

Elemental Research

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When Basile Rabbat was a boy in Alexandria, Egypt, he had a plan: get a doctoral degree in structural engineering and teach at a university. He had two uncles who were civil engineers who introduced him to the industry. “I thought the work they did was fascinating,” he says. When he

was accepted to Alexandria University, he completed his bachelor’s degree in civil engineering, then after spending a year as a lecturer, he migrated to Canada to continue his education.

That’s when the career plan took a surprising turn. While completing his doctoral degree at the University of Toronto, Rabbat spent time working in a lab doing large-scale testing of reinforced concrete beams. The Portland Cement Association (PCA) heard about Rabbat’s research through one of his professors and asked him to work on a related project in its own structural lab. “I expected to do it for a couple of years, then to return to Canada to teach,” Rabbat says. “But two years turned into 35, and I eventually spent my whole career at PCA.”

Rabbat did complete his PhD in 1975, but he never returned to teaching. Instead he stayed with PCA, where he became renowned for his innovative research on precast concrete elements to prove their safety, performance, and durability compared with other materials.

He completed dozens of studies over his career, including a comparison of double tees and box segments that proved the former were just as strong and that their use could cut millions of dollars from bridge projects. “We had to have two full-scale double tees shipped from Miami to Skokie for that project,” he says. “It was a once-in-a-lifetime opportunity.” He also led a project cosponsored by PCA and PCI to confirm the excellent performance of precast, prestressed concrete girders. These girders were removed from a 25-year-old bridge demolished due to highway realignment.

Rabbat is quick to point out that he is just one of many experts who have helped to demonstrate the durability and performance of precast, prestressed concrete beams through such research. “Research on precast concrete started at PCA in the 1950s,” he says. His research built on the foundation that his predecessors laid and continues today. “I have had the privilege of working with many great engineers on these projects.”

When he wasn’t running tests in the lab, Rabbat helped to develop and maintain structural codes for buildings and railroad and highway bridges, working closely with committees within the American Concrete Institute, the American Association of State Highway and Transportation Officials, the American Railway Engineering and Maintenance-of-Way Association, and the Transportation Research Board. His 1982 FHWA report “Optimized Sections for Major Pretensioned Concrete Bridge Girders” sparked renewed interest in the bulb-tee girder as an efficient and cost-effective bridge member, which helped standardize the use of these girders for highway bridge projects. “All of this work reflects the collaborative nature of this industry,” he says.

Rabbat also spent much of his career involved in PCI, where he regularly presented his research and participated on working groups and committees. He was a longtime member of the PCI Bridges Committee, a member of the Advisory Committee on Strand Development, and a member of the Quality Control Performance Criteria and Bridge Producers Committees. Two of his technical papers also won the 1980 Martin P. Korn Award and 1992 Charles C. Zollman awards for the *PCI Journal* articles “Fatigue Tests of Pretensioned Girders with Blanketed and Draped Strands” and “Performance of Prestressed Concrete Highway Bridges in the United States—The First 40 Years,” respectively.

“The sharing of information through PCI is invaluable,” he says. “You cannot learn this in school.”

Rabbat retired in 2010, but he still follows trends in the industry and research that proves new benefits of precast concrete. He says he believes that the next big innovation in precast concrete will focus on the joints between bridge girders. “In all cases, precast concrete beats all other materials for durability and maintenance-free performance,” he says, noting that the only durability problems that ever emerge are related to the connections. “We can further reduce that small percentage with jointless bridges. It would create a smoother ride and a longer bridge life.”

His days as a researcher may be over, but Rabbat is excited to see the current generation of leaders pushing this research forward. “R&D is a very important part of this industry,” he says. “It all leads to innovation and economy for the industry.” **D**