Resilient Design – An Overview
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Hurricanes, floods, tornadoes, wildfires—natural disasters impacting the world’s natural and built environment with devastating effect are occurring more frequently and with greater impact. These severe climate events and occurrences cause significant damage to building envelope and structures, roads, bridges, harbors, power and communication systems, and other critical elements of the built environment. Extensive economic loss and disruption of essential services and basic living conditions follow.

What are the duties of engineers, architects, environmental consultants, and other design professionals in their roles as protectors of the health, safety, and welfare of the general public? Resilient design is one way to minimize the damage these events cause and aid in subsequent recovery. Berkley DP believes it is important for design professionals to be familiar with the principles and strategies of resiliency in design as an evolving subject that has the potential to expand the standard of care.

Resilience is defined 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 Institute). In applying resilience to the built environment, the International Code Council describes four primary components of resilience in their 2018 publication Building Community Resilience through Modern Model Building Codes:

1. Efficient disaster mitigation and recovery
2. Ensuring mental and physical health and well-being
3. Improving building life cycles, and
4. Creating a sustainable community
Resilient design strategies straddle sustainability and energy efficiency and are applied at all levels of development: buildings, infrastructure, and communities. At the building level, the focus starts with creating a building that has the ability to withstand extreme weather and remain habitable in the event of power loss and storms, including the consideration of self-sufficient strategies such as renewable energy, compostable toilets, and rainwater harvesting. For the community, the focus begins with managing stormwater, protecting aquifers, implementing wildfire mitigation measures such as defensible spaces, and reducing the urban heat island (UHI) effect. These issues are just the start for a robust conversation on what and how to consider anticipated impacts of changes in our environment.

There are a number of non-binding standards that describe new guidelines for resilient design and considerations. The U. S. Green Building Council has launched the RELi 2.0 Rating System, in a format similar to LEED, for socially and environmentally resilient design and construction criteria for neighborhoods, buildings, and infrastructure. The American Society of Civil Engineers’ Adapting Infrastructure and Civil Engineering Practice to a Changing Climate is a comprehensive document which examines climate science, risk assessment, and principles for incorporation in buildings as well as infrastructure. In Canada, the non-profit Engineers Canada has published a similar document, called Principles of Climate Change Adaptation for Engineers. These and other resources are listed at the end of this article. They are excellent guides to issues and impacts to consider when designing for resiliency. However, be aware of the legal ramifications that may result when referring to them. That is, how is knowledge of these issues going to affect the current standard of care?

**Standard of Care Issues**

Has the consideration of climate change in non-binding standards as well as the higher likelihood of extreme environmental events caused a change and expansion of the standard of care? That question is increasingly being debated as current building codes and regulations are slow to catch up to the “new normal.”

Adoption of a comprehensive building code with amendments that define factors of extreme weather events will provide a solid foundation for a community to better address these evolving climatic conditions. In fact, according the National Institute of Building Sciences, designing new buildings in excess of select requirements of the 2015 model building code provisions can save $4 for every $1 spent. While federal and state agencies have varied in increasing or even just maintaining their regulations, many cities and counties have stepped up their efforts at the local level (see resource list for specific examples).

However, mere compliance with local codes does not preclude liability to the design professional if comparable buildings are being designed and built to a higher standard. This is how the standard of care can get stretched for a learned profession that is expected to have a high degree of technical knowledge.
Managing the Risks of Resilient Design

Design professionals, particularly engineers and environmental scientists, must strike a delicate balance when addressing resiliency factors on their projects, giving consideration to their clients’ specific needs, local community expectations, and industry aspirations. It is at this intersection where potential liability concerns are envisioned. Here are several recommendations for managing the risk that accompanies resilient design:

1. **Anticipate code and practice standards updates and upgrades due to climate change.**
   - If the current code basis for stormwater management is to design for a 100-year flood, promote design for a 500-year flood. Milestone floods are happening more often, In fact, Hurricane Harvey’s flooding effect in Houston was the city’s third “500-year” flood in the three years. Since you are recommending design beyond code minimums, balance the level of enhanced design with the function and exposure of the project. For example, an office building may not need to be as vigorously resilient as a hospital, water treatment plant, or other critical care facility or infrastructure component. A major highway along a coastal waterway will likely have more stringent criteria than an inland arterial road. Consideration of applicable climatology models, reports, and robust studies demonstrates a recognition of the importance of enhanced information to guide project criteria in site design.
   - Design structure, enclosure, energy services, and stormwater management components with additional safety factors not yet memorialized in building codes that address the likelihood of increasing wind and rain due to more intense storms. These components may include sea walls, retaining walls, bridge and power line supports and abutments, building foundations and structure, envelope and enclosure (roofing and roof structures, walls, and windows), flood plain areas, retention and detention ponds, spillways, and piping.

   - Discuss with your client why you recommend these increased factors of safety for resilient design. If they direct otherwise, such as to design only to minimum (current) code requirements, document such owner directives in letter form to them and store this correspondence in your project files. This issue will be of greater concern when working with private developers who may not have a long term view of the project lifespan. For example, a developer planning out a residential subdivision design may not want to pay for enhanced storm water retention. Compare their motivation to governmental agencies, such as the Army Corps of Engineers, which designs and constructs coastal protection systems with enhanced standards to address increasing impacts of climate change. We expect that more local and state agencies will adopt a similar perspective of the value of additional investment in resiliency—some already have (e.g., Florida after Hurricane Andrew in 1992).
2. Become familiar with climate change factors and design implications and integrate them with energy and carbon emission reduction strategies.
   - Be transparent in communicating these factors and diligently pursue client consent to design to an enhanced level.
   - You can provide informed advice to your clients, but put the responsibility on them to obtain the additional studies that may be required and to make the ultimate decision based on the options considered.

3. With regard to clauses in the professional services agreements, we recommend the following:
   - Disclaim third-party reliance. This will mitigate your risk to some degree, based on decisions reached and directives given by your clients to design to code minimum rather than to the enhanced levels as recommended above. The effectiveness of this disclaimer may be limited in consideration of the case law in the project’s jurisdiction and general responsibility of the licensed design professional to protect the health, safety, and welfare of the general public.
   - Disclaim warranties and guarantees, and establish a normal professional standard of care.
   - Include a force majeure clause in your contract to mitigate risk of catastrophic events.

What performance standard will you, the design professional be held to? At what point will an enhanced standard of care be triggered? This is still a gray area due to insufficient case law common to emerging risk management issues. But one thing is clear: awareness of environmental factors impacting design and communication of the risks and benefits of resilient design factors with the owner are key. Design professionals that provide their clients clear, transparent and knowledgeable advice will assist owners in making informed and proper decisions.
External Resource List

Adapting Infrastructure and Civil Engineering Practice to a Changing Climate, American Society of Civil Engineers

“Are design professionals liable for failing to anticipate the effects of climate change?” Larry Dany and Nick Boyd, The Architect’s Newspaper, May 9, 2019
https://www.archpaper.com/2019/05/architect-liability-climate-change/

Building Community Resilience through Modern Model Building Codes, International Code Council, Inc./Alliance for National and Community Resilience
https://www.iccsafe.org/advocacy/building-community-resilience/

Climate Resiliency Design Guidelines, City of New York

Climate Resilient Design Standards & Guidelines for Protection of Public Rights-of-Way, Boston Public Works Department

Principles of Climate Change Adaptation for Engineers, Canadian Engineering Qualifications Board
https://engineerscanada.ca/sites/default/files/01_national_guideline_climate_change_adaptation.pdf

RELi 2.0 Rating Guidelines for Resilient Design and Construction, U.S. Breen Building Council
https://www.usgbc.org/resources/reli-20-rating-guidelines-resilient-design-and-construction

Smart Growth Fixes for Climate Adaptation and Resilience, U.S. Environmental Protection Agency

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About Berkley Design Professional

Berkley Design Professional (Berkley DP) was created in 2013, by a team of insurance professionals with a passion for the design industry and deep roots in Architects and Engineers Professional Liability underwriting, risk management and claims management. The genesis of Berkley DP was the combination of our team’s commitment to bring fresh ideas to the products and services design professionals need together with the resources of W. R. Berkley Corporation. Berkley DP’s motto is: Better By Design®. By this we mean that our policyholders can become better businesses by leveraging our innovative risk management solutions, fair and experienced claims services and comprehensive architects and engineers professional liability coverage.

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