

A Master Craftsman

Bridge engineer Ted Zoli creates structural beauty and efficiency in both construction and performance.

PEOPLE FREQUENTLY INHERIT more than names from earlier generations, which certainly has been the case for Ted Zoli, aka Theodore P. Zoli, III. “I was born on a road job,” Zoli said. His grandfather had a road building business, which his father later took over. At the time, they were building the original Interstate 87 north of Lake George in the Adirondack Mountains of upstate New York.

It was a pretty remote area, Zoli recalls, and family business also was a big part of family life. “Being around heavy civil construction since my early years, I think I had this sense that that’s what I was supposed to do,” he said. The feeling was reinforced as he witnessed the generational transition of the family business. “I had the sensibility as I was growing up that I would be in some form or fashion involved with civil engineering. Then I got very interested in bridges in college.”

Zoli studied at Princeton University, where he was exposed to bridge engineers “who were actively developing informed, new ideas in structural engineering. And bridges being as utilitarian and as pure a form of structure as anything, it was a wonderful place to get a sense of what structural engineering can be and how ideas in structural engineering are explored. That’s all that you have in a bridge is structure.”

A year after earning his undergraduate degree from Princeton, he completed a master’s at California Institute of Technology. He then joined HNTB in New York and today heads the firm’s bridge division. “Literally my entire career has been focused in bridge design,” he said.

A leader in the field of long-span, cable-supported bridges, Zoli says he thinks of bridge building far more as a craft than as either science or art. “Craft for me has the right sensibility, where you are learning deeply from the people around you that you work and interact with and also from the people who went before you.” The western sense of art, he explains, is creating something for the few by the few. On the other hand craft, or what might be called folk art, is some-

what the antithesis of that, he says. “Craft is work that’s created for the many by the many, and bridge building is much more in that camp.” That perspective continually reminds him that he is working in a team, he says. And because bridges are public projects, built with other people’s money, he

says “that requires a certain sense of austerity about what we do, a sense of efficiency, and that really is more like craft than it is like art.” That also means there is less of a place for art and ego in this type of environment, he observes.

Zoli’s record as a craftsman includes a number of acclaimed structures. They range from high-capacity spans like Boston’s Leonard P. Zakim Bunker Hill Bridge to the recent award-winning S-shaped Bob Kerrey Pedestrian Bridge over the Missouri River. Sparse and understated, yet inspiring and fun, the Bob Kerrey bridge illustrates how masterfully Zoli pursues efficiencies in his designs. One option would have been to use curved members, but given the scale of the bridge, the potential additional cost of bending was significant. Instead it was built with all straight pieces. “Even though the bridge is curved, there’s not a single bent piece in the superstructure,” Zoli said, “and they’re all fabricated from rolled sections with every steel section being the same.” Although that meant extra conservatism in some members, the extra material use was balanced by efficiencies in fabrication.

“Tremendous cost efficiencies can be gained by designing a structure that’s optimized from the perspective of how it’s fabricated and how it’s erected and rather than by minimizing sections,” Zoli said.

In 2009 Zoli was selected as a MacArthur Fellow by the John D. and Catherine T. MacArthur Foundation. The program awards a significant, unrestricted grant, distributed over a five-year period, “to encourage people of outstanding talent to pursue their own creative, intellectual, and professional inclinations,” according to the foundation website.

For Zoli, that means the opportunity to further develop his concept of a lightweight rope bridge—an extension of the cat’s cradle/Jacob’s ladder string figure—that is inexpensive as well as structurally simple and efficient. “The 80-ft bridge I built with my Princeton students used 600 ft of synthetic rope, cost \$250, and weighed 28 lb.” And it fit in a backpack, he added, which makes it easily deployable in remote locations. Decking would be made from locally available materials.

With the MacArthur Foundation grant money he plans to fund construction of a prototype bridge in an appropriate location, quite likely in Vietnam. “My sense of engineering as craft is you have to build a few of these to get them right. They can be continuously improved.”

Although it’s not easy to switch topics once he starts talking about bridges, Zoli also says he is an avid biker and enjoys poetry. To learn more about his involvement in these areas and how these interests dovetail with his bridge-building expertise, listen to the complete interview at www.modernsteel.com/tz.

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◀ Ted Zoli, bridge engineer.