Destructive Incidents Call for New, Sustainable Building Codes

Code updates are in order for stronger buildings and site development regulation

By Don Neff

The Champlain Tower collapse in 2021 is heartbreaking, especially if you consider it may have been prevented. Depending on which expert is interviewed, the causes could be attributed to beach erosion undermining structural support columns, questionable concrete design mixes during original construction or extensive deferred maintenance by the HOA. Given that the HOA was to implement an estimated $15-16 million of recommended repairs, but sadly were never begun, deferred maintenance likely played a significant role in the collapse, in the author's opinion.

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Buildings go through cycles and the rubber hits the road during construction cycles and includes mobilization of the site work—excavation, rough grading, removal of organic matter from bearing soil, below grade foundation construction and waterproofing assemblies—taking place prior to going vertical. Post-construction is the cycle of ownership and maintenance and lasts for decades. It's these preventative maintenance procedures and practices that are necessary to ensure the building's longevity and prevent catastrophic failures like the tower collapse.

Some believe that the tower collapse happened because of foundation issues. Defective foundations and concrete slabs can be a cause for buildings' failures. The structural integrity failures can emerge from poor soil preparation, including improper compaction or poor workmanship such as improperly mixed concrete with too much water in the design mix. This over watering can lead to (post construction) vapor transmission into the conditioned living space causing damage to interior finished floors. Moisture intrusion can also cause corrosion of slab embedments, particularly if there are soluble sulfates in the native soils.

Vapor barrier requirements should be addressed in the structural plans. Moisture movement due to vapor pressure differentials may also allow radon and/or methane to invade the home. A complete geotechnical report is critical to determine the soil bearing strength of the site, underlying geology, native chemistry and other performance variables that can affect the foundation.

Hurricane Ian will also result in further strengthening of building standards, especially with respect to first floor living levels as compared to mean flood elevations. Federal flood maps which are used for tracking and analysis may underestimate flooding risk, but the Federal Emergency Management Agency (FEMA) is required to review these flood elevation maps every five years to identify any changes or inaccuracies. These reviews are to account for accelerating climate change, intense rainfall events and sea level rise.

Sustainable design solution examples include homes anchored on concrete piers and designed with open garages to protect elevated living spaces where storm surges do not rise to that level. There will likely be other adjustments in the current building codes, such as raising the building pad elevations. The challenge larger builders face is differential building pad elevations within a master planned community or large subdivision in which the build-out spans one or more building code cycle updates.

Additionally, concrete block construction may be required and will replace wood-framed structures. This helps performance in hurricane wind conditions. Even in locations that are more insulated from coastal hurricane winds, wood framed construction exists in older structures, but most new homes are proactively built with concrete blocks including robust structural tie downs connecting the roofing assemblies through the block walls and into the foundations.

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Now as we recover from these devastating disasters, new codes and construction practices will need to be implemented in the next building cycles. Studies from agencies like FEMA have shown that the adoption of modern building codes averts billions of dollars in structural damage. Beyond the safety of the occupants, there are a variety of codes at all levels that aim to increase sustainability, energy efficiency, and resilience of the building. And we believe building standards will continue focusing on reducing environmental impacts and using sustainable resources and materials. It makes sense to learn more about these new codes and construction principles. It's practical, sustainable and it's the right thing to do.

What's in your tool box?