GREAT ACHIEVEMENTS | notable structural engineers



William Hubert Burr

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illiam Hubert Burr was widely known as a Professor of Civil Engineering at Columbia University, New York, and internationally known as a Consulting Engineer and one of the greatest bridge engineers of the post civil war period. He was born in Watertown, Connecticut, July 14, 1851. He attended the Watertown Academy and then entered a four-year program at Rensselaer Polytechnic Institute (RPI), Troy, NY. He graduated in a class of 17 students in 1872 with a degree of Civil Engineer.

In 1872, he went to work for the Philipsburg Manufacturing Company in Philipsburg, New Jersey that had recently moved into the bridge building field with Alfred P. Boller, RPI '61. After a promising start, the firm went bankrupt in 1874 and Burr went to work for the City Water-Works of Newark, NJ, for part of one year. In the following year, he returned to Rensselaer as an Instructor in Mechanics. In 1876, he was appointed Professor of Rational and Technical Mechanics and served in that position until 1884.

His bridge building career began anew when he was appointed Assistant to the Chief Engineer of the Phoenix Bridge Company, Aldolphus Bonzano. Phoenix Bridge was the successor to Clark, Reeves and Company that ceased operations when Thomas C. Clarke left the firm. The President of the firm was David Reeves, Burr's classmate at RPI. William Reeves, RPI class of '73, was also an officer in the parent company, the Phoenix Iron Works.

Working with Adolphus Bonzano, Burr designed, or detailed the design of other engineers, and fabricated and erected some major bridges in the United States, including the Chesapeake and Ohio Railroad Railroad Bridge across the Ohio River at Cincinnati, Ohio, then the heaviest truss bridge in existence; the Louisville & Jeffersonville bridge across the



Chesapeake and Ohio Railroad Bridge connecting.

Ohio River; the Red Rock cantilever bridge across the Colorado River near Needles, Cal., designed by J. A. L. Waddell, (RPI '75); and, the Pecos viaduct in southwestern Texas, then the highest viaduct structure in the country.

He left Phoenix Bridge in 1891, when work slowed, and returned to New York City to become President of Sooysmith and Company, one of the early firms specializing in foundation design and construction. Sooysmith, a General in the Civil War, had a son by the same name who graduated from RPI in 1872, the same year as Burr, who was running the company at the time. He stayed with Sooysmith for one year and returned to engineering education as a Professor of Civil Engineering at the Lawrence Scientific School at Harvard University.

In 1893, he became a Professor of Civil Engineering at Columbia University in New York City. Burr remained at Columbia until 1916, but his appointment evidently permitted him to maintain an extensive consulting practice with offices in New York City. His first consulting position was on two swing bridges across the Harlem River, on which Alfred P. Boller, his mentor from the Philipsburg Manufacturing Company was the chief engineer. They were the Harlem Ship Channel Bridge and the 145th Street Bridge. He was successively consultant to the Department of Public Works 1893-1895, the Department of Parks 1895-1897, the Department of Docks 1895-1897 and the Department of Bridges 1897-1903. In 1897, he entered a competition to design the Arlington Bridge across the Potomac River at Washington, DC. Designs were also submitted by Leffert L. Buck, George Morison, and William Hutton. Burr proposed

three designs, the third of which had six segmental concrete (Melan) arch spans of 192 feet, a double leaf bascule draw span with a clear opening of



William H. Burr 1851-1935.

159 feet and 27 masonry arches with spans of 60 feet. The total length of bridge was 3,400 feet. The long concrete arches consisted of five ribs with the exterior faces being covered with granite. The commission accepted Burr's design, but bridge work did not begin on the bridge until 1926. It opened in 1932.

In 1894, Burr was appointed to a committee by President Cleveland to determine whether a proposed bridge across the Hudson River should be a 2,400-foot span cantilever with piers in the river or a 3,200-foot span suspension bridge. The committee recommended the suspension bridge, but such a bridge, the George Washington bridge, was not built until 1931. While still teaching and serving as consultant to New York City, he was appointed by President McKinley in 1899 to a Board investigating the proposed route for a canal to connect the Atlantic and Pacific Oceans. He was a member of the majority, George S. Morison being the minority, which selected the Nicaragua Route. The committee later recommended the Panama Route. In 1902, he was appointed by President Theodore Roosevelt to determine whether a sea level or lock canal was the best solution. He recommended a sea-level canal, but Roosevelt chose the lock canal that was built later.

In 1906, Burr designed the Sandy Hill Reinforced Concrete Bridge across the Hudson River between Saratoga and Washington Counties near Glens Falls. It



Pecos Viaduct 1892.

42



Arlington Memorial Bridge.



Sandy Hill Bridge.

was a series of 15 concrete arches reinforced with steel arched ribs.

In 1908, he submitted a design for the Henry Hudson Memorial Bridge spanning the Spuyten Duyvil Creek that was widened as part of the Harlem Ship Channel. It was another reinforced concrete bridge with a main span of 703 feet, reinforced in a manner similar to his Sandy Hill Bridge.

In addition, Burr had been a consultant for the Governor of New York on a study for the New York State Barge Canal, a Consultant on the Holland Tunnel, Member of a Board to locate a deep water port for Los Angles, California, member of a board to review Gustav Lindenthal's design for the Queensboro

(Blackwell's Island) Cantilever Bridge, Report on the Necessity for the Catskill Water System, a tunnel under the East River, the second Croton Dam, and designer of the Harlem River Speedway and City Island bridge (1901).

He was a prolific writer, with seven books written between 1886 and 1913. In addition, he wrote many articles in the professional literature of his day. He was awarded the Thomas Rowland Fitch award in 1891 and the Order of the Sacred Treasure by the government of Japan. His Memoir in the Transactions ASCE stated, "Although he possessed to an almost uncanny degree that inherent structura1 sense and ability to check and design structures by judgment, on which great engineers of earlier days had to depend so largely, he was a leader in the development and advancement of the present rational, scientific technique of design... Professor Burr occupied an outstanding position in earlier American engineering education. He stood for the most advanced development of technical theory, and he also was a staunch advocate of the broad and liberal training of the engineer – a training which would enable him to develop into a cultured and useful citizen. In his papers' on engineering education, written in his characteristically crisp,

formal, and forceful manner, he always emphasized the fact that Engineering should be held to a professional parity with the professions of Law and Medicine...and... In fact, there were few major American engineering undertakings of the Twentieth Century in connection with which his approval or advice was not sought." James Kip Finch, his colleague at Columbia, stated, "With the death of Professor Burr at the Doctors Hospital in New York City on December 13, 1934, the Engineering Profession lost one of the great leaders of an engineering generation whose record of achievement is written in the greatest engineering works the world has ever known.".



Proposed Hudson-Fulton Memorial Bridge.

Dr. Griggs specializes in the restoration of historic bridges, having restored many 19th Century cast and wrought iron bridges. He was formerly Director of Historic Bridge Programs for Clough, Harbour & Associates LLP in Albany, NY, and is now an independent Consulting Engineer. Dr. Griggs can be reached at **fgriggs@nycap.rr.com**.



43