

POLICY MEMO

Florida Shoreline – The Urgency for Periodical Structural Inspections.

Executive Summary:

The collapse of the Champlain Towers in Surfside, Florida, has rekindled debates over construction restrictions in the Florida shoreline. Concerns about the inspection and regulation of high-rise buildings have arisen in the wake of the recent disaster. Many of the structures along Florida's shoreline that still exist were built before 1980 when the state's building code did not include a threshold inspection, which provides additional quality-control supervision during the construction process.

Florida's Threshold Inspection Law, contained in Section 553.71 of the Florida statutes, mandates a state-certified inspector to monitor the construction process and check structural parts for compliance and safety. A threshold building is defined as having a height greater than three stories or 50 feet, a footprint exceeding 5,000 square feet, and an occupant content of greater than 500 persons (Pistorino, 2020). However, periodical inspection is not a state-wide regulation. Structural inspections mandates on buildings vary in each local government of Florida. In Miami-Dade and Broward counties, local governments require 40-year recertification inspections. But afterward, further inspections are often at the owner's discretion and once every ten years, an approach that is more reactive than proactive.

Background Analysis:

Almost 40 years ago, after another building collapsed in Florida, Congress approved the Threshold Inspection Law. On March 27, 1981, the Harbor Cay Condominium in Cocoa Beach, Florida, collapsed while workers poured roof concrete to finish the framework. Numerous design flaws were uncovered in that incident. Like Harbor Cay Condominium, the Champlain Towers in Surfside was one of 10 similar projects designed on the flat plate model, where concrete pillars support concrete slabs. Because each section is linked, a fault in the flat plate design essentially guarantees collapse (Montgomery, 1981).

A further study in 2020 by Shimon Wdowinski, professor at Florida International University Institute of Environment, showed the Champlain Towers were sinking at a rate of about two millimeters a year between 1993 and 1999 (Tejedor, 2021). While land subsidence was not the only cause of the Champlain Towers collapse, it is worth noting that regions with sinking terrain are more susceptible to the consequences of sea-level rise (Wdowinski & Fiaschi, 2020). The rising sea level along the U.S. Atlantic coast has increased flooding risk in some coastal areas while also speeding up the corrosion of foundations and element materials supporting structures. Which materials and building techniques are used for the foundation and weight-bearing elements are very important. For example, using corrosion-resistant structural connections can help maintain structural integrity and prevent building failures, but these techniques require corrosion inhibitors and galvanized steel, which are expensive. Therefore, adequate building

maintenance and periodical structural inspections should be prioritized in coastal zone buildings (FEMA P-55, 2011).

Policy Option Recommendations:

Amendments to the Florida Building Code are recommended to include:

- 1- Mandatory structural inspections- with no exception- at least every 2 to 5 years. The recommended inspections should cover the internal infrastructure components and land subsidence.
- 2- Include mandatory use of corrosion inhibitor materials that enhance load safety and increase building redundancy.

Citing the case of the Champlain Towers, the original 1979 design did not provide building redundancy. Due to the lack of steel reinforcement (rebar), the columns were under-reinforced, reducing ductility in the structure, which increased the risk of brittle behavior in the event of a failure. The original design did not consider a last-minute addition of a 13th-story penthouse, which incurred an increasing weight that might have caused severe structural damage to the concrete slab (McQuate, 2021). A threshold inspector would have noted the crowded columns during the early stages of development. However, local authorities haven't uncovered any initial job-site inspection paperwork for the Champlain Towers. Therefore, threshold inspections during the construction phase, and additional periodical structure inspections, are very efficient solutions that ensure our shoreline buildings are safe and resilient for the years to come.

Implementation:

The proposed periodic structural inspection can be time-consuming and requires special scanners. A Ground Penetrating Radar scan is recommended, as it can detect post-tensioned cables and electrical conduit voids in addition to concrete slab measurement and rebar spacing for structural review. However, a single-frequency GPR system costs USD 14,000 and needs more thorough training than other radars. Although data collecting could be time-consuming and, as a result, more expensive, these periodical structural inspections with the help of GPR are still very specific, measurable, and attainable. Its implementation could bring relevant outcomes that can be further used for time-based solutions.

Besides implementing GPR, the inspector is suggested to be a P.E. or Registered Architect with threshold building design competence- an engineer-of-record (EOR). It is also recommended that the structural inspector must have a contract that allows for enough time on the project to do thorough inspections of all structural components (Pistorino, 2020).

The stakeholders involved are the constructors, the government, and the current and future residents of shoreline buildings. Attaining to improve resilient infrastructure from an early phase will not only save lives, but it will guarantee the preservation of our city's landscape despite of weather anomalies that affect shoreline towns. Lastly, having a strict building code will declare the efforts made by our local government to ensure the citizens that they are being cared for, further enhancing the trust and support in our government officials and policymakers.

Reference

- FEMA P-55. (2011). *Coastal Construction Manual: Principles and Practices of Planning, Siting, Designing, Constructing, and Maintaining Residential Buildings in Coastal Areas (Fourth Edition)* (Vol. Volume I). FEMA.
- McQuate, S. (2021, July 9). 'We need to be patient' — U.W.'s Dawn Lehman on the collapse of the Champlain Towers South. Retrieved February 2022, from University of Washington News: <https://www.washington.edu/news/2021/07/09/dawn-lehman-on-the-collapse-of-the-champlain-towers-south/>
- Montgomery, P. L. (1981, March 29). TWO STILL MISSING IN CONDOMINIUM COLLAPSE. *New York Times*, Section 1, Page 28.
- Pistorino, J. C. (2020, July). *Potential Liabilities Facing Threshold Building Inspectors*. Retrieved from Florida Board of Professional Engineers: <https://fbpe.org/potential-liabilities-facing-threshold-building-inspectors/>
- Tejedor, C. (2021, June 24). *FIU professor: Collapsed Surfside building showed signs of subsidence in the '90s*. Retrieved from FIU News: <https://news.fiu.edu/2021/fiu-professor-collapsed-surfside-building-showed-signs-of-subsidence-in-90s-era-space-radar-data>
- Wdowinski, S., & Fiaschi, S. (2020, April 1). Local land subsidence in Miami Beach (F.L.) and Norfolk (V.A.) and its contribution to flooding hazard in coastal communities along the U.S. Atlantic coast. *Ocean and Coastal Management*, 187(105078). Retrieved from FIU Library: <https://faculty.fiu.edu/~swdowins/publications/Fiaschi-Wdowinski-OCM-2020.pdf>