

Resilient design for a safer, more secure future

By Andrew D. Mendelson | July 12, 2021



The consequences are undeniable. Global climate change has affected everything from the design and building of roads, bridges, homes and office complexes to the upgrading of our nation’s electrical grids and pipeline systems.

Unfortunately, the forecasts of many of the world’s leading climate research agencies are less than optimistic. According to NASA, the effects of global climate change are likely to continue “over this century and beyond” as the growing intensity and frequency of severe storm events, heat waves and wildfires increasingly wreak havoc on the nation’s infrastructure and ecosystem. In fact, the National Centers for Environmental Information, recently reported that 25 storm-related disasters in the U.S. caused more than a billion dollars in damages each from 2018 to 2019. Of these, the top five combined to cause more than \$75 billion in damages.

As a result, a renewed emphasis has been placed on the creation of buildings and infrastructure that not only withstand severe natural events but remain habitable under extreme conditions. Even President Biden’s American Jobs Plan proposed wide-ranging initiatives promising that infrastructure projects developed under the plan would include funding to prevent, reduce and withstand the impacts of the climate crisis.

Given that researchers from Colorado State University have already forecast an “active” 2021 hurricane season, with 18 named storms of which four or more may become major hurricanes, resilience has become a prominent topic among engineers, architects, environmental consultants, legislators and property owners.

Defined by the Resilient Design Institute “as the capacity to adapt to changing conditions and to maintain or regain functionality and vitality in the face of stress or disturbance,” resilient design has moved to the forefront of criteria necessary to protect critical infrastructure systems, structures and the environment from severe storm damage. In its 2018 publication titled “Building Community Resilience through Modern Model Building Codes,” the International Code Council defines four of the initiative’s primary components. They are:

- Efficient disaster mitigation and recovery.
- Ensuring mental and physical health and well-being.
- Improving building lifecycles.
- Creating a sustainable community.

Resilient design strategies

Resilient design and construction is intended to maintain the ongoing operation of key infrastructure, systems and facilities during and after severe weather events, and restore the capacity to return to normality in the short term with minimal interruptions.

For this to happen, the adoption of resilient strategies ranging from the design and construction of structures that can withstand the impact of severe storms to the installation and implementation of renewable energy and potable water sources must be conducted on multifaceted levels that jointly involve local businesses; energy, water and other utilities; and state and local governments.

On the construction side, practical and realistic solutions often begin by emphasizing the building of highly durable, self-sustaining structures that remain habitable no matter the challenge. This includes expanding the livability of these facilities with features such as compostable toilets, rainwater harvesting techniques, and passive heating and cooling. For many communities, this also means focusing on better management of stormwater, protecting aquifers, implementing enhanced wildfire mitigation measures and reducing urban heat island effects with advanced technologies, components and materials.

Standard of care issues

How has climate change affected the standard of care of construction projects? What is the potential culpability of designers and contractors? What exposures accompany the compliance or non-compliance with non-binding standards? These questions are increasingly being debated within the design and construction communities as today’s building codes and regulations steadily evolve to address the new environmental normal posed by the ever-increasing threat of global climate conditions.

The challenge for many professionals, particularly engineers and environmental scientists, is the need to strike a balance among a project's budget, client goals, community best interests and resilient design principles, which can be affected by a wide range of factors from the area's storm history to the latest climatology studies. In such cases, the typical standard of care definition used as a defense by design professionals, contractors and subcontractors in most negligence cases may not be sufficient. This is because the reasonable degree of care and skill applied in similar instances by members of the same profession may be significantly stretched in regions where comparable buildings and structures were designed and built to a higher standard.

Consequently, mere compliance with local codes may not be enough to protect design or construction professionals from the liability associated with potential environmental disasters. This can be particularly true for high-impact storm areas that can reasonably be expected to sustain additional losses in the foreseeable future. To prepare for such instances and mitigate the potential liability risks, professionals should:

- **Anticipate code and practice standard upgrades.** Engage with professional associations to understand future trends. Stay informed with the latest climatology models, reports and studies to guide project criteria and site designs.
- **Think long-term durability and safety.** Recommend to project owners the establishment of design criteria with protocols not yet memorialized in building codes to address the likelihood of increased severe storm events and excessive wind, rain and flooding. Consider additional features such as structural reinforcement, storm water management, spillways, retention ponds, and sea and retaining walls to provide extra layers of building and infrastructure protection.
- **Document everything.** Document owner directives, especially the ones that decline the added resilient design criteria you have recommended.
- **Disclaim third-party reliance.** To some degree, this can mitigate risk based on the decisions and directives of clients who would rather design to code minimums than to the enhanced levels recommended by design professionals.

There is significant evidence that global climate change will have a profound influence on the way we live our lives for years to come. Fortunately, the methods exist to assist in protecting against its devastating effects. Resilient design offers a practical approach for fortifying everything from roads and bridges to public safety facilities and commercial and residential properties from the costly, destructive and sometimes deadly circumstances resulting from severe weather events.

But resilience alone will not work without common sense. Professionals need to protect against unforeseen liabilities by advocating and employing strategies intended to mitigate the risks of severe climatic events. Fortunately, numerous insurance alternatives exist for professionals presently working within this increasingly volatile, unforgiving and highly litigious environment.

About the Author



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