

# Design professional's design duty to mitigate against extreme weather events

September 27, 2018

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# Learning objectives

- Become familiar with professional responsibility for designing to mitigate against damage from foreseeable flooding.
- Learn from case law examples how design firms have been found liable even if codes are met.
- Understand the potential enhanced Standard of Care for addressing damages from floods and sea-level rise.
- Learn about American Society of Civil Engineers-24 (ASCE), flood-resistant design and construction and how it applies to design for flood mitigation.

# Sea-level rise

- Although there may be debate about what is causing climate change and sea-level rise, there *is* overwhelming evidence that the climate is changing and that sea-level is rising.
  - Since 1901, global sea-levels have risen about 7.4 inches – at an average rate that doubled in the 1990s.



# Do design firms have duties beyond those imposed by law and code?

- What are the legal and ethical responsibilities that design professionals must consider with respect to climate change when designing projects?
- Is resiliency such an important obligation that a design professional must design for resiliency based on current science – and the evidence and facts at hand – even if the law, regulations and government agencies do not yet require it?

# What is the architect/engineer's duty if there is well-known flooding in an area?

- If it is well-known that there is a high likelihood of flooding in an area, and that damages from such flooding could be significantly mitigated or reduced by elevating all new construction several feet, would the professional standard of care render a design professional liable for damages that could have been avoided if it had specified that foundations be built to higher elevations?
- Adaptive and resilient design is a great risk management solution in the face of climate change.

# Accelerating high-tide flooding

- A February 2018 NOAA report has published projections stating that sea-level rise is causing high-tide flooding to accelerate along many parts of the coastline.
- The report states that by 2100, “high-tide flooding will occur ‘every other day’ (182 days/year) under what is called an ‘intermediate low scenario.’”
  - NOAA Report (NOS-CO-OPS 0896, February 2018)

# Impacts if fail to plan for frequent flooding associated with sea-level risk

- *The Washington Post* quotes Astrid Caldas, a senior climate scientist at the Union of Concerned Scientists, who tracks the effects of sea-level rise:

*“By mid-century, the frequency of this type of ‘minor’ flooding would become so disruptive that business as usual would be practically impossible without significant adaptation measures. Without planning for flooding with measures such as protecting, elevating, accommodating the water, or even moving stuff out of the way, the impacts on the cities, their economy, and their residents would be immense.”*

– Astrid Caldas



# Flooding examples: Naval Station Norfolk

- The cover story of the August 7-10, 2017 *Engineering News-Record* (ENR) is titled, “Rising Challenge,” by Pam Radtke Russell.
- A highlight about Hampton Roads, Virginia explains that Naval Station Norfolk is only about 10 feet above sea-level and tidal flooding is often a problem for the base.
  - The latest modeling suggests the area faces a sea-level rise of between 2.5 feet to almost seven feet by 2100.
- According to a Union of Concerned Scientists Report, low-lying locations in and around the base may experience about 280 tidal floods per year by 2050. That is the intermediate scenario.
- A worst-case scenario suggests that the base would have 540 floods annually and render some areas of the base unusable within the next 35 years.

“Adaptive design is an emerging engineering practice that addresses the uncertainty of climate change and sea-level rise. This design technique allows infrastructure to be built now, with the understanding that the underlying design assumptions might change.”

– Pam Radtke Russell, *Engineering News-Record*, August 2017

- American Society of Civil Engineers (ASCE) publishes ASCE 24, *Flood Resistant Design and Construction*.
  - This is a referenced standard in the International Codes (I-Codes®).
- The ASCE 24 establishes the minimum requirements and expected performance for the siting and design and construction of buildings and structures in flood-hazard areas that are subject to building code requirements.

# FEMA accepts ASCE-24

- Federal Emergency Management Agency (FEMA) accepts ASCE 24 as meeting or exceeding the minimum National Flood Insurance Program (NFIP) regulations for buildings and structures.
- It includes some additional requirements and specificity not included in the NFIP regulations.
- What is important is that buildings and structures that fall within the scope of the International Building Code (IBC) that will be located in a flood hazard area must meet the requirements set by the ASCE 24.
- The International Residential Code likewise requires that dwellings in floodways be designed consistent with the ASCE 24 requirements.

# ASCE 24 four design classes

- The ASCE 24 lists four flood design classes.
- Depending upon which class of building is involved, the additional height will vary.
- For the majority of residential, commercial and industrial buildings (those which pose only a moderate risk to the public should they be damaged by flooding), the ASCE 24 requires that their foundation be elevated a minimum of one foot above the base flood level (BFL) or the design flood elevation (DFE), whichever is higher.

# FEMA flood maps not necessarily up-to-date and accurate

Many FEMA flood maps do not necessarily reflect current science.

- Consequently, an official 100-year flood zone could be a 10-year flood zone.
- See Status of Map Change Requests on the FEMA website:

<https://www.fema.gov/status-map-change-requests>

### Status of Map Change Requests

This page outlines information regarding current flood map change activities across the nation. Use the links below to check the status of your Letter of Map Change (LOMC) application, learn more about map change activities by state, and how to stay informed of other information regarding flood map changes.

> Expand All Sections

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> Letter Of Map Change (LOMC) Application Status

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> Automated Status Information

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> Letter Of Final Determination Lists

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> Proposed Flood Hazard Determination Notices

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> Priority Map Changes

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Last Updated: 11/15/2017 - 08:28

# Executive order 13690 and FEMA regulations

- In reaction to the costs being incurred in rebuilding structures that have been destroyed or damaged in recent floods, President Obama issued Executive Order (EO) 13690 on January 30, 2015, directing FEMA to require higher elevation foundations for structures being built in areas that have flooded.
- This EO contained more stringent requirements than those adopted by ASCE 24.
- EO sought to avoid a repeat of a flood situation where a FEMA flood map might designate an area as a 500-year zone, but the area has actually flooded every three years.
- EO would require design action even though the project was listed on a map location requiring no action.

# Federal flood risk management standard

- EO 136590 (2015) established the Federal Flood Risk Management Standard (FFRMS) “to increase resilience against flooding and help preserve the natural values of floodplains.”
- The EO stated that the floodplain must be established using one of several different approaches, the most significant of which is “adding an additional 2 feet to the base flood elevation for non-critical actions and by adding an additional 3 feet to the base flood elevation for critical actions.”



# Anticipated savings if executive order and FEMA regulations were implemented

- The Obama administration estimated the regulations would increase building costs by 0.25% to 1.25% but save taxpayers significant money in the future.<sup>1</sup>
- A report by the U.S. Government Accountability Office (GAO) states that for every \$1 spent on disaster mitigation, the government would save \$4 on post-disaster aid.<sup>2</sup>
- An updated report suggests that \$6 in damages is avoided by every \$1 spent on mitigation efforts.<sup>3</sup>

<sup>1</sup> Relman, Eliza. "Trump reversed regulations to protect infrastructure against flooding just days before Hurricane Harvey." Business Insider. 28 August 2017.

<sup>2</sup> U.S. Government Accountability Office. "Natural Hazard Mitigation: Various Mitigation Efforts Exist, but Federal Efforts Do Not Provide a Comprehensive Strategic Framework." August 2007.

<sup>3</sup> Multihazard Mitigation Council. "Natural Hazard Mitigation Saves 2017 Interim Report: An Independent Study – Summary of Findings." Principal Investigator Porter, K.; Co-Principal Investigators Scawthorn, C.; Dash, N.; Santos, J.; P. Schneider, Director, MMC. National Institute of Building Sciences, Washington. 2017.

# Executive order 13690 revoked by new executive order

- Before the new FEMA regulations could be fully adopted and implemented, President Donald Trump, on August 15, 2017, issued an EO revoking EO 13690.
- FEMA then rescinded the new regulations that would have established a Federal Flood Risk Management Standard.



# ASCE opposed revoking the executive order

- The ASCE was a signatory on a March 22, 2017 letter to the President stating its concern about the repeal of EO 13690, the Federal Flood Risk Management Standard (FFRMS)
- The letter states: “The FFRMS represents a pragmatic and prudent disaster risk management strategy that will safeguard the nation’s infrastructure, protect businesses and communities, and conserve taxpayer resources...We believe it should be preserved.”

# Reasons ASCE supported the executive order and FEMA regulations

- “The updated flood standard provides sound disaster and flood risk management guidance that involves assessing risks, avoiding them to the extent possible, and making appropriate financial arrangements, through insurance or otherwise, for risks that cannot be avoided.
- The FFRMS is a responsible, multi-layered risk management approach that ensures federal resources are spent wisely and efficiently.
- The pressing need for an updated approach to assessing and managing flood risk is borne out by an increasingly costly cycle of flooding and rebuilding that can and should be stemmed. From 1980 to 2013, flooding caused more than \$260 billion in damage in the U.S.”

# ASCE explains aim and benefit of FFRMS

- “Without the FFRMS, disaster relief and recovery policies will allow for and even encourage unprepared communities to build unwisely and subsequently rely upon federal help when flood disasters hit.
- We simply cannot afford to allow this pattern to continue.
- When federal funds are used for development in flood-prone areas, it is simply common sense to consider and mitigate those risks upfront in order to ensure the investment will be long lasting. That in a nutshell is the aim of the FFRMS.”

# ASCE says short sighted to repeal FFRMS

- “When implemented, the FFRMS will help protect people and property, reduce federal expenses associated with rebuilding after tremendous flood losses, and make communities stronger.
- Repealing the FFRMS would be shortsighted and we ask the administration to strongly reconsider any repeal or rollback.”

# HUD implements old executive order and ASCE 24

## U.S. Housing and Urban Development (HUD) flood damage grants

- Despite the rollback of the Obama Administration Executive Order, HUD is ~~basically~~ enforcing the requirements established by that Executive Order and the ASCE 24 requirements on new block grants to the states damaged by floods in 2017.



Housing and Urban Development Department. Notice: Allocations, Common Application, Waivers, and Alternative Requirements for 2017 Disaster Community Development Block Grant Disaster Recovery Grantees. 9 February 2018.

# What does the standard of care require of design professionals?

- The issue of what professional responsibility or liability a designer may have for failing to design buildings and structures to account for climate change and sea-level rise is beginning to get more attention in the press.
- Designers may have to go beyond mere code requirements when designing to take into account what is appropriate due to climate conditions.
- Michael Sanio, ASCE Director of Sustainability, is quoted as stating, “Taking into account the best science is a responsibility...designing to existing codes is insufficient.”
  - Justin Rice, *Engineering News-Record*, March 19, 2018



# Codes set minimum standards

Designers can be liable even if code met

- There are numerous court decisions imposing liability on project owners and design professionals due to their failure to provide a design sufficient for the safety of people that would use a facility – even though the designer satisfied the applicable building codes.
- As stated by Jay Wickersham, president of the Boston Society of Architects, the law is one of the foundations of the professional standard of care, but the law is “the floor, not the ceiling.”
  - “There can be circumstances in which design professionals know more protective measures beyond the building code and zone code and could be potentially held liable.”

# How much should climate change be considered when designing?

- It can be expected that fingers will start being pointed at design firms and contractors that design and construct structures that are damaged by storms and floods that are foreseeable.
- What consideration is a design professional required to give to the changing climate and flood frequency when designing new structures or renovating and repairing existing buildings?

# Case example: DP responsibility for reflecting flood hazards in their designs

- Design firms can be expected to reflect the risk from flood hazards in their designs when there are publicly available flood maps for the area.
  - *Seiler v. Levitz Furniture Co.*, 367 A.2d 999 (Del. 1976)
- The question is what enhanced risks must be considered in light of the increasing severe storms and flooding being encountered in certain areas?

# Meeting code may not be a sufficient defense with flood mitigation

- Compliance with all regulations and adherence to the generally accepted standards of engineering or architectural practice in a community may not be sufficient to avoid liability.
- This is particularly true where regulatory standards or practice in a community may be outdated.
- Reliance on industry standards does not mean that the design professional will not also be judged by whether his or her design was reasonable under the specific circumstances that should have been considered.

# Code compliance found not to be enough

- Compliance with an ordinance or statute does not bar a negligence suit.
  - “Unreasonable conduct is not an excuse when one merely complies with minimum regulatory requirements.”
    - *Corley v. Gene Allen Air Service, Inc.*, 425 So. 2d 781 (La., 1983)
- Regulatory standards or what is deemed generally accepted practice in a community may become outdated due to changes that are occurring in the climate or weather.

# Case example: Code compliance not being a complete defense

- Even if code requirements are satisfied, the standard of care may render parties liable for not designing appropriate for conditions that could foreseeably lead to injury.
- In *Henry Tang v. NBBJ, LP*, court addressed liability where a two-year-old child fell to his death from the third floor of Staples Center in Los Angeles. He was standing on a concrete shelf/banister that ran along the front of the seats in the luxury sky box and had a glass barrier from 26 inches to 10 inches mounted on it.
  - *2014 WL 555163 (Cal. Appl. 2 Dist. (2014))*
- An expert testified that even if the glass partition was code compliant, it constituted a dangerous condition because the shelf invited patrons to sit or stand on it, and they often did so.

# Enhanced standard of care

- The FEMA standards are national minimums
  - FEMA encourages communities to adopt higher standards where appropriate, and communities are rewarded by FEMA with Community Rating System insurance premium discounts.
  - Communities may need to enforce the higher standards that are included in its FEMA-approved ordinance.
- Many state and community regulations exceed the minimum federal Emergency Management Agency standards for construction in flood hazard areas.
- Some have adopted more stringent regulations such as “freeboard” requirements for elevation of new structures on fill or flood proofing of structures to 100-year flood elevation, a “zero-rise” floodway, and prohibition of residences in floodplains or at least floodways.

# State codes are adopting flood regulations

- Some communities that have adopted the International Building Codes or the NFPA codes have also adopted enhanced floodplain construction standards that address:
  - Freeboard flood elevations
  - The use of flood-resistant materials in construction
  - Additional requirements for the design of critical facilities



# State issuing guidelines imposing responsibilities

- New York guideline is an example local authorities adding “meat to the bones” of the various federal and state regulations.
- Design professionals doing projects in these communities must be aware of the guidelines as they enhance the requirements of what is required under the professional standard of care.
- Even if the specific local rules don’t apply to a design professional because the project is located in a different state, an argument can be made that these local standards are influencing and affecting how the design firm will be judged in those other areas as well.

# Will state guideline set standard in other states?

- If these guidelines provide important protections for projects in the counties of New York, and a design firm could have avoided flood damage by applying these same guideline principles in a different state, would a judge or jury in that state find the designer liable for failing to implement the New York standards there because they might be considered the current state-of-the-art nationally?

# Magnitude of flood risk must be considered

- In an Arizona case, a court found an engineer liable for damage to a building that was destroyed by flooding as a result of a bridge the engineer designed blocking the free flow of water from a 100-year flood.
- The court rejected the engineer's argument that the case should be dismissed based on lack of foreseeability of damage.
- The court stated that “the question of whether this was a 25, 50 or 100-year flood is merely one fact to be considered by judge or jury on the question of foreseeability and negligence.”
  - *L.H. Bell & Associates, Inc. v. Granger, 543 P.2d 428 (Ariz., 1975)*

# Foreseeability of harm may create independent duty of care

- In the context of whether a designer would be liable for damages sustained by failure of its design structure to withstand adverse weather conditions, the court would look to whether the designer knew or could have reasonably known that damages could result from a design that did not take into proper account **foreseeable** climatic and weather conditions.
- It is not a defense for the designer to argue that it didn't have actual knowledge that its design would result in damages.
  - The issue is whether a reasonable designer would foresee an appreciable risk and resulting damages from its actions.

# Do FEMA and state rules and guidance documents legally make flood damages more foreseeable?

- Should a designer foresee the potential harm based on current rules and guidance documents of FEMA, state and local governments that put him or her on notice of potential flooding?
- Based on knowledge of recent storm and flooding events, should designers be on notice that harm will result if they fail to design to parameters greater than those required by current regulations and guidance?

## “Act of God” defense

- Just because the extreme storm may be what is commonly known as an “Act of God,” this does not necessarily relieve the designer of liability for failing to design to avoid or mitigate the losses that would be associated with such an event.
- An “Act of God” is such an unusual, extraordinary and unexpected manifestation of nature that it cannot be reasonably anticipated, guarded against or resisted.
  - *In Re Flood Litigation, 607 S.E. 863 and 1 Am Jur.2d “Act of God” p. 897 (2005)*

# “Act of God” defense may not prevail

Court held that the state of Colorado could not successfully use the Act of God defense when a dam designed for a maximum probable flood failed since the court believed the event that occurred was predictable and foreseeable.

- *Barr v. Game, Fish, and Parks*, 497 P.2d 340 (Col., 1972)

# Foreseeability based on flood maps and flood experience reduce “Act of God” defense

“Widespread availability of flood maps and flood predictions reduce the situations in which the Act of God defense may succeed since even very infrequent events are now ‘expected’.”

- Jon Kusler, supra, p.17, citing to *Hoge v. Burleigh Cty. Water Management Dist.*, 311 N.W. 2d 23 (N.D., 1981) in which the court held that the “Act of God” was not the sole proximate cause of flood damages.



# When 100- and 500-year floods occur more frequently than their name suggests



Recent flooding history of places like Houston with repeat 100-year floods occurring every few years instead of every 100 years would logically be considered by a judge and jury in rejecting an Act of God defense where a design firm could reasonably have foreseen the likelihood of floods exceeding what the official maps predicted.

- As storms seem to be increasing in severity, and areas that were previously flooded once per hundred years are now being flooded multiple times in just a few years, design professionals might be held to an enhanced standard of care to consider the foreseeable risk of damages that can result from failure to design to mitigate flood loss and damages.
- Regardless of whether the President directed FEMA to rescind its President Obama-era regulations, does the design professional nevertheless have a duty to meet those same rescinded regulations because they are the state of the art when it comes to dealing with flooding?
- Regulations and codes don't set the limit on what is required –merely the floor.

# Final thoughts

- When the facts in the air and on the ground demonstrate that areas will be flooded every few years, instead of every 100 or 500 years as predicted by current FEMA maps, does a design professional not have a duty to design to mitigate against the damages of the more severe and frequent floods?
- It can reasonably be anticipated that there will be an increasing amount of litigation against design professionals for damages that could have been avoided through prudent flood-resilient and flood-resistant design.

# Questions?



For questions regarding this presentation, please contact:

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