Building Materials, Construction and Sustainable Design
Built Environments
Building Materials

- Since the beginning of time, people have created shelter out of whatever was at hand. Caves were convenient ready made shelters and, yes, people did live in them. But after emerging from the caves shelters were constructed of wood, grasses, skins, stone and any other suitable readily available resources.
A simple igloo can maintain a 70 degree temperature differential between the indoor and outdoor environment.
TiPi
TiPi
Building Materials

- Mud/Bricks

![Diagram of Pueblo Acoma, Warm Season Day and Night](image1.png)

![Diagram of Pueblo Acoma, Cool Season Day and Night](image2.png)
Pueblos

- Heat wave build up
- Sleeping/cooling room
- Store room
- Sleeping room
- Window
- Door

- Eating area, work area
- Cooking is done outside in the summer.

Idealized Pueblo cross section
Building Materials

- Glass
Building Materials

- Wood

Fairbanks House, Dedham, Massachusetts
Building Materials

- Wood
Building Materials

- Iron/Steel
  - with Glass

- Industrialization

Crystal Palace 1851
Building Materials

- Cast Iron
Air Conditioning

- 1800’s Experimental
- 1902 Carrier invents first air conditioner
- 1920’s AC starts showing up in movie theaters, office buildings and department stores
Larkin Building

1904
Skyscrapers

- Lake Shore Drive
  - Mies van der Rohe
  - 1951
  - Chicago, IL

- Lever House
  - SOM
  - 1952
  - New York, NY

- Equitable Life
  - Pietro Belluschi
  - 1947
  - Portland, OR

- UN Secretariat
  - W. Harrison, et al.
  - 1950
  - New York, NY
Skyscrapers

Bank of America 2009
LEED CS Platinum
New York, NY

Legg Mason Headquarters 2010
LEED CS Gold
Baltimore, MD
Kahn

- **Dormitories**: India Institute of Management, Ahmedabad
- **National Assembly Building**: Dhaka, Bangladesh
Kahn

- Institute of Public Administration
The Competition seeks integrative solutions for a building using clay masonry units (brick) as a primary material. This competition seeks to explore the potential of brick construction. Design teams are challenged to maximize the physical characteristics of this construction in the creation of integrated design solutions utilizing the physical characteristics of this material such as thermal mass, porosity (or lack thereof), modularity, color, etc.
BrickStainable

Hector Alejandro Mudica de Caso and Lourdes Ivonne Del Rio Suarez, Mexico
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Integration

- Thermal Storage

  - Thermal Storage Wall Systems
    - Heat absorbed from sunlight slowly penetrates 10-18 in. brick walls and warms the interior.
    - Less temperature fluctuation than direct gain systems.
    - Performance may be increased by providing vents to induce convection.
Integration

- Thermal Storage
Integration

- Trombe Walls
Integration

“Transparent Trombe Wall”

Nicholas Sawyer, England
Integration

- Green walls
  - storm water management
  - reduce heat island
  - create habitat

Aimilios Michael, Maria Eftychi, Floura Bouglatotii, Cyprus
Integration

- Green walls
  - storm water management
  - reduce heat island
  - create habitat

Raul Mata Reyes, Mexico

Real San Fratello Architects, USA
Integration

- Technology for shading

Institut du Monde Arabe, Jean Nouvel, Architect

Rogelio Chapa Treviño, Mexico
Integration

- Manufacture for water management and resource conservation
Integration

- Manufacture and assembly

ON-SITE Process: MANUFACTURE + ASSEMBLY

Kenfield Griffith, USA
Future or Present?

1.

2.

3.

4.

5.

6.
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