

Editorial | Affordable Construction to Resist Extreme Events

By Donald Dusenberry, P.E., SECB



Over the past few years, our news seems to have been filled with stories of regional devastation caused by natural effects on the built environment. We have seen stories about hurricane and storm surge damage along the Gulf coast, tornadoes in many regions of the US, and earthquakes, along with some related tsunamis, in regions from the Caribbean Ocean to the Indian Ocean.

In general, the outcome of these events has been as we might expect: structures designed and constructed in accordance with modern technologies have performed well. If that was the only outcome, the stories we have read probably would not have been newsworthy on an international scale. These events have been newsworthy because of the contrasting expected outcome: structures that have not been designed in accordance with modern technologies have suffered severely.

But that is not the real story. The real story is that much of the devastation has occurred in regions where economies and cultures have not allowed for structures to be designed for the extreme environmental effects that we, as a profession, have developed the capacity to anticipate reasonably. Many of the victims that have suffered the most have been from regions that do not have building codes that define appropriate standards for construction, technical capability to design and construct robust structures, or financial resources to put into practice the technologies that will enhance resistance.

Most of us practice in regions where the standards for design and the quality of construction are well-understood, and robust designs are achievable. Of course, we still have losses when the design-base events occur, and we learn something new each time we have a severe storm or earthquake. But we generally do not feel that we are under-serving our clients or our society. At the same time, it is easy to read with sadness the news about devastation elsewhere, but to move on and continue to serve clients that have the resources to develop projects that incorporate the technologies that we have learned will lead to satisfactory performance.

Who serves the regions where economies are poor and appropriate technology is not available? Generally speaking, of course, the answer is “nobody.” Most of the buildings impacted by the recent Indonesian tsunami and Caribbean earthquake, for example, were not constructed in accordance with designs developed for reasonable resistance to these events. In most cases, this was not by choice, but rather by necessity because the resources simply were not available.

Is this the best we can do? Certainly not – and by the way, some of our colleagues are doing much more. Researchers, consultants, and advocates are working

to develop and promote affordable means to respond to a need for robust structures in regions without strong economic foundations. Approaches developed by these organizations can substantially reduce the suffering of communities in vulnerable areas.

An example is the work of the Buoyant Foundation Project (BFP), which is sponsored by the University of Waterloo School of Architecture. The concept involves placing pontoons under buildings that normally rest at grade. The pontoons, and the rest of the building for that matter, can be fabricated from locally available materials. When flood waters reach the building, it floats rather than floods, guided in place vertically by piles. The concept is not new, but it is being extended by BFP to new applications and initiatives.

Another example is the work of Build Change, headquartered in Denver, Colorado. This organization promotes education about detailing structures for robustness, using materials and construction skills that are indigenous to the region of construction. This organization’s message is capsulized in its *Six Steps to Safe Homes*, paraphrased here as:

- 1) learn from failures,
- 2) identify low-cost improvements in construction,
- 3) disseminate the knowledge,
- 4) convince developers to improve construction,
- 5) help find capital, and
- 6) measure success.

Architecture for Humanity is dedicated to bringing together design professionals interested in sustainable development, often for disaster-prone regions where residents normally would not be able to afford design services. This organization has a stable of volunteers poised to provide professional services when warranted.

Then there is Engineers Without Borders (EWB). As it says on its website, this organization envisions a world in which communities have the capacity to sustainably meet basic human needs. EWB supports community-driven development worldwide by collaborating with local partners to design and implement sustainable projects.

These are just a few examples of ongoing initiatives that are intended to alleviate the plight of those who have not had access to the resources available to most of us. These organizations, and others like them, are using research, training, outreach, and direct collaboration to implement cost-effective approaches to improve the built environment for vulnerable populations in vulnerable regions.

It should be a message to all of us that the entire world is in our backyard, and that we have the capacity to do more than our often-narrow vision might reveal. We are civil engineers, after all. We need to broaden our definition of clients to be served and look for ways to improve the quality of life anywhere we can. ■

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