Analysis of Historic Structures

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Hagia Sophia, Istanbul

Completed in 537 AD, dome span of 32 m
Hagia Sophia, Istanbul

Partial collapse of dome, due to earthquakes:

- 558 AD (east quadrant)
- 869 AD (west quadrant)
- 1346 AD (east quadrant)

Image courtesy of Adrien Mortini, structurae.de
Beauvais Cathedral

- Partial collapse in 1284
Beauvais Cathedral

- Tower built in 1569
- Height of 153 m
- Supported on piers
- Tower collapsed 1573
Basilica of St. Francis in Assisi, Italy

13th C construction

Frescoes by Giotto

Image courtesy of Rob Jaffe, structurae.de
1871 Fire in Chicago
Boston Public Library, 1889-1890
1886 Patent for Fireproof Building
R. Guastavino Co. (1889-1962)
Essay of 1893

ESSAY
ON
THE THEORY AND HISTORY
OF
COHESIVE CONSTRUCTION,
APPLIED ESPECIALLY TO THE TIMBREL VAULT.

READ BEFORE THE SOCIETY OF ARTS,
MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
BOSTON,
BY
R. GUASTAVINO, ARCHITECT.

SECOND EDITION.

BOSTON
TICKNOR AND COMPANY
237 Tremont Street
1893
Load Testing by Guastavino Sr.
Spiral Staircases in Compression
Tiffany Building, NY, 1906
Grand Central Station, NY, 1913

Image courtesy of Adrien Mortini, structuraae.de
Guastavino Vaulting

• Research questions
  – Mechanics of tile vaults
  – Calculation methods used by Guastavino
  – Analysis of complex forms, like spiral staircases
  – etc