CROSSCURRENTS

(RE)EXAMINING THE CITICORP CASE: Ethical Paragon or Chimera

by Eugene Kremer

The architect for the fifty-nine-story Citicorp Center tower completed during 1977 in midtown Manhattan was the much-celebrated Hugh Stubbins. The renowned structural engineer William LeMessurier was responsible for the conception and design of the building's ingenious structural framing system.

As part of the land acquisition negotiation for Citicorp Center it was agreed that Saint Peter's Lutheran Church located on one corner of the nearly full-block site since 1903 would retain its location. Citicorp would erect a new church building and, as part of its new headquarters complex, an office tower utilizing a portion of the air rights above the church.

That decision led to a unique structural system for a tower supported on a central service core and four 114-foot high piers placed not at the corners, but at the center of each tower face. The edges of the tower floors were then supported on a series of enormous eight-story-high cantilevered steel frames transferring their loads seventy-two feet from each corner to columns centered above the nine-story-high piers.

The extraordinary structural efficiency of the steel frame made the tower significantly lighter than a conventional structure of its height and therefore far more subject to lateral harmonic vibration due to the buffeting of winds. Working with other consultants, LeMessurier designed an innovative system to diminish the accelerations caused by the vibration. The tuned mass damper, a block of concrete weighing more than four hundred tons floating on a film of oil and linked to the top of the structural frame by hydraulic springs, was the first of its kind in a tall building.

Citicorp Center was designed and constructed during an extended period of economic malaise in the city. In the 1970s dozens of major corporations departed, 600,000 jobs were lost,[1] and, in the face of a fiscal crisis, the President's 1975 decision on Federal aid prompted the legendary *Daily News* headline "FORD TO CITY: DROP DEAD."[2] Even before its completion, full-page color advertisements appeared featuring a photo-realistic view of the new church and the soaring tower. Citicorp's ad copy brashly proclaimed:

> A skyscraper in the New York tradition, 59 stories. A multi-million-dollar investment in New York.

> New York is our town. . . .We grew up here. We're staying here.[3]

The tower, clad in alternating ribbons of bright aluminum and glass, and crowned with a triangular prism, added a dramatic new corporate icon to the city's storied skyline. No less significant in attracting public and professional attention and praise was the design of the elements at the base of the tower. An enormous skylight illuminated a seven-story galleria, and a lushly landscaped courtyard was surrounded by shops and restaurants linked to brick paved public outdoor spaces incorporating seating, sweeping stepped terraces, access to the subway, and space for concerts and other events sponsored by Citicorp and by the church (the "jazz church" as it is commonly referred was well-known for holding block-long events—including the memorial service for Louis Armstrong). Stubbins and his collaborators had succeeded. The new building epitomized the client's intention to create a visible statement announcing its corporate identity, celebrating its steadfast loyalty to New York, its commitment to innovation, and its performance as a responsible citizen in the neighborhood and the larger city.

Extended feature articles in leading American and international architectural journals extolled the project. Citicorp Center was the subject of broad attention as well as great praise in the popular media. The city, the client, the architect, the structural engineer, and the multitude of others that had contributed to realization of the project took understandable pride in what had been created. More than a generation later, the tower remained a New York landmark, and an important symbol for the successor owner, Citigroup, which adorned its *1999 Annual Review* with a striking image of the still-potent corporate icon.

The initial acclaim had not subsided when, through a series of serendipitous events, William LeMessurier recognized in June 1978 that the Citicorp tower's steel frame was structurally inadequate.[4]

Information about the details of his discovery and the actions that averted an epic disaster was secreted for the better part of two decades by LeMessurier, other engineers, academics, attorneys, equipment manufacturers, construction contractors, government officials, public safety and emergency response agencies, and by the client, Citicorp. Once the public silence was broken in an extended May 29, 1995 article in *The New Yorker*, the case quickly became a staple element in engineering and architectural ethics teaching. In virtually every instance I have discovered, William LeMessurier's professional behavior and ethical conduct, as well as that of the other participants, has received high praise.

Representative examples include:

1) The Online Ethics Center for Engineering and Science web site which describes five detailed cases "of scientist and engineers in difficult circumstances who. . .demonstrated wisdom that enabled them to fulfill their responsibilities. . . .Their actions provide guidance for others who want to do the right thing in circumstances that are similarly difficult."[5] Roger Boisjoly and the space shuttle *Challenger* disaster, Rachel Carson and pesticides, Frederick Cuny and efforts to aid refugees in third world countries, Inez Austin and the Hanford Nuclear Reservation, and William LeMessurier and the Citicorp Center tower are the subjects of these cases.

2) The IIT (Illinois Institute of Technology) Center for the Study of Ethics in the Professions's web site states:

> On 26 March 1997 on IIT's main campus, William J. LeMessurier one of the nation's leading structural engineers told the dramatic story of when he "blew th [sic] whistle" on himself in 1978. This lecture was co-sponsored by the CSEP, College of Architecture and the Department of Civil and Architectural Engineering and was part of the Ethics Center's 20th anniversary celebration.[6]

3) The *Journal of Professional Issues in Engineering Education and Practice*, published by the American Society of Civil Engineers, reprinted *The New Yorker* article in full during 1997 and editorialized "LeMessurier's

exemplary behavior— encompassing honesty, courage, adherence to ethics, and social responsibility— during the ordeal remains a testimony to the ideal meaning of the word, 'professional.' "[7]

4) The *New Yorker* article is reprinted in its entirety in *Professional Practice 101*, published in 1997 by John Wiley, a well-received volume addressed to university students and young architectural practitioners. In a brief preface, the book's author, architect and educator Andy Pressman, FAIA, describes the Citicorp case as a "stunning example of good ethics in action."[8]

5) *Ethics in Engineering Practice and Research*, published in 1998 by Cambridge University Press, includes detailed accounts of two cases: the efforts of Roger Boisjoly in the space shuttle *Challenger* disaster and the role of William LeMessurier in the Citicorp Center tower crisis. Each engineer is praised for demonstrating "how courage, honesty and concern for safety are implemented in engineering practice."[9]

6) The second edition of *Engineering Ethics: Concepts and Cases*, published in 2000 by Wadsworth, opens chapter 1 with a full-page photograph of Citicorp tower and a laudatory essay on the case. The second essay is on the *Challenger* disaster, and the final piece is on the work of engineer Frederick Cuny in responding to disasters caused by war and natural forces in nations across the globe. The authors explain that "engineers play a vital role in protecting and assisting the public and that this requires not only basic engineering competence. . .but also imagination, persistence, and a strong sense of responsibility." They go on to say "as the cases illustrate, sometimes this may require great courage."[10]

7) The National Council of Architectural Registration Boards' (NCARB) professional development monograph series aids registered architects in fulfilling mandatory continuing education requirements established by the states and by the American Institute of Architects. Published in 2000, the *Professional Conduct* monograph was written by a distinguished Boston attorney who had served for more than a decade as council to the NCARB Committee on Professional Conduct. Observing that "there are singular instances of professional rectitude that exemplify the core values of competence, accountability and honesty underlying the [NCARB] Rules of Conduct,"[11] the author cites William LeMessurier's efforts in the Citicorp case and incorporates the full text of *The New Yorker* article in an appendix.

A high-profile corporate client, world-famous design professionals, an innovative landmark skyscraper in the congested center of the nation's largest city, and the prospect of a catastrophic structural failure provide an abundance of material for a compelling tale. Add to that the received wisdom of ethicists that the Citicorp case exemplifies the best in professional ethical behavior and the stage is set for critical reexamination. I will briefly examine six facets of the Citicorp Center tower case.

Wind Loads

LeMessurier employed an ingenious, radically unconventional structural frame in the Citicorp tower. He reports considering only wind loading normal to the building faces. The Building Code of the City of New York did not call for analysis of so-called quartering winds and LeMessurier states that he did not examine the effects of quartering winds until after Citicorp tower was occupied. It was then that he discovered the unexpectedly high stresses they produced on the structural frame.[12]

In some respects the design of virtually every building is a prototype. Nonetheless, when a major departure from conventional practice is contemplated for a key element effecting the safety of an enormous urban structure, the professional has an obligation to ensure that the analyses employed go beyond the routine techniques developed for structures transferring loads in significantly different ways.

Like many other laws and regulations safeguarding public safety, building codes specify minimum standards

and they do not necessarily reflect the state of the art or the prevailing standard of care. Indeed, although during the early 1970s the New York Building Code made no mention of wind loads other than those produced by winds acting at right angles to building faces, many other tall structures in New York and elsewhere had been designed considering the effects of quartering winds. Until adoption of a new code in late 1968, New York had required that all structures be designed "to resist, in the structural frame, horizontal wind pressure from any direction."[13] The distinguished engineer Matthys Levy, Executive Vice President and Director, Structural Division of the National Academy of Engineering and author of *Why Buildings Fall Down*[14] observes, "From the code point of view, it is implicit that wind from any direction should be considered, even if not stated explicitly."[15]

Further, two senior members of William LeMessurier's firm who were directly involved with Citicorp state that quartering winds were considered early in the development of the building's frame. From the start of conceptual design in 1970, Robert J. McNamara was the managing principal for Citicorp in LeMessurier Associates' Cambridge office. McNamara states that at the time of the tower's design it was customary for engineers to consider the effects of quartering winds on the structure of tall buildings. He reports that for Citicorp tower "the effects of quartering wind were originally studied by Bill LeMessurier" who "concluded that the quartering wind did not govern the design and need not be further considered."[16] Stanley Goldstein was partner in charge of LeMessurier Associates' New York office where the construction drawings for the tower were prepared. Goldstein states that in the design of tall buildings "quartering wind is always considered."[17] He explains that Citicorp's "wind bracing system, which seemed so simple and easy to understand. . .proved to be deceptive."[18] "The unusual structure of Citicorp made it seem obvious that it could easily withstand quartering once it was designed for broadside winds."[19]

Bolted Joints

LeMessurier's design and the tower's construction drawings called for five, full- penetration welded joints in each of the eight-story-high diagonal steel members transferring loads from the tower's corners to the columns at the center of each face. Offering Citicorp a credit of $250,000, the structural steel fabricator proposed substituting bolted joints. The proposal was accepted. Employing the loads at each joint calculated by LeMessurier's firm, the fabricator designed bolted connections and prepared shop drawings that were then reviewed and approved by the engineers for fabrication and construction. Although less strong than welded joints, the bolted connections were entirely adequate for the designated loads. LeMessurier reports that it was his associates in the New York office who studied the proposal and approved the change. He asserts that he learned of the substitution only after Citicorp's completion during a conversation about using full-penetration welded connections for another project.[20]

When a major departure from the construction documents is proposed for a critical system effecting the health, safety, and welfare of the public, the decision ought to involve the key persons in the design of the system. Robert McNamara states that he reviewed the proposal to use bolted rather than welded connections and presented the suggested change to Bill LeMessurier. We discussed the technical implications and did calculations as to what effect the bolt extension in the connection would have on the movement of the tower . . . .LeMessurier Cambridge approved the substitution for concept, LeMessurier New York approved the actual details and capacities on the steel shop drawings.[21]

Professional Responsibility

LeMessurier acknowledges that his analyses undertaken after the building was completed and occupied revealed that quartering winds produced far higher stresses in the diagonal members than had been understood. Emergency consultations in Canada with the director and staff of the wind tunnel laboratory, where tests had

been run on a model of the tower while it was still in design during 1973, led to appreciation that the problem was significantly more critical than he had realized. Returning from Canada to Cambridge, he met with a trusted colleague, drove to his Maine summer home where for several days he carefully worked through a series of detailed structural calculations and concluded that failure of a bolted joint at the thirtieth floor was likely in a sixteen-year storm. Among the courses of action he briefly considered was driving along the Maine Turnpike at a hundred miles an hour and steering into a bridge abutment without telling anyone else about the problem he had discovered.[22]

Without addressing the ethics of suicide in general, since LeMessurier states that he could have hidden his knowledge of the flawed structure, his contemplation of suicide could hardly have been more irresponsible. His explanation that "I didn't think about it very long because. . .if I did that I would miss finding out how the story ended. . .and that might be a rather stimulating experience"[23] evidences his focus on himself rather than on the safety of the public or the welfare of his client. LeMessurier also explains that he contemplated remaining silent about the inadequacy of the tower's structural frame. Observing that only staff members at the laboratory where the tower's responses to wind forces had been modeled knew of the full implication of the problem, LeMessurier opined "My friends up in Canada were so professional, they would keep their traps shut forever."[24] LeMessurier's confident assertion that as a matter of professional responsibility his Canadian colleagues would preserve his secret suggests remarkable indifference to ordinary morality and fundamental misunderstanding of professional ethics. So, too, did his 1996 declaration to an audience of M.I.T. engineering faculty and students that he knew of an important fifty-story building that was likely to collapse, that was "totally under-designed," but that he would not identify, followed by his assertion that "there are a lot of them out there."[25]

Public Statements

In actuality LeMessurier informed the architect's attorney, his own liability insurance company, the architect, and the owner. Soon afterward other engineers, consultants, and contractors were engaged to study, monitor, and repair the building. Local building officials, the Red Cross, the police, and other emergency response agencies were told of the situation and plans for remediating the structural inadequacies of the tower were developed and implemented.

Early in the repair process, the owner knowingly issued a grossly misleading statement to the press obscuring the reality of the threat the building posed to the public health, safety, and welfare. LeMessurier was not only aware of the false public statement, he had supplied the kernel of truth regarding new data on marginally higher likely wind speeds that was then spuriously used as the explanation for the remedial welding of two-inch-thick by six-foot-long steel plates over hundreds of bolted joints in the structural frame.[26]

In a *Wall Street Journal* interview Henry DeFord III, Citicorp Senior Vice President responsible for the corporation's building operations, explained "engineers have assured the bank that the building isn't in any danger. The work is being done 'to anticipate the impossible that might happen.' "[27]

Contacted by the New York *Daily News*, DeFord elaborated:

> As it is, the building could withstand a one-hundred-year wind. . . .We are a very cautious organization—we wear both belts and suspenders here. We dont [sic] want people concerned, so we sent out a press release announcing the work.[28]

Although the highest wind speed ever recorded in Manhattan was 113mph, later in the same August 9, 1978 *Daily News* story, Acting Building Commissioner Blaise Parascandola used his position of public trust to further the deception by observing, "of course it's improbable, but there's always the chance of winds up to 150mph,

which. . .could break bolts. This way we'll be safe."[29]

On the basis of the news release and an interview with LeMessurier, the August 17, 1978 issue of *Engineering News Record* reported "LeMessurier maintains that the. . .tower has well over the structural support it requires to withstand anticipated wind loads and that the purpose of the extra bracing is simply to supplement it." The article continued, "LeMessurier declines to say, however, whether he feels the bracing is necessary or optional. 'I advised the bank and they listened to me,' he says. 'As the bank put it, "we'd like to have belts and suspenders." '"[30]

None of the other architectural, engineering and legal professionals, public officials, or contractors involved in averting the disaster stepped forward to correct what they knew to be the false news release, or the subsequent statements by officers of Citicorp, the Department of Buildings, and by LeMessurier compounding the misrepresentations.

There are just six fundamental canons in the National Society of Professional Engineers Code of Ethics. Canon 3 states that in the fulfillment of their professional duties engineers shall "Issue public statements only in an objective and truthful manner."[31]

Public Safety

Elaborate emergency evacuation plans were developed not only for the Citicorp tower, but also for 156 city blocks[32] in the neighborhood of what was then the seventh tallest building in the world. These events took place during mid- and late summer, the hurricane season, when the greatest threat of structural failure inducing wind speeds existed. The plans were kept secret from the general public, from other property owners, and tens of thousands of residents, shop and office workers, and others in the neighborhood who were to be informed only if a hurricane were bearing down on New York. "A Red Cross estimate indicated that if the building collapsed, up to 200,000 people could lose their lives."[33]

The autonomy of other stakeholders was denied by the paternalistic behavior to which LeMessurier, Stubbins, Citicorp officers, Red Cross, city officials and a host of others were party. Speaking at M.I.T. on November 17, 1995, LeMessurier told his audience of faculty members and engineering students at a videotaped Mechanical Engineering Colloquium:

> We had to cook up a line of bull, I'll tell you. And white lies at this point are entirely moral. You don't want to spread terror in the community to people who don't need to be terrorized. We were terrorized, no question about that.[34]

"Engineering Ethics," an October 1996 cover story in the American Society of Civil Engineers' journal *Civil Engineering* described Citicorp Center, its design, the discovery of its structural flaws and the emergency repairs.[35] The story was influential in stimulating the National Society of Professional Engineers (NSPE) Board of Ethical Review (BER) to consider a scenario strikingly similar to the facts of Citicorp.[36] Published as Case 98–9, the BER based its findings on six sections of the NSPE Code of Ethics in concluding that while

> [t]he desire to avoid public panic is certainly a legitimate factor in deciding on a course of action. . .withholding critical information from thousands of individuals whose safety is compromised over a significant period of time is not a valid alternative. . . .[37]

The BER considered Case 98–9 important and interesting enough to justify its use as the basis of the 1999 NSPE BER Ethics Contest open to all NSPE members, state societies and chapters.[38] The subject of a feature

story in the NSPE *Engineering Times*[39] magazine and another in *Engineering Ethics Update*[40] published by the National Institute for Engineering Ethics, the winning entry reached essentially the same conclusions as had the BER.

Advancing Professional Knowledge

LeMessurier took care after these events in the late 1970s to obscure his experience and new understandings from his peers in the engineering community. Not until the laudatory 1995 article was published in *The New Yorker*, did engineering professionals, and the larger public, become aware of the near disaster and its causes.

The responsibility to advance the knowledge and usefulness of the profession was ignored by LeMessurier for almost two decades. The October 30, 1995 issue of *Engineering News Record* reported that although LeMessurier himself had brought the problems to light. . .the full urgency of the situation in 1978—"the Citicorp building could fall on Bloomingdales"[sic]—had never been revealed. The Cambridge, Massachusetts-based designer says he "had to tell a few white lies" in order to avoid revealing all of his concerns. "I wasn't ready yet."[41]

LeMessurier presented "Forty Years of Wind Engineering: A Personal Memoir" in early April 1995 during the Thirteenth Structures Congress of the ASCE (American Society of Civil Engineers) in Boston. Published by ASCE in its congress proceedings later that year, the paper spans from his graduate student days at M.I.T. through his role in the structural design of landmark high-rise towers across the nation and abroad. He explains in the "Introduction" that he will "describe the learning process through discussion of several design problems of real buildings."[42] Understandably, Citicorp is treated at length yet there is no mention of its structural crisis or of the lessons learned from it.

In late 1991, some years before the ASCE Congress, writer Joe Morgenstern, who had learned of Citicorp tower's structural crisis during a dinner party conversation, telephoned LeMessurier. After several weeks delay while he checked Morgenstern's references and reviewed samples of his work, LeMessurier and he traveled from Cambridge to the house in Maine where the story was recounted in minute detail during a long weekend. The manuscript for "The Fifty-Nine- Story Crisis" and *The New Yorker*'s fact-checking efforts were completed two years before its publication[43] at the end of May 1995 less than two months after LeMessurier elected to omit all reference to the crisis in discussing Citicorp with his audience of engineers.

Professionals' initial responses to the Citicorp Center tower case may have derived from its dramatic journalistic presentation, and from an understandable desire to perceive their eminent colleague at the center of the drama as a hero. Nonetheless, architects and engineers are well acquainted with professional norms and professional codes of ethics. And ethicists who study these professions continue to add to the enormous body of critical-case literature and so I am perplexed by the absence of a reevaluation of the conventional wisdom on this celebrated case.

Although I have invested a good deal of effort in exploring this case, some of the concerns I have voiced are based on matters that are immediately evident in *The New Yorker* article. Within months of that story's publication the concerns of three engineers directly involved with the tower during its design, construction, or repair were reported in *Engineering News Record*. A November 20, 1995 article, "Critics Grade Citicorp Confession," reported that two senior engineers in William LeMessurier's office engaged in the design of the Citicorp Center tower disputed significant aspects of *The New Yorker* account.[44] Three weeks earlier, an *ENR* article, "LeMessurier's Confession," concluded by reporting that the office of Leslie Robertson, the distinguished engineer who served as a consultant to Citicorp during the crisis, had written a letter implying that the problems were worse than LeMessurier acknowledged in *The New Yorker*.[45] To my knowledge those who

have continued to celebrate the case have pursued none of this and have ignored the 1998 NSPE BER Case 98–9 finding, as well as the results of the 1999 NSPE BER Ethics Contest.

Some of these thoughts on Citicorp Center tower have been shared with design professionals and with academic colleagues in the United States and Australia. I am in correspondence with people who helped design and repair the tower, with others who have written about the crisis and its resolution, and with still others who are experts on codes, engineering practices, and ethics. Some have responded to inquiries about Citicorp with interest and insight. Others have made evident their desire to avoid comment. Still others have voiced outrage at any further examination of this subject. I continue to study Citicorp in an effort to enhance understanding of professional responsibility among students, practitioners, and the larger public.

Notes

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