# A Case Study in Planning

*By Matt Kuisle, PE, PRA, RS / Published September 2021*

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When I woke the morning of June 25 to the horrible news of the partial collapse of a condominium in Surfside, my initial reactions were shock and sorrow for the families and friends of those affected. As a condominium board member and a licensed professional engineer, my thoughts quickly turned to **why** and **how could this happen?** As of the publication deadline for this article, we are still asking those same two questions.

Late that morning, when the name and address of the building were released, I immediately logged into our company's database to see if our firm had ever provided a reserve study or other services for them—is it possible we missed something? It turns out that we had never been engaged by the community.

As more details were released, including the October 2018 structural report by Morabito Consultants, it was clear that there was evidence of structural stress in the building many years prior to the collapse. Experts agree that there were likely several factors involved in this particular case, and I would caution all of us to limit our speculation, rumors, or even "educated guesses" until the experts complete their investigations. We may never know all of the factors; at a minimum it will take many months for the full review into causation. In the meantime, I want to share a few best practices for board members to provide peace of mind to owners when it comes to the safety of their community.

## Early Diagnosis and Treatment

Like any condominium of that age and type, the Champlain Towers South Condominium Association had been looking at repairs leading up to the county-required 40-year recertification. By the time the 2018 structural engineering report was completed, the price tag for repairs was already astronomical—estimated at over $9 million at the time. Just a few short years later, the engineer found that the damage had worsened, and construction costs skyrocketed to $16 million.

What can we learn from this? Many types of structural repairs can quickly and exponentially worsen when they are not diagnosed and treated immediately. We would not let a roof continue to leak or wood trim/siding continue to rot without expecting the costs of the eventual work to grow as a project is neglected. The same rules apply to structural concrete and other building components.

Over time, all buildings are going to show signs of fatigue. In corrosive environments like coastal Florida, deterioration can happen more rapidly and is more progressive when compared to inland/protected structures. The exact fatigue in each building will vary, depending on the design, age, location, exposure, and maintenance activity. Potential signs of structural fatigue are simple and may include the following:

- Cracks
- Rust spots
- Evidence of leaks
- Concrete spalling
- Missing or failed sealants or flashing
- Peeled, blistered, cracked, or chalked waterproofing
- Loose or lifted balcony tile or façade components
- Efflorescence (salt deposits on concrete or masonry surfaces)
- Delamination or other patterns

It is, without question, a best practice to hire professionals to inspect the common areas regularly. Many experts would suggest annual or even quarterly inspections, but certainly an interval of three years or less is needed in our extreme environment. These regular inspections can be done by your reserve study provider, who acts like a primary care physician conducting regular "checkups" of the physical health of your community. As near-term projects approach and/or issues are identified by the reserve study provider, the specialists can get involved to conduct more noninvasive or even destructive testing and analysis.

## Implement Preventive Maintenance

In addition to qualified inspections by an independent expert, preventive maintenance is critical for successful building management. Preventive maintenance is a type of maintenance plan that uses a proactive approach to repairing and replacing components. Utilizing a preventive maintenance plan, board members can reduce the annual cost of ownership by extending the useful life of a component. It also allows associations to avoid early or unexpected replacement.

For example, we know concrete is porous, which means it absorbs salt and moisture in the air. Mid-rise and high-rise buildings are often constructed of pre-cast or poured-in-place concrete with reinforcing steel (rebar). If the skin (or surface) of the building isn't waterproofed, the steel reinforcing bars will rust as the concrete absorbs moisture and salt. When steel rusts, it can expand up to 10 times its original size and exert a force of more than 10,000 psi on the surrounding concrete. This expansion leads to concrete cracking and breaking away from the building, which is also referred to as spalling.

One of the best ways to slow this deterioration of concrete structures is regular waterproofing applications and sealant replacements. Minimizing the amount of water and chlorides that can migrate to that reinforcing steel will extend the life of the components and reduce the long-term costs of ownership. In buildings with waterproofing systems on plaza areas and elevated pool decks, it is especially important to monitor these areas and address any evidence of leaks or ponding water as soon as they become apparent. The waterproofing membranes in these applications are often covered by pavers or landscaping, so their condition may not be obvious, but a trained eye can observe their performance based on visible symptoms like leaks, efflorescence, or staining. If your building is using

gutters in the garage to keep water from dripping on cars, it's probably time to address the plaza waterproofing system.

In the best-case scenario, boards would use preventive maintenance programs accompanied by independent reserve studies to regularly assess conditions and conduct preventive maintenance of structural components, including balconies, railings, elevated slabs, plaza waterproofing, flashing, and sealants. Doing the bare minimum, or worse, doing nothing, will result in higher costs of repairs—the exact opposite of why the board likely deferred or avoided the preventive maintenance in the first place!

## Listen to the Professionals and Prepare Financially (Eat Right, Exercise, and Take Your Medicine)

Even with regular preventive maintenance and waterproofing applications, concrete structures will eventually exhibit some level of deterioration. When diagnosed early, concrete cracks or spalls on balconies, columns, beams, slabs, and other components can be addressed before they become large issues.

When concrete stress becomes visibly evident, communities should engage a structural engineer to write project specifications and oversee the project. The engineer will likely refer to the International Concrete Repair Institute (ICRI) specifications and procedures to provide a specific scope and criteria for repairs. The most important requirement is to remove all concrete from around the reinforcing steel bars and two inches beyond the rusted metal, into "clean steel." Until the removal of concrete begins, it is impossible to determine exactly how much concrete will need to be removed. Even the best prognosticators would not be able to identify the exact scope and cost of future concrete restoration projects, so it is key to work with an independent engineer to oversee the project.

Well in advance of any project, ideally as soon as a community is built, a board should consult with a reserve study provider that has worked with thousands of buildings to understand future repair and replacement needs. These professionals can consider the size and design of the structure along with the conditions, age, and exposure to the environment to develop reasonable cost and life valuations for the common elements of the community, including preventive maintenance and eventual needs of the "hidden" components. This information allows boards to set an appropriate budget and be transparent with the membership about future needs and the amount of "wear and tear" that the community experiences over time. Boards must communicate their options when reserves are not available for needed projects since, as we have seen time and again, that can result in deferral of needed repairs or replacements. Attempts to avoid saving for them certainly does not make the projects cost any less and usually leads to higher long-term costs for additional repairs.

It's the duty of each condominium board of directors to maintain common elements (and protect the investment of the owners). One of the very best ways to fulfill this duty is by hiring experts and following their advice. Over the years, I've been lucky to have met thousands of volunteer board members with overwhelmingly great intentions. Like me, many of them have valuable skills and deep knowledge in many aspects of operating facilities and running businesses. In my 12 years on the board of my condominium in Tampa, I have made many mistakes and a few good decisions along the way. The biggest mistakes have been decisions that were made without first consulting enough expert advice. With the pressure to keep fees low from residents, all board members have undoubtedly felt the need to avoid getting that expert opinion or waited a little too long to address a maintenance or repair item. I know I will think twice before making that mistake again and will encourage my fellow board members to do the same. Being on the board is a difficult job, and without proper planning, the job can get harder or nearly impossible for future boards.

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