

Guastavino Structural Tile Vaulting in Pittsburgh

Spring Semester 2021

Instructor: Matthew Schlueb

Program Format: Five week course, 90 minute academic lectures and guided tour, with time for questions.

Course Objective:

To offer a master level survey of the Pittsburgh architectural works by Rafael Guastavino and his son, drawn from their Catalan traditions in masonry vaulting, as interpreted by a practicing architect and author of architecture.

Course Description:

Architect Rafael Guastavino and his son Rafael Jr. emigrated to the United States in 1881, bringing the traditional construction method of structural tile vaulting from their Catalan homeland, thereby transforming the architectural landscape from Boston to San Francisco. This course will examine their works in Pittsburgh, illustrating the vaults and domes made with structural tiles, innovations in thin shell construction, fire-proofing, metal reinforcing, herringbone patterns, skylighting, acoustical and polychromatic tiles. Lectures supplemented with a guided tour of these local structures, provided logistics and health safety measures permit.

Course Outline:

Lecture 1: From Valencia to New York [Tuesday, March 16, 2021 3pm-4:30pm]

Convent of Santo Domingo Refectory (arches and vaults; Mudéjar style; Zaragoza, Spain; 1283)

Monastery of Santo Domingo Refectory (bóveda tabicadas / maó de pla; Juan Franch; Valencia, Spain; 1382)

Batló Textile Factory (vaulted arcade atop metal columns; Rafael Guastavino; Barcelona, Spain; 1868)

La Massa Theater (shallow dome vault; Rafael Guastavino; Vilassar de Dalt, Spain; 1880)

Boston Public Library (structural tile vaults; Charles McKim; Boston, Massachusetts; 1889-1895)

St. Paul's Chapel (dome; Isaac Newton Phelps Stokes; Columbia University, New York; 1907)

Lecture 2: Material Innovations in Building Science [Tuesday, March 23, 2021 3pm-4:30pm]

Cathedral of St. John the Divine (dome; Rafael Guastavino Jr.; Morningside Heights, New York; 1909)

Western Theological Seminary Admin. Bldg. of Presbyterian Church (vestibule; Thos. Hannah; Pittsburgh; 1915)

Biltmore Estate (exterior loggia vaults; Richard Morris Hunt; Asheville, North Carolina; 1894)

Bell Telephone Company (exterior loggia vaults; James T. Windrim; Pittsburgh; 1931)

Phipps Natatorium (pool vault; Grosvenor Atterbury; Pittsburgh; 1908)

Pittsburgh Athletic Association Swimming Pool (pool vault; Benno Janssen; Pittsburgh; 1910)

Mellon Residence (pool vault; E.P. Mellon; Pittsburgh; 1917)

La Ceramica Manufacturing Plant (vestibule; Rafael Guastavino Jr.; Woburn, Massachusetts; 1906-07)

Vanderbilt Hotel Della Robbia Room (vaults; Whitney Warren & Charles Wetmore; Murray Hill, New York; 1912)

Allegheny General Hospital (portico and vestibule vaults; Edward York & Philip Sawyer; Pittsburgh; 1929-31)

Saint Thomas Church (Rumford tile; Ralph A. Cram & Bertram G. Goodhue; Midtown, New York; 1913)

County Office Building (Akoustolith tile; Stanley L. Roush; Pittsburgh; 1930)

Cathedral of Learning (Akoustolith tile; Charles Z. Klauder; Pittsburgh; 1937)

Buhl Planetarium (thermal tile dome; Charles T. Ingham & William Boyd Jr.; Pittsburgh; 1938)

Monocoque 1 (single shell composites; Neri Oxman; Museum of Modern Art, New York; 2007)

Lecture 3: Geometric Innovations in Architecture [Tuesday, March 30, 2021 3pm-4:30pm]

Spanish Pavilion (vaulted arcade atop spiral columns; Rafael Guastavino; Columbian Exposition of Chicago; 1893)

La Lonja de la Seda (vaulted arcade; Pedro Compte, Juan Iborra & Johan Corbera; Valencia, Spain; 1482)

Pantheon (dome with central oculus; Caesar N. Trajan, Caesar T. Hadrian; Rome, Italy; 114-126)

Hagia Sophia (pendentive dome; Isidore of Miletus & Anthemius of Tralles; Istanbul, Turkey; 360-537)

Central Congregational Church (dome with ocular wdws.; John Carrere & Thomas Hastings; Providence, R.I.; 1893)

Bristol County Superior Courthouse (elliptical and conical domes; Frank Irving Cooper; Taunton, Mass.; 1893)

St. Boniface Roman Catholic Church (pendentive dome with arched wdws.; A.F. Link; Pittsburgh; 1926)

Calvary Episcopal Church (crypt vaults; Ralph Adams Cram; Pittsburgh; 1906)

First Baptist Church of Pittsburgh (nave, aisle, narthex vaults; Bertram Goodhue; Pittsburgh; 1911)

Holy Rosary Church (plastered nave, aisle, apse vaults; Ralph Adams Cram; Pittsburgh; 1929)

East Liberty Presbyterian Church (nave, apse, narthex, stair, crypt vaults; Ralph Adams Cram; Pgh.; 1931-33, 42)

Heinz Memorial Chapel (transept and aisle vaults; Charles Z. Klauder; Pittsburgh; 1934)

Wainwright Building (early skyscraper; Louis H. Sullivan; St. Louis, Missouri; 1891)

Gould Library (dome; Stanford White; New York University, New York; 1897)

University of Virginia Rotunda (dome; Thomas Jefferson; Charlottesville, Virginia; 1899)

Brooklyn Institute of Arts and Sciences (shallow dome; Stanford White; Prospect Park, New York; 1905)

Minnesota State Capital (pointed dome; Cass Gilbert; St. Paul, Minnesota; 1905)

Rodef Shalom Synagogue (square dome; Henry Hornbostel; Pittsburgh; 1906)

Queensboro Bridge (vaulted arcade atop piers; Henry Hornbostel; East River, New York; 1909)

Park Güell (vaulted arcade atop columns; Antoni Gaudí; Barcelona, Spain; 1903)

Cathedral of Learning (vaulted arcade atop columns; Charles Z. Klauder; Pittsburgh; 1937)

St. Paul's Chapel (spiral stair vaults; Isaac Newton Phelps Stokes; Columbia University, New York; 1907)

Cathedral of St. John the Divine (spiral stair vaults; Rafael Guastavino Jr.; Morningside Heights, New York; 1909)
Baker Hall (vestibule, serpentine stair vaults; Henry Hornbostel; Pittsburgh; 1914)
Japanese Pavilion (fitted timber joinery, large overhanging roofline; Columbian Exposition of Chicago; 1893)
Byōdō-in Temple (fitted timber joinery, large overhanging roofline; Kyoto, Japan; 1053)
Robie House (cantilevering horizontal roofline; Frank Lloyd Wright; Chicago, Illinois; 1909)
German Pavilion (cantilevering horizontal roofline, floor vaults; Ludwig Meis van der Rohe; Barcelona, Spain; 1929)
House of Tile (decorative tile; Rafael Guastavino Jr.; Bay Shore, Long Island, New York; 1914)
Ca'n Terra 'House of the Earth' (quarry grotto; Antón García-Abril & Débora Mesa; Menorca Island, Spain; 2021)

Lecture 4: Structural Innovations in Engineering [Tuesday, April 6, 2021 3pm-4:30pm]

Boston Public Library (interlocking flanged tile vaults; Charles McKim; Boston, Massachusetts; 1889-1895)
Yale Memorial Rotunda (shallow dome floor; Carrère & Hastings; New Haven, Connecticut; 1900)
Doherty Hall (basement, bridge vaults; Henry Hornbostel; Pittsburgh; 1908-09)
William Penn Hotel (bridge vault; Benno Janssen; Pittsburgh; 1928)
University Club (shallow vault; Henry Hornbostel; Pittsburgh; 1922)
Grace Universalist Church (spherical dome; William Chase; Lowell, Massachusetts; 1895)
Central Congregational Church (dome with adj. vaults; John Carrere & Thomas Hastings; Providence, R.I.; 1893)
St. Boniface Roman Catholic Church (pendentive dome with arched wdws.; A.F. Link; Pittsburgh; 1926)
Cathedral of St. John the Divine (long span dome; Rafael Guastavino Jr.; Morningside Heights, New York; 1909)
Gould Library (thin shell dome; Stanford White; New York University, New York; 1897)
Buhl Planetarium (long span, thin shell dome; Charles T. Ingham & William Boyd Jr.; Pittsburgh; 1938)
St. Paul's Chapel (double flying dome; Isaac Newton Phelps Stokes; Columbia University, New York; 1907)
University of Virginia Rotunda (dome atop floor columns; Thomas Jefferson; Charlottesville, Virginia; 1899)
Army War College (stacked domes; Charles McKim; Washington D.C.; 1905)
Elephant House (stacked domes; George Heins & Christopher La Farge; Bronx Zoo, New York; 1906)
City Hall Subway Station (series of arched vaults; George Heins & Christopher La Farge; New York; 1903)
Porter Hall (series of arched vaults; Henry Hornbostel; Pittsburgh; **1905-07**, 1915)
Basilica of St. Lawrence (elliptical dome; Rafael Guastavino; Asheville, North Carolina; 1903)
Tiffany Building (elliptical dome; Charles McKim; New York; 1905)
Baker Hall (serpentine stair vaults; Henry Hornbostel; Pittsburgh; 1914)
St. Francis de Sales (flying buttress; Henry D. Dagit; Philadelphia, Pennsylvania 1908)
National Museum of Natural History (double flying dome; Charles McKim; Washington D.C.; 1909)
Calvary Episcopal Church (crypt vaults; Ralph Adams Cram; Pittsburgh; **1906**)
Biltmore Estate (exterior loggia vaults; Richard Morris Hunt; Asheville, North Carolina; 1894)
Astor Courts (barrel ribbed vaults supporting steel truss; Charles McKim; Rhinecliff, New York; 1902)
Pennsylvania Station (steel truss vaults; Charles McKim; Midtown, New York; 1910)
Stephan Foster Memorial (steel frame; Charles Z. Klauder; Pittsburgh; 1937)
Cathedral of Learning (vaulted arcade atop columns; Charles Z. Klauder; Pittsburgh; 1937)
Rodef Shalom Synagogue (square dome; Henry Hornbostel; Pittsburgh; **1906**)
Williamsburg Bridge (steel truss vaults; Henry Hornbostel; East River, New York; 1907)
Mellon Arena (retractable metal frame dome; Mitchell & Ritchey; Pittsburgh; 1961-2011, 50 yrs.)
East Liberty Presbyterian Church (nave, apse, narthex, stair, crypt vaults; Ralph Adams Cram; Pgh.; 1931-33, **1942**)
Armadillo Vault (unreinforced cut sandstone asymmetric vault; Block Research Group, ETH Zurich; 2016)
Beyond Bending (unreinforced concrete stiffened vault; Block Research Group, ETH Zurich; 2016)

Lecture 5: Decorative Innovations in Ornament [Tuesday, April 13, 2021 3pm-4:30pm]

Progress Club of New York City (brick façade; Rafael Guastavino; Upper West Side, New York; 1882)
Boston Public Library (exposed decorative tiles; Charles McKim; Boston, Massachusetts; 1889-1895)
Porter Hall (relief cornice; Henry Hornbostel; Pittsburgh; **1905-07**, 1931)
Baker Hall (relief cornice; Henry Hornbostel; Pittsburgh; 1914)
Biltmore Estate (exterior loggia vaults; Richard Morris Hunt; Asheville, North Carolina; 1894)
City Hall Subway Station (decorative glazed tiles; George Heins & Christopher La Farge; New York; 1903)
Church of Christ Scientist (decorative glazed tile; Charles Brigham; Boston, Massachusetts; 1905)
Army War College (layered decorative tiles; Charles McKim; Washington D.C.; 1905)
Madison Square Garden (rooftop open garden; Stanford White; Midtown, New York; 1890)
Basilica of St. Lawrence (elliptical dome; Rafael Guastavino; Asheville, North Carolina; 1903)
La Ceramica Manufacturing Plant (broken mosaic; Rafael Guastavino Jr.; Woburn, Massachusetts; 1906-07)
Pavellons Güell 'Dragon Gate & Stables' (broken mosaic; Antoni Gaudí; Barcelona, Spain; 1884-87)
Shadyside Presbyterian Church (mosaic tile; Wilson Eyre & McIlvaine; Pittsburgh; 1938)
B'Nai Israel Synagogue (portico vaults with decorative metal, mosaics; Hornbostel, Sharove & Friedman; Pgh; 1924)
Chapel of Our Lady (decorative shrine; Rafael Guastavino Jr.; Asheville, North Carolina; 1908)
Cathedral of St. John the Divine (long span dome; Rafael Guastavino Jr.; Morningside Heights, New York; 1909)
Catedral de Puebla (dome, colorful tile; Manuel Tolsá; Puebla, Mexico; 1575)
Mexico City Metropolitan Cathedral (largest masonry roof; Claudio de Arciniega; Mexico City, Mexico; 1573-1813)
Catedral de Guadalajara (spires, mixed styles; Martín Casillas; Jalisco, Mexico; 1618)
Grand Central Terminal Oyster Bar (decorative tile; Warren & Wetmore; Midtown, New York; 1912)
Pittsburgh Athletic Association Swimming Pool (pool vault; Benno Janssen; Pittsburgh; 1910)
Margaret Morrison Carnegie College (pavilion vault; Henry Hornbostel; Pittsburgh; 1914)
U.S. Bureau of Mines / Hamburg Hall (vestibule vaults; Henry Hornbostel; Pittsburgh; 1916)

Mellon Residence (pool vault; E.P. Mellon; Pittsburgh; 1917)
Pittsburgh City-County Building (loggia vaults with stone ribs; Henry Hornbostel; Pittsburgh; 1916)
 Basilica de la Virgen de los Desamparados (elliptical dome; Juan Gilaberto Jofré; Valencia, Spain; 1667)
 Vanderbilt Hotel Della Robbia Room (relief tile; Whitney Warren & Charles Wetmore; Murray Hill, N.Y.; 1912)
 House of Tile (decorative tile; Rafael Guastavino Jr.; Bay Shore, Long Island, New York; 1914)
Doherty Hall (basement, bridge vaults; Henry Hornbostel; Pittsburgh; 1908-09)
Machinery Hall / Hamerschlag Hall (vestibule vaults; Henry Hornbostel; Pittsburgh; 1914)
 Saint Thomas Church (Rumford tile; Ralph A. Cram & Bertram G. Goodhue; NY; 1913)
Allegheny General Hospital (portico and vestibule vaults; Edward York & Philip Sawyer; Pittsburgh; 1929-31)
 Nebraska State Capital (mosaic tile; Bertram Goodhue & Hildreth Meière; Lincoln Nebraska; 1928-1931)
St. Boniface Roman Catholic Church (pendentive dome with arched wdws.; A.F. Link; Pittsburgh; 1926)
County Office Building (Akoustolith tile; Stanley L. Roush; Pittsburgh; 1930)
 Allegheny County Morgue (horse drawn relocation; Pittsburgh; 1903)
Allegheny County Courthouse (basement vaults; Stanley L. Roush; Pittsburgh; 1911-13?, 1924-28)
 Native Mound Site (palimpsest dome; Early Archaic Culture; Monongahela fork in the Ohio River; circa 9,000 BC)
Bell Telephone Company (exterior loggia vaults; James T. Windrim; Pittsburgh; 1931)
U.S. Post Office and Courthouse (vestibule thru glass; Trowbridge & Livingston; Pittsburgh; 1931-34)

Bibliography:

Guastavino Vaulting: The Art of Structural Tile, John Ochsendorf (Princeton Architectural Press, 2010)
The Transfer of Thin Masonry Vaulting from Spain to America, George R. Collins (Journal of the Society of Architectural Historians, Vol. 27, No. 3, pp. 176-201, Oct., 1968)
Essay On the Theory and History of Cohesive Construction: Applied Especially to the Timbrel Vault, Rafael Guastavino (Ticknor and Company, 1893)
Guastavino Fireproof Construction Company architectural records, 1866-1985 [3,651 architectural drawings, administrative records, project files, factory orders, photographic slides, and sample products], Gift of the Guastavino Fireproof Construction Company Department of Drawings and Archives, Avery Architectural and Fine Arts Library, Columbia University, 1963)
<https://clio.columbia.edu/catalog/3463538>
The Old World Builds the New: The Guastavino Company and the Technology of the Catalan Vault, 1885-1962, Janet Parks and Alan G. Newmann (Avery Architectural and Fine Arts Library, 1996)
An Architect and His Son: The Immigrant Journey of Rafael Guastavino II and Rafael Guastavino III, Rafael Guastavino IV (Heritage Books, 2008)
Guastavino Co. (1885-1962): catalogue of works in Catalonia and America, Salvador Tarragó (Collegi d'Arquitectes de Catalunya, 2002)
The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900-1933, Emily Thompson (The MIT Press, 2004)
Timbrel domes of Guastavino: Nondestructive Assessments on a Half-Scale Model, Ece Erdogmus (International Journal of Architectural Heritage, Vol. 2, Issue 4, pp. 330-352, 2008)
Immigrant Architect: Rafael Guastavino and the American Dream, Berta de Miguel, Kent Diebolt, Virginia Lorente (Tilbury House Publishers, 2019)

Optional Writing Assignment:

Due: Friday, March 12, 2021 (Submit: matthew.schlueb@pitt.edu)
 Maximum Length: 1,500 words (Minimum Length: three-line haiku)

Subject:

Tell a story about a childhood memory or family tradition that involved one of the Guastavino buildings listed in the course syllabus. Describe a particular insight into the building unique to your personal experience, that may have involved a special event, social custom, ritual, or simply in passing, ideally revealing a practice that no longer exists. Alternatively, a memory of an everyday sensory experience originating from use of the building, such as the sound of the door hinges closing, the smell of the musky interior, or the feel of worn stone steps, indented, eroded by shoes. Ultimately, try to capture something meaningful about the building to you, that resonated for a specific reason.

Example:

When my wife and I were to be married, we considered several churches in which to hold our wedding, before settling on **St. Boniface Roman Catholic Church**. As a student of architecture, you might think the selection of a building would be of utmost importance. And, although it mattered, at the time I was more overwhelmed by the excitement for the coming day. That said, reflecting back on that period over a quarter century ago, I recall the impression the central dome had on me, such a dominating presence that defined the interior space. This was partially due to the bright blue color on the interior, but more so the barrel tiles on the roof, that reminded of old-world domes found all over my wife's ancestral Italian homeland. I have since learned that this dome originates from the Catalan region of Spain, revealed by the proportionately flat shape of the dome as compared to the circular profile of a Roman dome. Pittsburgh is filled with churches built with methods carried over from Europe. Yet somehow, I was drawn to this one, with a dome that possessed a certain authenticity, the weight of a structure built of materials and techniques so often missing in the buildings constructed today. It is no wonder, as this is a dome pieced together with a know-how that only one man and his son had in America back then.



“Look around you and you will find some of the most exciting architecture the past century has produced.” – American Institute of Architects, New York Chapter exhibition of Guastavino buildings (Sept. 1967).

Instructor Bio:

Matthew Schlueb is a licensed architect practicing architecture for over two decades. He owns and operates a sole-proprietorship private practice, where he specializes in residential architecture and is dedicated to mastering the art of exceptionally tailored homes crafted by hand. He has authored ten books on architecture and lectures from the kindergarten to post-graduate level. His designs have been awarded locally and nationally by juried competitions, receiving praise internationally in both print publications and television media. His own home, Villa Vuoto, is a manifesto on creativity, questioning the conventions of the building industry, while expanding the minds and sensitivities of his two sons raised within circular space, where rooms are rounded and walls sloped. The house is an ongoing experiment exploring human sensibilities to subtleties revealed only by a careful handling of soft, curvilinear, textural form. Matthew was awarded Master of Architecture from Pratt Institute, where his thesis studied the visual perception of architectural space, exploring proxemic relationships between inhabitant and inhabitable form, isolating perceptual thresholds and their influences on human behavior. He continues this experimentation through his collaborations with local artists, folding their knowledge of materials and technique into his search for a meaningful architecture.

Instructor Experience:

Matthew Schlueb owns and operates a sole-proprietorship private practice, maintaining six to eight active projects, specializing in residential architecture. He has authored ten books on architecture and lectures from the kindergarten to post-graduate level.

Abridged CV:

2020 - Began construction of one-room, plant-based, addition to Villa Vuoto
2019 - Instructor, Carnegie Mellon University, Osher Lifelong Learning Institute, The Architecture of Antoni Gaudí
2018 - Invited Entry, Laka Foundation, The End of Architecture
2017 - Invited Speaker, PechaKucha Night Pittsburgh 26, Are We the Last Architects?
2016 - Instructor, University of Pittsburgh, Osher Lifelong Learning Institute, Architecture in the Modern Era
2015 - Featured writer/monthly contributor to the North Hills Magazine
2014 - Launched ‘Architectural Storytelling’ initiative, Cherry Blossoms
2013 - Featured guest on the Discovery Channel Network, Epic Bathrooms
2012 - Profiled in Pittsburgh Business Times, Executive Living, A Well-Rounded Experience
2011 - Villa Vuoto featured in Wesley Spectrum Tour of Homes, charitable fundraiser
2010 - Inaugural SCHLUEBarchitecture Student Design Competition, Dream Home
2009 - Published An Architect's Manifesto on the Origins of Creativity
2008 - Villa Vuoto published in Pittsburgh Magazine, winner of Superior Interiors, Far Out
2007 - Launched ‘the schlueb suite: Rifugio Collection’, SPLASH Luxury Home Collection
2006 - Villa Vuoto published in Moodne Kodu, Estonia, Crusade Against Rectangle
2005 - Featured guest on the HGTV Network, OFFbeat America
2004 - Completed construction on Villa Vuoto
2003 - Registered Architect, State of Ohio
2002 - Launched the ‘Why Learn to Draw?’ initiative, creativity against the world
2001 - NCARB Certification, licensed to practice throughout North America
2000 - Established SCHLUEBarchitecture studio, private practice, Pittsburgh
2000 - Registered Architect, State of Pennsylvania
1994 - Master of Architecture, Pratt Institute
1993 - Bachelor of Architecture, Pratt Institute
1991 - Bachelor of Science in Architecture, Ohio State University
1968 - Born in Columbus, Ohio

Authored Books:

2018 - traces: drawing from underlays (Villa Vuoto Publications, Pittsburgh)
2017 - eave shakings: North Hills Monthly Magazine, vol.3 (Villa Vuoto Publications, Pittsburgh)
2016 - mousetrap (Villa Vuoto Publications, Pittsburgh)
2016 - leaf shakings: North Hills Monthly Magazine, vol.2 (Villa Vuoto Publications, Pittsburgh)
2015 - sleeve shakings: North Hills Monthly Magazine, vol.1 (Villa Vuoto Publications, Pittsburgh)
2012 - sketches: blog on architecture (Villa Vuoto Publications, Pittsburgh)
2008/2010 - Villa Vuoto: An Architect's Manifesto on the Origin of Creativity (Stella Cadente Publications, Pittsburgh)
2002/2005 - creativity against the world (Villa Vuoto Publications, Pittsburgh)
1994 - gestured form and activated space (Pratt Institute, New York)

Contact:

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abridged cv: <http://www.schluebarchitecture.com/schlueb.pdf>

Self-Guided Tour of Pittsburgh's Guastavino tile vaults:

1. Rodef Shalom Synagogue (architectural innovation in square dome; Henry Hornbostel; 1906)
2. Baker Hall (structural innovation in serpentine stair vaults; Henry Hornbostel; 1914)
3. Mellon Residence (building science innovation in daylighting; E.P. Mellon; 1917)
4. Pittsburgh City-County Building (decorative innovation in dimensional tiles; Henry Hornbostel; 1916)
5. St. Boniface Roman Catholic Church (architectural innovation in pendentive dome; A.F. Link; 1926)
6. Allegheny General Hospital (decorative innovation in relief tiles; Edward York & Philip Sawyer; 1929-31)
7. Buhl Planetarium (structural innovation in thin shell dome; Charles T. Ingham & William Boyd Jr.; 1938)
8. Cathedral of Learning (building science innovation in Akoustolith tile; Charles Z. Klauder; 1937)

