

lecture
one

**overview of
structures**

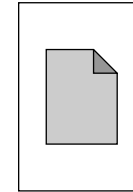
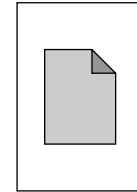


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www.greatbuildings.com
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Syllabus & Student Understandings



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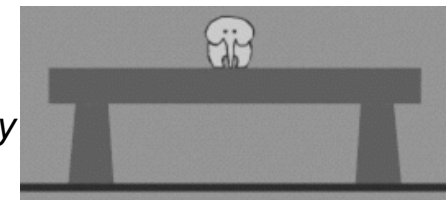
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Course Description

- *synthesis in structural design*
 - *form and function*
 - *safety*
 - *serviceability*
 - *feasibility*
- *context of*
 - *design codes (loads, method, limits)*
 - *material properties and behavior*

Architectural Space and Form

- *structure is a device for channeling loads that result from the use and/or presence of the building to the ground*
 - *span a roof*
 - *hold up a floor*
 - *cross a river*
 - *suspend a canopy*



www.pbs.org/wgbh/buildingbig/

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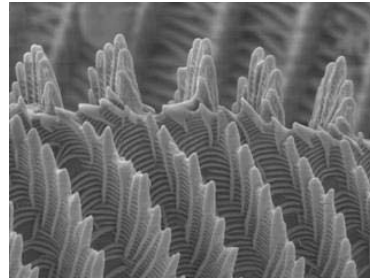
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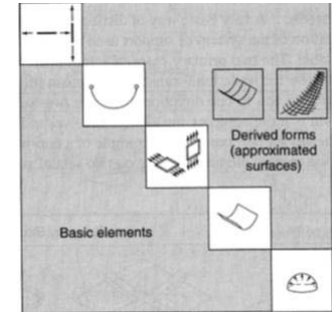
Structure Definition

- alternatively:
 - “a physical entity having a unitary character that can be conceived of as an organization of positioned constituent elements in space in which the character of the whole dominates the interrelationship of the parts”



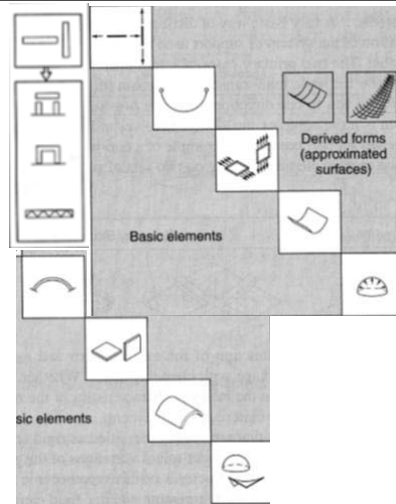
Structural Organization

- classifications
 - geometry
 - line-forming
 - surface-forming
 - stiffness
 - rigid
 - flexible
 - one-way or two-way
 - spatial organization and load transfer
 - materials

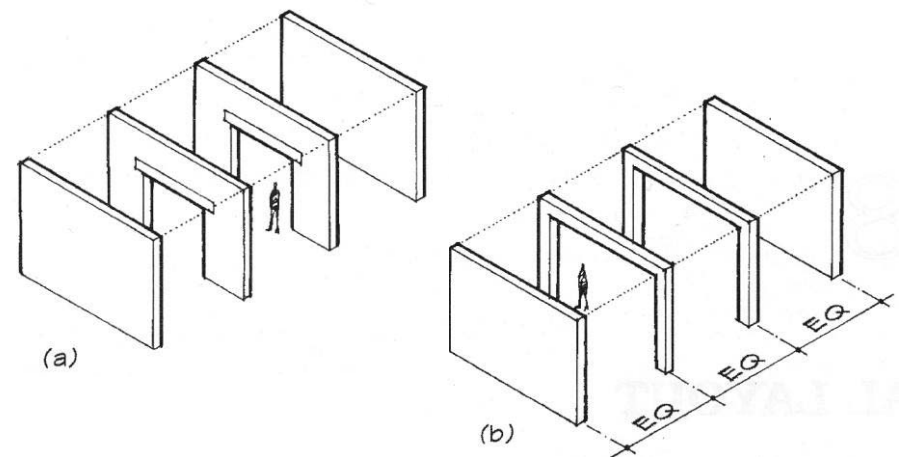


Structural Components

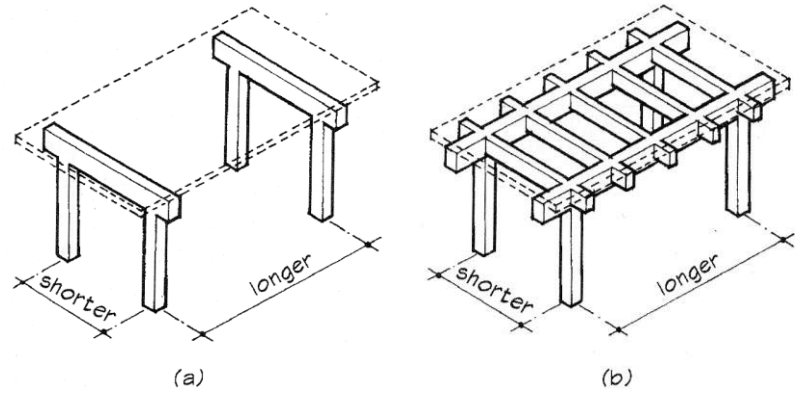
- bearing walls
- columns
- beams
- flat plates
- trusses
- arches
- shells
- cables



Bearing Walls



Beams & Plates

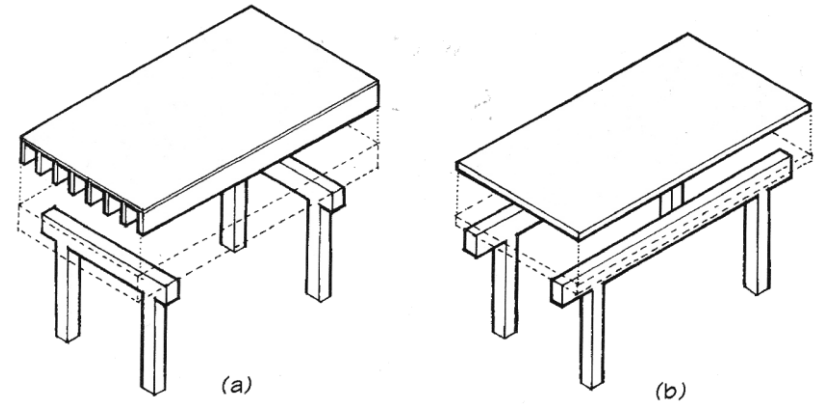


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Beams & Plates



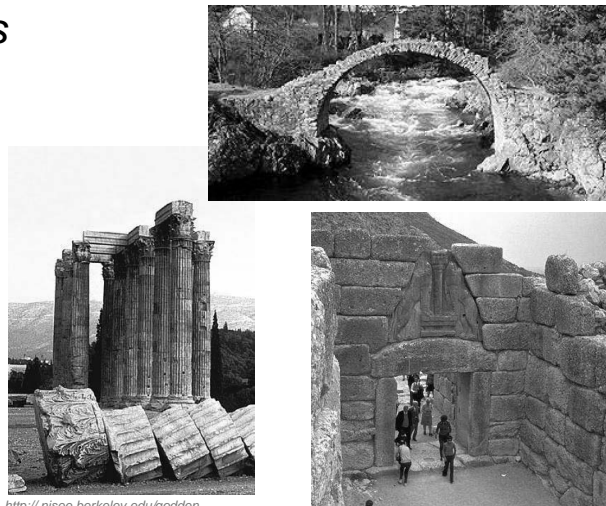
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Stone + Masonry

- columns
- walls
- lintels
- arches



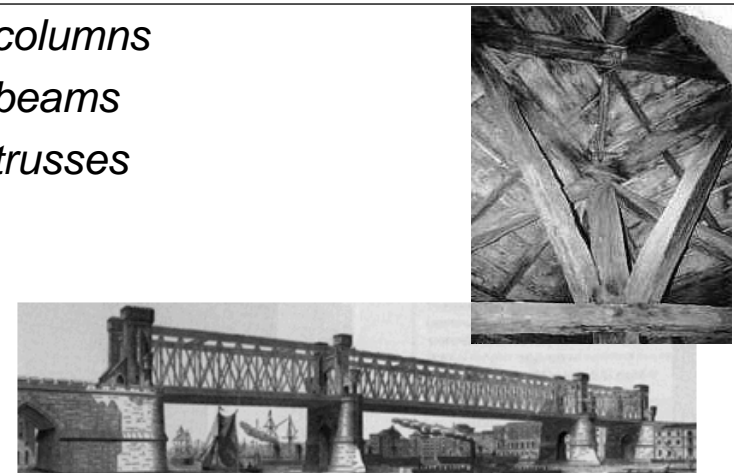
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Wood

- columns
- beams
- trusses



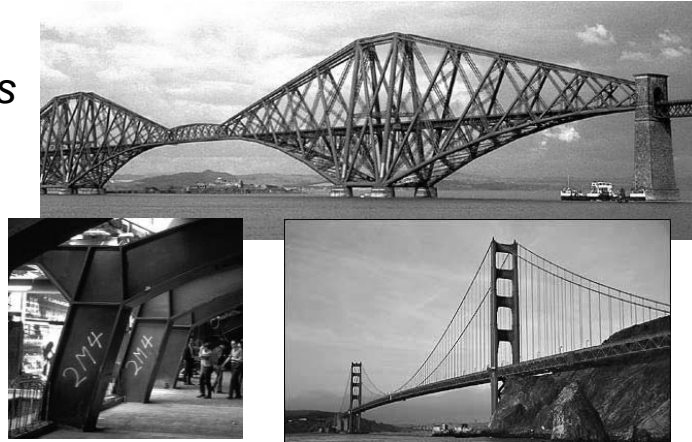
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Steel

- cast iron – wrought iron - steel
- cables
- columns
- beams
- trusses
- frames



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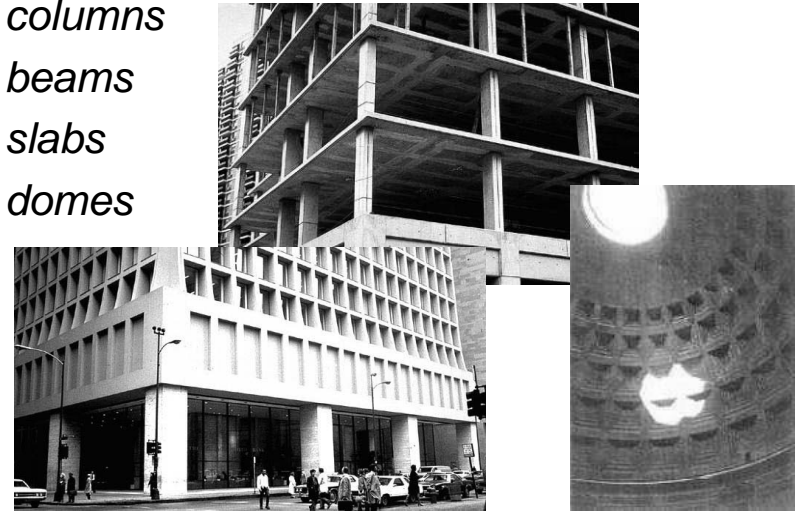
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Concrete

- columns
- beams
- slabs
- domes



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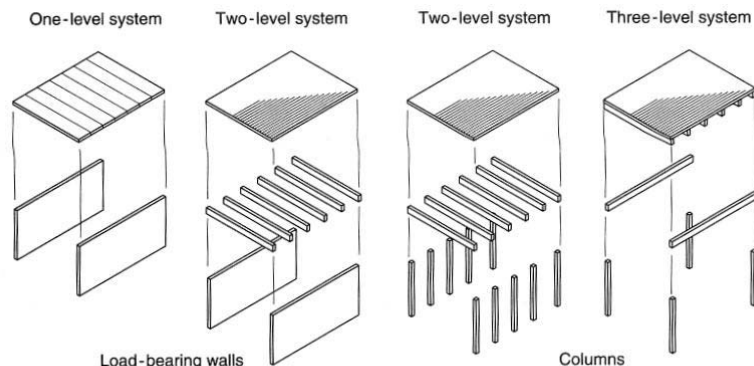
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Building Framing

- Components or Assemblages



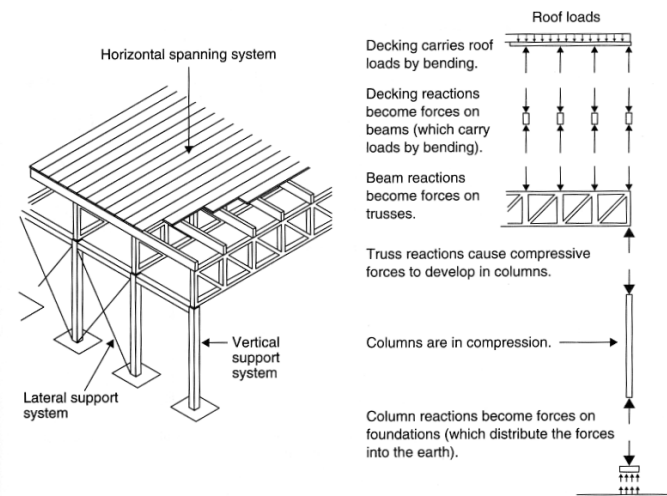
(a) Common types of horizontal spanning systems (one, two, and three level systems) used in relation to different types of load-bearing wall and columnar vertical support systems.

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Building Framing



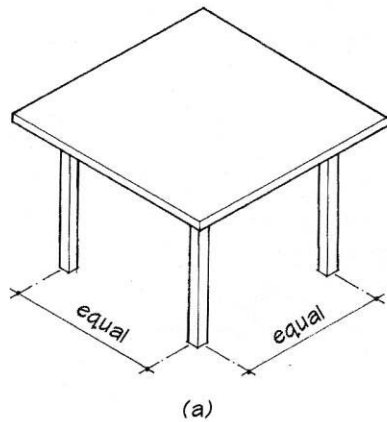
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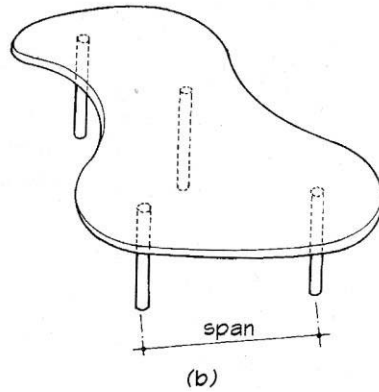
System Selection

- *evaluation of alternatives*



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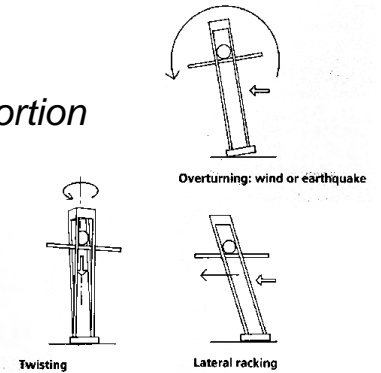
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Structural Design Criteria

- *components stay together*
- *structure acts as whole to be stable*
 - resist sliding
 - resist overturning
 - resist twisting and distortion
- *internal stability*
 - interconnectedness
- *strength & stiffness*



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