Concrete Building Pathology

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Content:

1. CONCRETE, BUILDING, PATHOLOGY

1.1 Short history of the concrete:

Despite being thought of as a modern material, concrete has been in use for thousands of years. Lime-based hydraulic cements (those set by chemical reaction with water) have been in use since Roman times, and examples of ancient mortars (cement and aggregate) still survive today. The word *concrete* comes from the Latin *concretus*, which means mixed together or compounded.

The use of concrete has changed dramatically over the last 100 years as our understanding about the material and how it is made has improved. The industry continues to evolve today as experience grows and its versatility and cost-effectiveness is exploited.

1.2 Concrete: composition and characteristics

Concrete is made up of aggregates of various sizes, broadly categorised as fine (commonly sand) and coarse (typically crushed stone or gravel), combined with a cement paste (a mixture of cement and water) which acts as binder.

Concrete is very strong in compression at relatively weak in tension. To overcome this deficiency when concrete is used as a structural building material, and to combat early shrinkage and control subsequent diurnal thermal expansion and contraction, reinforcement (historically iron and later steel) is included in areas where tension occurs to create reinforced concrete. Steel and concrete have similar coefficients of thermal expansion and form effective composite section. Reinforced concrete is a manufactured material, produced either in a casting yard (in the case of precast concrete) or, more commonly for buildings, it is site-made (when it is known as in situ concrete).

- Documentary evidence of the building's condition in the past, such as photographs and previous reports, are useful ways of measuring the progress of deterioration. This is an important part of any appraisal process, and can also be used to assess the timing (urgency and prioritization) of proposed repair works. It is therefore important that the visual survey is as quantitative as possible in recording the location and size of defects so that their growth (if any) can be monitored.
- Structural monitoring, environmental monitoring and corrosion monitoring are all tools in the assessment process.
- There are various strategies that can be adopted to address the defects, damage and decay of a concrete building or structure:

➢ *Do nothing;*
➢ *Re-consideration of the building's structural capacity – possible down-grading of function so it is fit for purpose;*
➢ *Arrest or reduce further deterioration;*
➢ *Repair, remediation and any necessary structural upgrading;*
➢ *Reconstruction of part or all of the structure;*
➢ *Demolition.*

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6. BIBLIOGRAPHY

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