the state of U.S. bridges? Should engineers lobby for congressional support and appropriate amounts of federal spending to be allocated to bridge repairs and reconstruction?

REFERENCES

1. ASCE, "Report Card for America's Infrastructure," 2005. This document can be accessed online at http://www.infrastructurereportcard.org/wp-content/uploads/2016/10/2005-ASCE-Report-Card-for-Americas-Infrastructure.pdf
2. Minnesota Department of Transportation, "Interstate 35W Bridge Collapse," 2007. This document can be accessed online at http://www.dot.state.mn.us/i35wbridge/index.html
3. U.S. Department of Transportation, Federal Highway Administration, "I-35 Bridge Collapse, Minneapolis, MN." This document can be accessed online at http://www.fhwa.dot.gov/pressroom/fsi35.htm

CASE 4

Citicorp[6]

William LeMessurier was understandably proud of his structural design of the 1977 Citicorp building in downtown Manhattan. He had resolved a perplexing problem in a very innovative way. A church had property rights to a corner of the block on which the 59-story building was to be constructed. LeMessurier proposed constructing the building *over* the church, with four supporting columns located at the center of each side of the building rather than in the four corners. The first floor began the equivalent of nine stories above ground, thus allowing ample space for the church. LeMessurier used a diagonal bracing design that transferred weight to the columns, and he added a tuned mass damper with a 400-ton concrete block floating on oil bearings to reduce wind sway.

In June 1978, LeMessurier received a call from a student at a nearby university who said his professor claimed the Citicorp building's supporting columns should be on the corners instead of midway between them. LeMessurier replied that the professor did not understand the design problem, adding that the innovative design made it even more resistant to quartering, or diagonal, winds. However, since the New York City building codes required calculating the effects of only 90-degree winds, no one actually worked out calculations for quartering winds. Then he decided that it would be instructive for his own students to wrestle with the design problem.

This may have been prompted by not only the student's call but also a discovery LeMessurier had made just one month earlier. While consulting on a building project in Pittsburgh, he called his home office to find out what it would cost to weld the joints of diagonal girders similar to those in the Citicorp building. To his surprise, he learned that the original specification for full-penetration welds was not followed. Instead, the joints were bolted. However, since this still more than adequately satisfied the New York building code requirements, LeMessurier was not concerned.

However, as he began to work on calculations for his class, LeMessurier recalled his Pittsburgh discovery. He wondered what difference bolted joints might make to the building's ability to withstand quartering winds. To his dismay, LeMessurier determined that a 40 percent stress increase in some areas of the structure would result in a 160 percent increase in stress on some of the building's joints. This meant that the building was vulnerable to total collapse if certain areas were subjected to a "16-year storm" (i.e., the sort of storm that could strike Manhattan on average once every 16 years). Meanwhile, hurricane season was not far away.

LeMessurier realized that reporting what he had learned could place both his engineering reputation and the financial status of his firm at substantial risk. Nevertheless, he acted quickly and decisively. He drew up a plan for correcting the problem, estimated the cost and time needed for rectifying it, and immediately informed Citicorp owners of what he had learned. Citicorp's response was equally decisive. LeMessurier's proposed course of action was accepted and corrective steps were immediately undertaken, although the public was not informed of the problem. As the repairs neared completion in early September, a hurricane was reported moving up the coast in the direction of New York. Fortunately, it moved harmlessly out over the Atlantic Ocean, but not without first causing considerable anxiety among those working on the building, as well as those responsible for implementing plans to evacuate the area should matters take a turn for the worse.

Although correcting the problem cost several million dollars, all parties responded promptly and responsibly. Faced with the threat of increased liability insurance rates, LeMessurier's firm convinced its insurers that because of his responsible handling of the situation, a much more costly disaster may have been prevented. As a result, the rates were actually reduced.

Identify and discuss the ethical issues this case raises.

CASE 5

Disaster Relief[7]

Among the 24 recipients of the John D. and Catherine T. MacArthur Foundation Fellowships for 1995 was Frederick C. Cuny, a disaster relief specialist. The fellowship program is commonly referred to as a "genius program," but it is characterized by MacArthur executives as a program that rewards "hard-working experts who often push the boundaries of their fields in ways that others will follow."[8] The program, says Catherine Simpson, director of the awards program, is meant to serve as "a reminder of the importance of seeing as broadly as possible, of being willing to live outside of a comfort zone and of keeping your nerve endings open."[9]

Cuny's award was unusual in two respects. First, at the time the award was announced, his whereabouts were unknown, and it was feared that he had been executed in Chechnya. Second, he was a practicing engineer. Most MacArthur awards go to writers, artists, and university professors.

Ironically, although honored for his engineering achievements, Cuny never received a degree in engineering. Initially planning to graduate from the ROTC program at Texas A&M as a marine pilot, he had to drop out of school in his second year due to poor grades. He transferred to Texas A&I, Kingsville, to continue his ROTC coursework, but his grades suffered there as well. Although he never became a marine pilot, he worked effectively with Marine Corps officers later in Iraq and Somalia.[10]

In Kingsville, Cuny worked on several community projects after he dropped out of school. He found his niche in life working with low income residents of barrios in Kingsville and formulated some common sense guidelines that served him well throughout his career. As he moved into disaster relief work, he understood immediately that the aid had to be designed for those who were in trouble in ways that would leave them in the position of being able to help themselves. He learned to focus on the main problem in any disaster to better understand how to plan the relief aid. Thus, if the problem was shelter, the people should be shown how to rebuild their destroyed homes in a better fashion than before. Similar approaches were adopted regarding famine, drought, disease, and warfare.

The first major engineering project Cuny worked on was the Dallas–Ft. Worth airport. However, attracted to humanitarian work, he undertook disaster relief work in Biafra in 1969. Two years later, at age 27, he founded the Intertect Relief and Reconstruction Corporation in Dallas. Intertect describes itself as

> "a professional firm providing specialized services and technical assistance in all aspects of natural disaster and refugee emergency management—mitigation, preparedness, relief, recovery, reconstruction, resettlement—including program design and implementation, camp planning and administration, logistics, vulnerability analysis, training and professional development, technology transfer, assessment, evaluation, networking and information dissemination."[11]

Intertect also prides itself for its "multidisciplinary, flexible, innovative, and culturally appropriate approach to problem-solving."[12] Obviously, such an