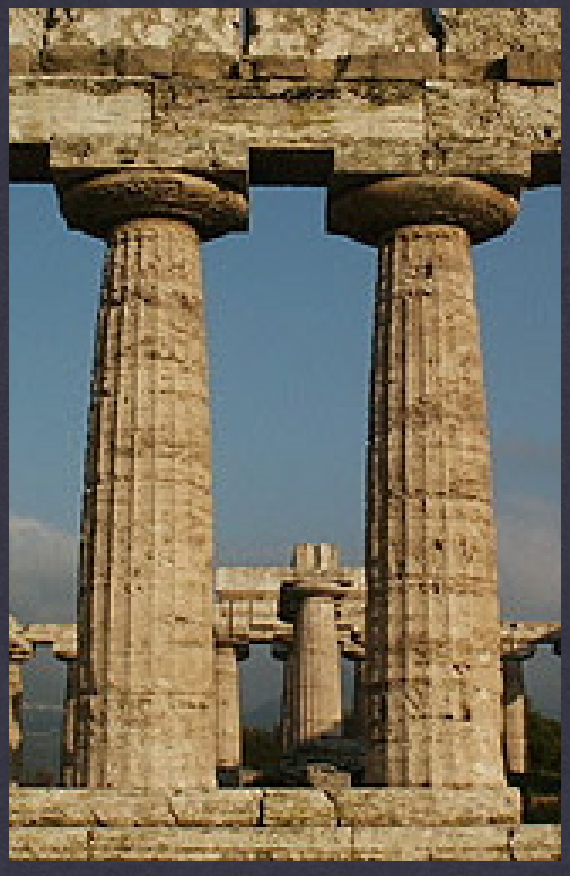
FORCES ON BUILDINGS

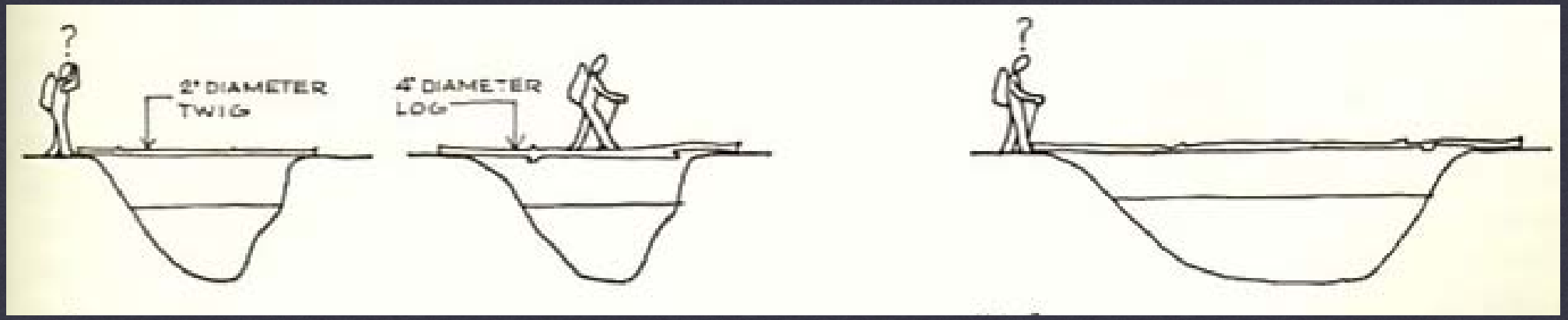
loads + stresses

Professor Friedman

ARCH 1230







FORCES ON BUILDINGS

loads + stresses

Professor Friedman

ARCH 1230

force

shape and proportion in response to stresses

Professor Friedman

ARCH 1230

summary of properties of Materials

Professor Friedman

ARCH 1230

CONCRETE (UNREINFORCED)

WORKING STRENGTH IN:

COMPRESSION	1000 - 4000 psi
TENSION	0 psi
DENSITY:	145 pcf

STEEL

WORKING STRENGTH IN:

COMPRESSION	24,000-43,000 psi
TENSION	24,000-43,000 psi
DENSITY:	490 pcf

summary of properties of Materials

Professor Friedman

ARCH 1230

wrap up

FUNDAMENTAL TO THE PRACTICE OF ARCHITECTURE IS THE IMMERSION IN AND MASTERING OF THE POTENTIAL OF MATERIALS

- formation of elements of construction governed by required resistance of stresses
- selection of materials is driven by their structural advantages and their aesthetic qualities
- innovation is rooted in an evolving knowledge and sophisticated manipulation of materials and their assembly
- knowledge and mastery are pursued through three dimensional investigation and exploration

Class #1: In-Class Assignment

Sketch a floor plan and section of the 3rd floor stairwell (include the landings). Use your hands and feet as reference guides.

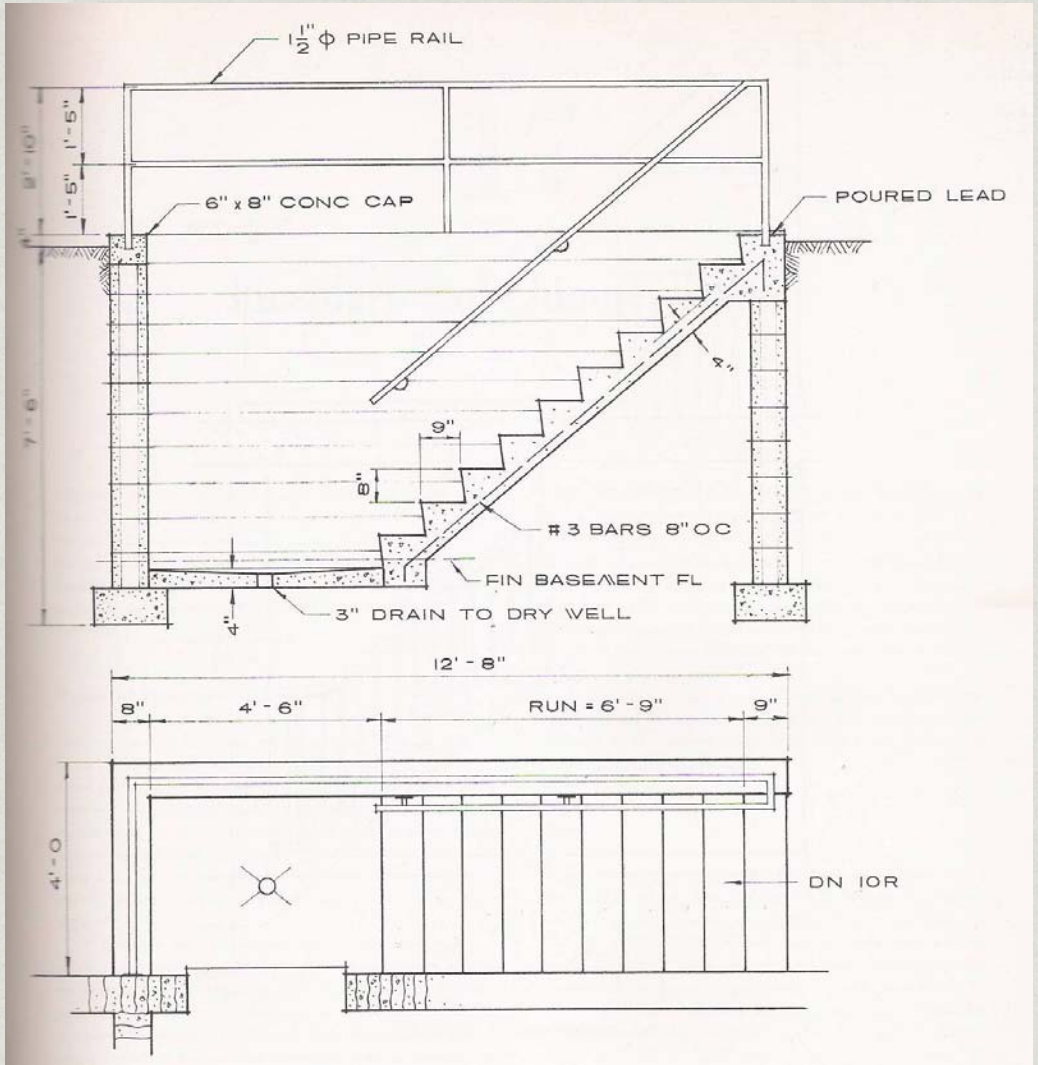
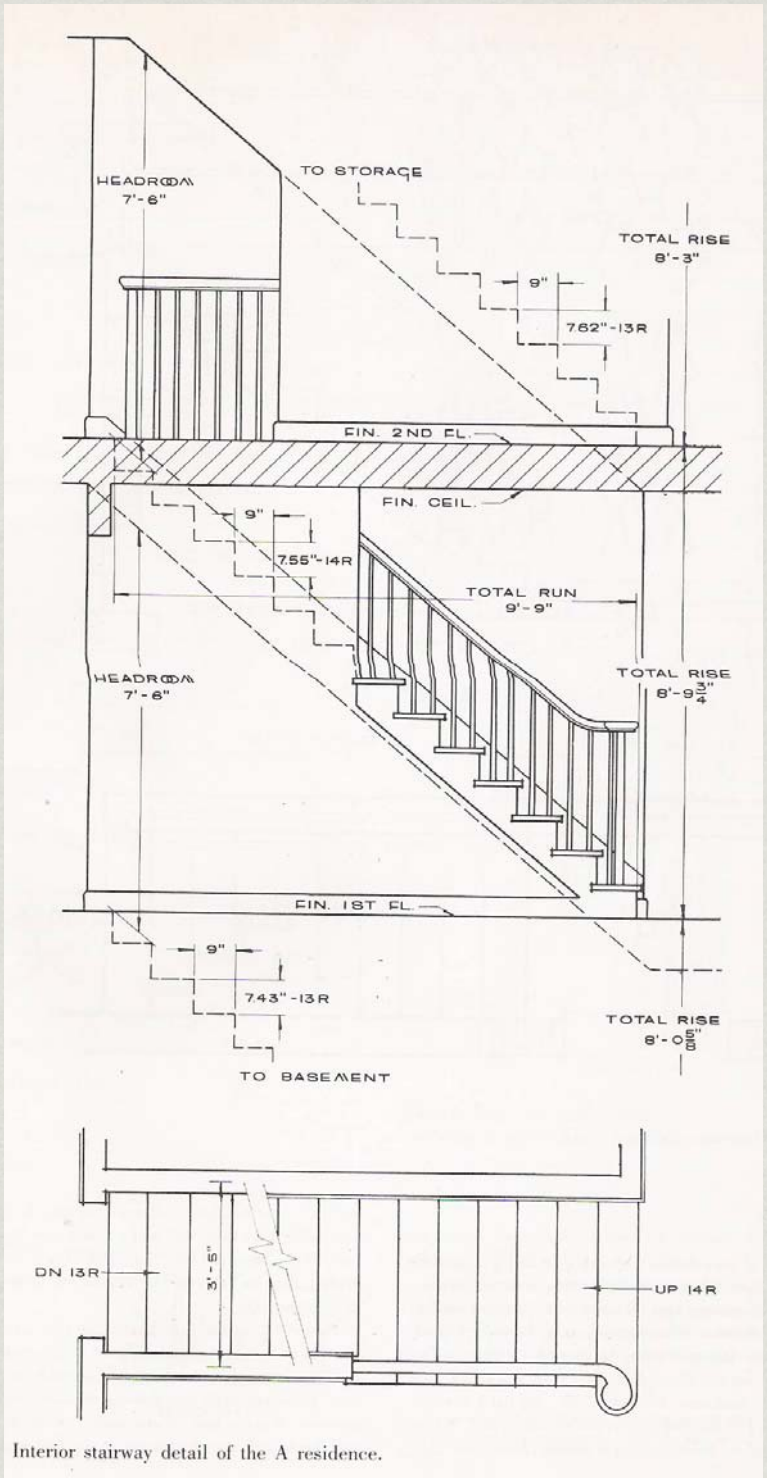


Figure 12. Exterior stairway detail of the Z residence.



Interior stairway detail of the A residence.