

TECHNICAL EDITORIAL

Need for periodic inspections in buildings. Creation of the Directorate of structural failures of Alconpat Internacional

This technical editorial was timely released as an institutional statement on the occasion of the Miami landslides and the immediate actions that Alconpat International took. That statement is reproduced verbatim here, strictly respecting its content. In addition, the names of those who make up the new Directorate of structural failures of Alconpat International are provided.

As specialists in concrete pathology, the images of the collapse of the building near Miami seemed overwhelming, both because of the number of victims that occurred at night, and because of the sequence of how it occurred. This feeling of anguish occurs because the main objective of structural engineering is the safety of the lives of the people who use structures and buildings, in addition to their functionality and aesthetics. Safety in which the building does not collapse is the essence of structural engineering. In our case, the specialty that we develop is added to this original objective. Like doctors to the human body, we are dedicated to detecting possible injuries and deterioration that the action of the environment, the loads on the building or the use itself may have caused over the years.

Absolute security does not exist and the more security the more expensive the structure is. Therefore, during the design phase of a new structure, calculations are commonly optimized so that the probability of collapse of residential buildings is 1 in a million. That is, safety is cost-optimized so that the probability of collapse is reasonably small. This theoretical probability was first proposed by the CEB (Euro International Concrete Committee) and then implicitly or explicitly adopted worldwide as the basis for all structural codes. Currently, there is an International Committee on Structural Safety (JCSS) that is responsible for maintaining and disseminating knowledge in this area. The result of decades of application of the principles of what we technically call “limit states” has been highly satisfactory, since it is a general perception that, if the rules based on these concepts are followed in each country, accidents are really very rare.

In the case of the building near Miami, the construction was 40 years old, so the safety level of the project should not have been affected, which must be maintained throughout the useful life of the structure. Without going into technical details, security cannot be less than that established by law and must be maintained over time and for that. If necessary, the buildings are reinforced and repaired. Therefore, the periodic inspections must contain a priority section so that it is reviewed and verified that the structural safety continues to maintain the levels foreseen in the project. It is not only a matter of detecting dampness or functional failures or of enclosures and roofs, which are also important since they affect comfort, but comparatively they are secondary when human life is at stake. The fundamental objective should be to review the structural components and confirm that their good performance is maintained.

Therefore, the inspector should not only have knowledge of structural engineering but also of pathology and durability of the materials, that is to say, know which injuries and deterioration are possible due to the particular location of each structure, in detecting its degree of risk and its impact on the required structural safety levels.

There are already guides and recommendations on how to carry out the inspection and what tests to carry out in existing structures, to detect hidden injuries despite the good external appearance, such as unexpected decreases in the mechanical resistance of concrete due to chemical attacks, due to high

salinities in water tables or by the corrosion of reinforcing steel in marine environments, such as that at the site of the collapse.

In the case of the collapsed building, we do not dare to venture an opinion on the causes of the collapse as we do not have the necessary data for its analysis, but if we want to state that it is necessary to "learn lessons" that allow us to avoid other accidents in similar circumstances. Only a rigorous forensic analysis, developed by specialists, will be able to confirm the true cause from all the hypotheses that are raised.

We want to manifest that some issues seemed essential to us in the stage in which the debris removal works were carried out, fully respecting the need for them to have been as fast as possible, always considering that the highest priority is to find life or at least human remains and personal belongings. Reputable specialists in the pathology and durability of concrete and materials, and there are, for example, in Florida universities themselves, who advise and collaborate with rescuers to take samples and identify clues about the possible causes of the collapse. If those tests are not acquired now, crucial evidence to elucidate the validity of the hypotheses that need to be developed to explain the collapse may be lost. For example, it is essential to have expertly selected samples of the concretes and trusses of the pillars on the ground floor and the slabs of the basement.

As the demolition of the remaining part of the building has been determined for safety reasons, there must be a separation of remains between one and the other collapse so that an immediate inspection of the part of the building that was still standing is undertaken, in order to verify the degree of injuries or the integrity of its materials, especially of the base of the pillars and the areas of connection with the foundations and the slabs of the mezzanines. This will allow a comparison between both collapses, which only an inspection by specialists in pathology can help to elucidate.

In addition, since there is a twin building that has collapsed, it would be necessary to carry out an inspection by the aforementioned specialists in concrete durability to expand the possibility of confirming the hypotheses that may be raised.

As specialists in construction pathology of ALCONPAT (Latin American Association for Quality Control, Pathology and Construction Recovery) we want to declare that we have immediately constituted within our organization, a commission of independent experts comparable to the way it is done with the aeronautical accidents. In particular accidents, defects can be detected that should not be repeated in other constructions, including the improvement of the diagnoses to be carried out on the structures in service. It is essential that these types of accidents are explained by structural engineering in a transparent and usable way according to the codes and recommendations of the world. Only transparency and publicity of the conclusions will restore to society the confidence that the knowledge and professionals capable of detecting defects and injuries in structures really exist and thus anticipating and avoiding other similar accidents with the most regrettable consequences, losses. of human lives.

The Directorate of Structural Failures of Alconpat International was made up of Raúl Husni (President, Argentina), Jesús Rodríguez (Member, Spain), Andrés Torres (Member, Mexico), Paulo Helene (Member, Brazil), and Alberto Sagüés (Member, Argentina / USES).

Signed by:
International Board of Directors (expanded)