

Masonry Design

Ce479

Instructor Julio A. Ramirez

Topics

- History of Masonry (*Photos courtesy of Prof. Richard Klingner*)
- Masonry Components
- Bonding Patterns and Wall Types
- Fire resistance and Durability of Masonry
- Masonry Design Provisions
- Classification of Masonry Elements According to Structural Function
- Design of Gravity Load Bearing Elements
- Design of Reinforced Masonry

History of Masonry- Origins



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Modern Masonry Design

Historical Building Method

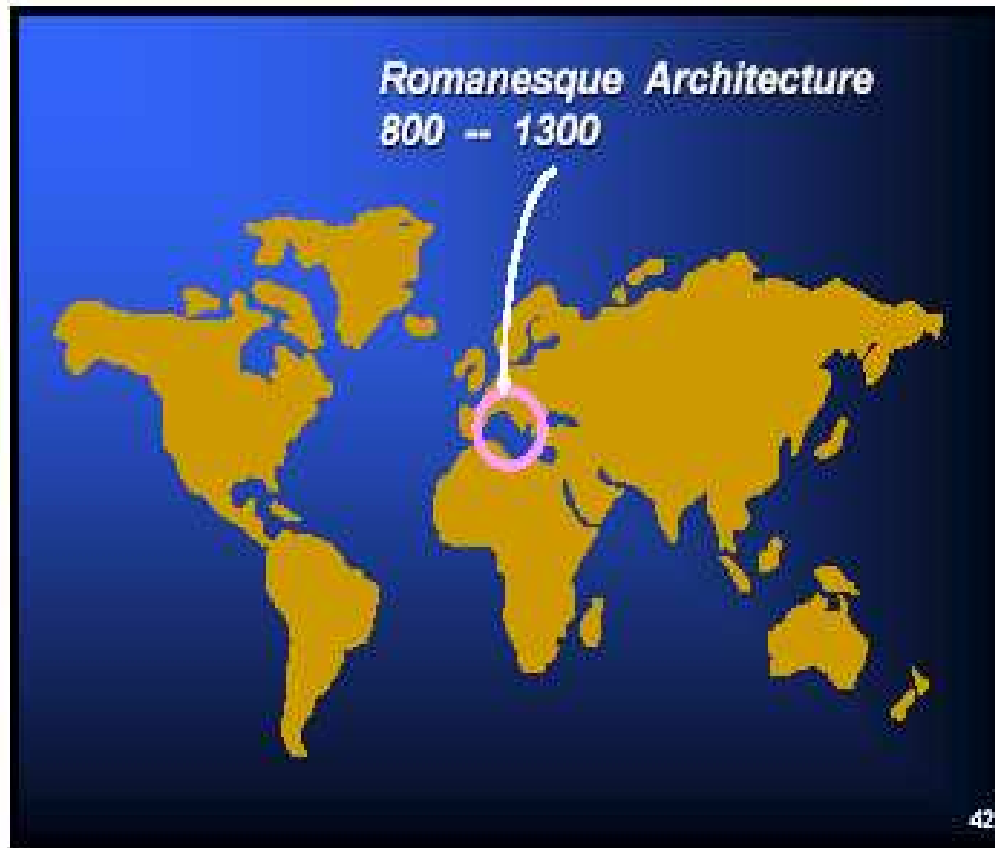
- Originally unreinforced, compression element
- H/T limited-natural restriction on height before unstable
- Empirical design (Remains in code)
- Oldest manufactured building material

Origins



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Evolution



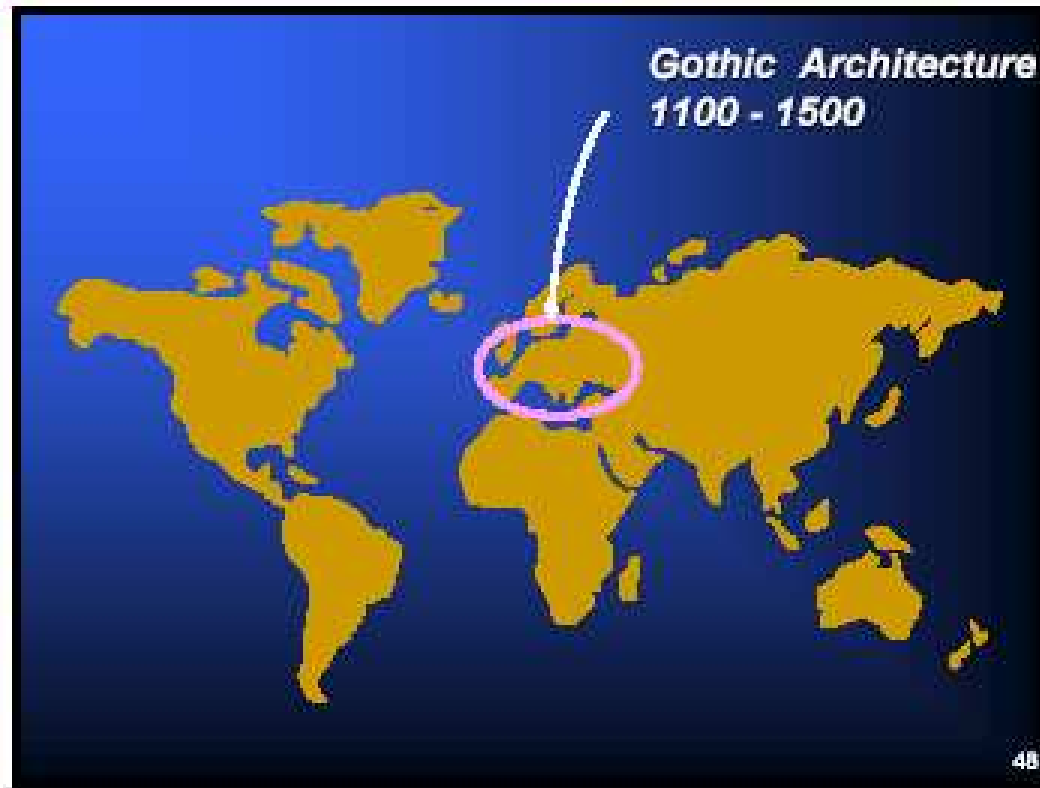
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More Recent Examples



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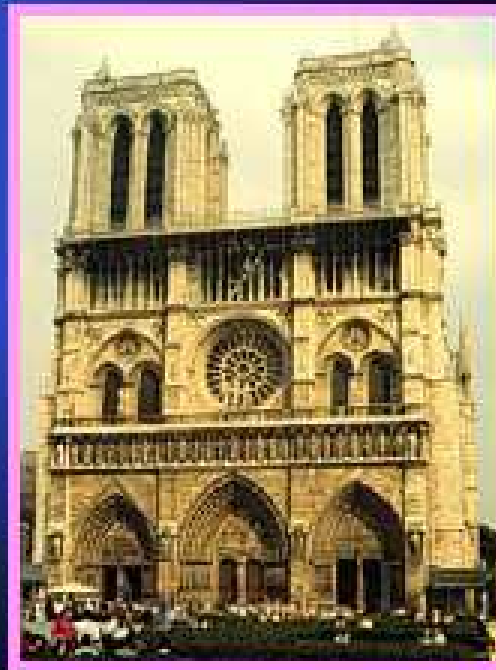
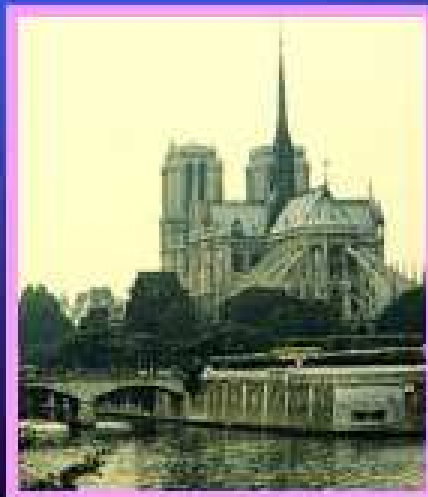
History of Masonry



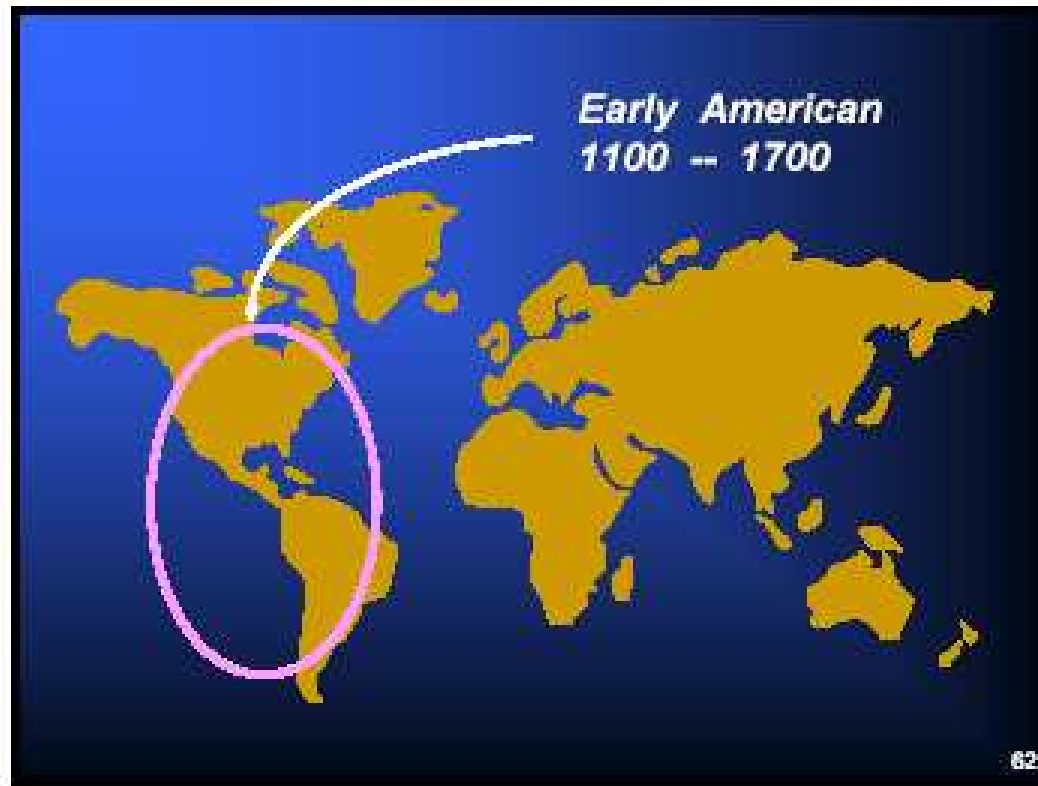
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History of Masonry

Paris, France
Notre Dame Cathedral
1163 - 1235



History of Masonry



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History of Masonry



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History of Architecture



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History of Masonry

*Chicago, USA
skyscrapers 1890's*




*Monadnock Building, 1889
16 stories
unreinforced masonry walls
6 ft thick at base, 1 ft thick at top*

73


History of Masonry

Washington , DC , USA

*Neo - Grecian
Supreme Court Building
1935*



*Neo - Egyptian
Washington Monument
1848 - 1854
555 ft high
75 ft at base*



04

The image is a slide with a dark blue background. It features two photographs of buildings in Washington, DC. The first photograph, on the left, shows the Supreme Court Building, a large neoclassical structure with a prominent portico supported by columns. The second photograph, on the right, shows the Washington Monument, a tall, slender obelisk. Text labels in orange and white font provide details for each building, including their architectural style, names, and construction dates. A small number '04' is located in the bottom right corner of the slide.

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Masonry Units

- . Adobe
 - Unburned Clay Masonry
 - Restricted area use today
 - 16" min thickness
 - Low seismic areas

Masonry Units

C. Glass Masonry

- Non-structural, decorative
- Must carry self lateral loads to surrounding restraining structure

D. Stone Masonry

- Natural stone
- Multnomah Falls Lodge
- Crater Lake Lodge
- Min Thickness = 16 inches

Masonry Units

F. Hollow Unit Masonry

- A masonry unit whose net cross sectional area in every plane parallel to the bearing surface is less than 75 percent of the gross-sectional area in the same plane
- Concrete block
- Hollow clay units

G. Solid Masonry

- A masonry unit whose net cross sectional area in every plane parallel to the bearing surface is 75 percent or more of the gross-sectional area in the same plane

Masonry Types

I. Grouted Masonry

- 2 wythes with interior space partially or completely filled with grout
- Grouted cells of units
- Unreinforced
- Reinforced

Masonry Types

- J. Reinforced Hollow Unit Masonry
- Some cells contain rebar
 - Cells with rebar contain grout
 - All cells may be grouted
 - Horizontal reinforcement may be in block bond beams or in mortar joints or both

Masonry Types

K.Masonry Veneer

- “Non-structural”
- Must be vertically supported
- Must be laterally stabilized

Masonry Units CE479

- Clay Brick
- Concrete Block

Example of use of modern Masonry (TGRW Structural Engineers, Chicago ILL)

*747 North LaSalle
Chicago, Illinois*

Primary Structural System

- Load Bearing CMU
- Composite Metal Deck / Framing
- CMU Shear Walls

Exterior Wall System

- Architectural Split Face CMU and Glass Curtain Walls



BIG BOWL

FRESH ASIAN COOKING

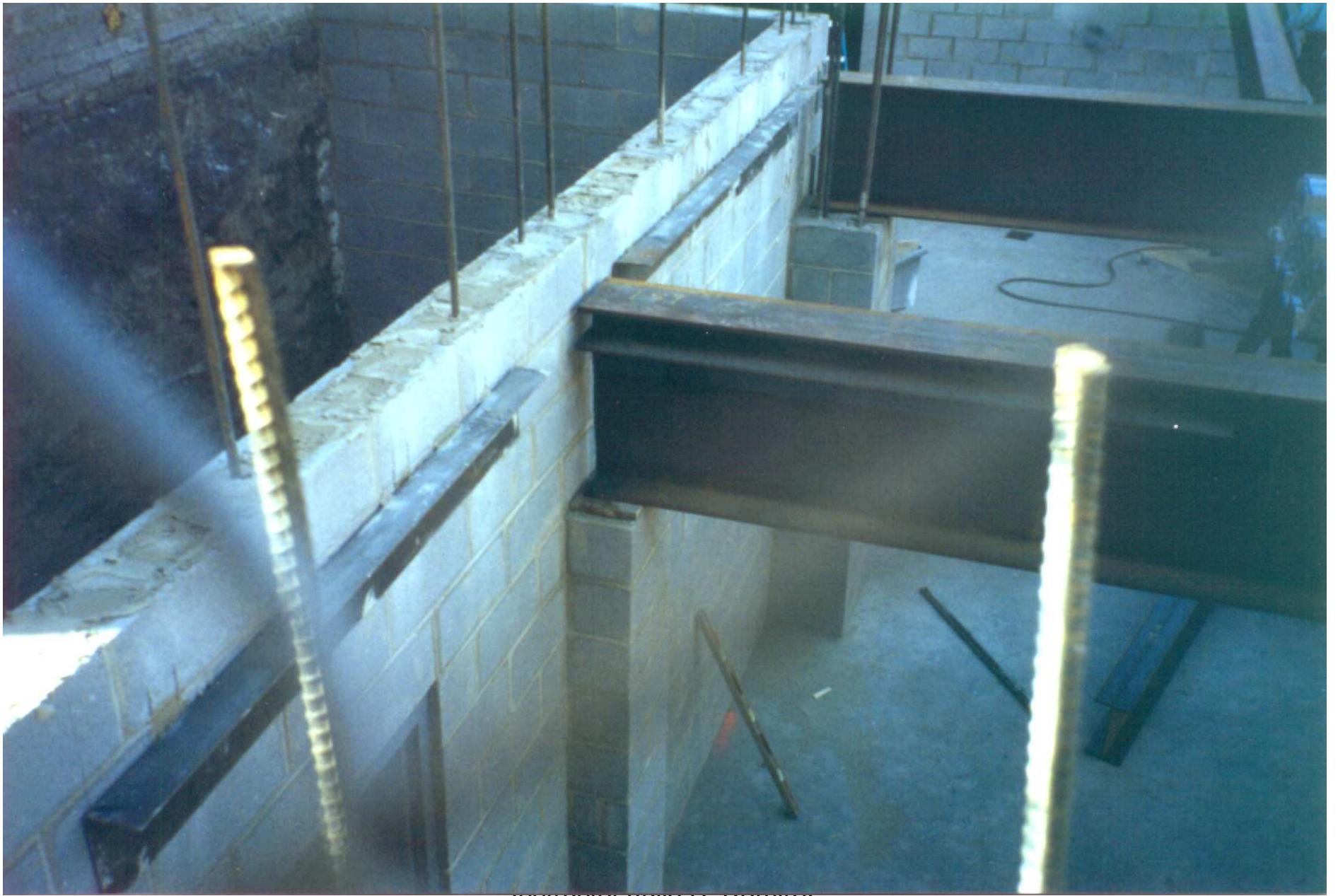
STATE & CEDAR
ERIE & LASALLE
LINCOLNSHIRE

ERIKS
BRIDGE, MARINE AND OFFSHORE SERVICES
WINDING PILING DREDGING
CONCRETE MARINE MARINE
CONSTRUCTION CONSTRUCTION CONSTRUCTION









Instructor Gökçe A. Karamoç



Welding steel beams at a construction site.





