

So, Why Don't You Teach Bridge Engineering?

by Dr. Richard Miller

Workforce development has become an important issue in the bridge design community. The Spring 2026 issue of *ASPIRE*[®] included an interview with Donn Digamon, state bridge engineer with the Georgia Department of Transportation (DOT), and this issue has an article from the Delaware DOT (page 5), both on workforce development. To effectively serve our readers, *ASPIRE* will continue to publish articles on this subject.

In discussions of workforce development, representatives of state departments of transportation and consulting firms have remarked on the lack of recent graduates who have taken a bridge design course. When the public thinks of civil engineers, they often think of people who design bridges. However, most universities do not offer bridge design, and even when it is offered, students may not take the class. So, why don't more universities offer bridge design and why don't more students take the course?

Let me offer one perspective. Prior to retirement, I was the department head of Civil and Architectural Engineering and Construction Management at the University of Cincinnati. A common question from employers, alumni, students, and parents was why certain classes were offered and others were not. There are many answers to this question. University course offerings are influenced by budgets, the level of interest from students, and whether faculty are qualified to teach certain courses.

According to the U.S. Census Bureau, transportation-related construction is roughly 3% of all construction expenditures in the United States.¹ Most civil engineering students reasonably assume that they will work in the commercial sector and are not

inclined to consider bridge design courses relevant to their career plans. In contrast, courses on reinforced concrete design, which focus on buildings, are usually well-populated.

University and college budgets are very tight. Although tuition costs keep rising, tuition increases are often capped and do not offset inflation, declining government aid, unfunded government mandates, declining enrollment, increasing expenses for information technology, and rising costs of noneducational expenditures such as sports programs and student housing. Some colleges and universities face budget deficits and have laid off faculty and staff. Others have closed programs or have closed entirely. Laws in several states also mandate the closure of low-enrollment programs and/or place limits on the credit hours required for degrees.

Engineering programs have not been immune to financial challenges. My former colleagues in academia report continuing budget cuts. Available research grant dollars have been reduced or eliminated. There is little money to hire new faculty, upgrade facilities, and pay teaching assistants. Some engineering labs have been closed as funding is redirected to areas such as computer science and artificial intelligence (AI).

We are also losing advocates for bridge design education. As faculty committed to research and teaching in bridge-related areas retire or move to other positions, they are not always being replaced. In some cases, the positions are simply eliminated. In other cases, the universities opt to hire nontenured faculty or adjuncts because they are more cost effective than tenure-track appointments. When new tenure-track faculty are hired, they are often

specialists in emerging areas such as computer-aided design and AI. Traditional areas of civil engineering may no longer be attractive to universities. For some universities, the barrier to offering courses in bridge design is a lack of faculty qualified or interested in teaching those classes.

We can debate all of these matters, but as a department head, I had no influence over these internal and external factors. Each year I had to present and justify a budget. To make our budget, each class needed a minimum enrollment. Low-enrollment classes were a problem, and I was constantly asked to justify offering such classes.

Enrollment challenges were especially difficult for electives such as bridge design. From a budget perspective, if 50 seniors each needed six electives, the department should only offer six elective courses with an enrollment of 50. However, that strategy would defeat the idea of electives and would not serve the students or their future employers. My goal was to offer enough electives to serve the needs of the undergraduate and graduate students and to maximize enrollment in those classes.

At the University of Cincinnati, we offered a class called Bridge Engineering every other year. We had about 15 to 20 students, far short of the number that I needed to meet budget-related enrollment expectations, but our robust bridge research program generated sufficient income to justify the class. Most engineering schools do not have enough bridge-related research to make a bridge design course seem cost effective.

Using an adjunct professor to teach bridge design is a possible solution, as the break-even point for an adjunct's

salary is much lower than that for full-time faculty. However, it is difficult to find qualified adjuncts in engineering, and their teaching skills vary widely. Some adjuncts are only available at night, which students don't prefer, and that lowers enrollment. Also, I had to request additional funds to hire an adjunct, and justifying that funding would be difficult if the courses taught by full-time faculty were not full. Rather than offer a new class taught by an adjunct, it was more cost effective to have the students take an existing, high-enrollment class taught by full-time faculty.

So, what can industry do to help this situation? If we are going to have new bridge engineers, it is necessary for industry to find a way to make it happen. There are efforts underway. For example, the Concrete Bridge Engineering Institute (CBEI) at the University of Texas at Austin, is funded by the Federal Highway Administration, more than a dozen state highway agencies, and various construction industry organizations. CBEI's efforts at workforce development have been discussed several times here in *ASPIRE* since the program was introduced in the Summer 2022 issue. The PCI Foundation supported an excellent bridge design studio at Sacramento State University. When the foundation funding ended, PCI West and local precast concrete producers came together to ensure that funding continues. These types of large-scale efforts are helpful, but there are some smaller-scale, local initiatives that can be done as well.

If you are working in the concrete bridge industry and are not already engaged with your local university, reach out to faculty and administrators. The key here is to listen. In my experience, people from industry often wanted to tell university faculty what they were going to do, rather than asking us what we needed.

Work with them to establish a roster of engaged volunteers that will develop a relationship with the faculty and student groups. Ask if they are looking for presentations for meetings or seminars. Such outreach efforts may help you reach students early in their education before they have decided on a specific career path. See the Perspective on page 5 for outreach ideas.

If you are associated with a transportation agency or professional group that holds conferences, provide support for students to attend and then aggressively recruit them. Most faculty will excuse students from classes for professional development, and students may welcome the opportunity to attend.

As I observed at the University of Cincinnati, the birthplace of the cooperative education experience, co-ops and internships can be excellent recruiting opportunities. However, be aware that students may shy away from experiences in bridge engineering because it is so different from what they learn in school, and they may find the co-op or internship experience difficult

or confusing. Patience and strong mentorship are needed.

Finally, consider other ways to support bridge design education at a local university. Simple actions such as agreeing to be an adjunct or helping identify qualified adjuncts help. There are also examples of industrial groups providing funds for course development and paying adjuncts to teach the courses.

I have provided one perspective based on my experience. If you have a different perspective or insight that would be informative to the readers of *ASPIRE*, please contact us. We would love to hear different points of view.

In *Poor Richard's Almanac*, Benjamin Franklin wrote, "If you would have your business done, go; if not, send." This adage reminds us that personal involvement is crucial. If we want bridge engineers, the onus is on us to make them.

Reference

1. U.S. Census Bureau. 2026. "Monthly Construction Spending, March 2026." Published May 7, 2026. <https://www.census.gov/construction/c30/c30index.html>. 

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