



Civil Engineering

Damage Assessment and Rehabilitation Of Concrete Structures

Course Introduction

As cities grow older they inherit a wealth of buildings that have economic, functional and heritage values and yet their uses may need to change, human knowledge is enhanced and thus their vulnerability to extreme events are better understood and sometimes changes may need to be made in their structure to adapt to new uses. In all of these cases structural engineers are called upon to make assessment of the current condition of the structure and to advice on what type of intervention is needed to ensure safety, functionality and economy of such alterations. The purpose of the course is to provide participants with a fundamental and practical understanding on condition assessment of concrete structures and concrete repair and strengthening methods

Target Audience

- civil engineers.
- Experienced Civil Engineers Seeking Professional Development
- Architects and Urban Planners
- Entrepreneurs in the Construction Industry
- Project Managers in the Construction Industry

Learning Objectives

- Have an overview the types of motivations for evaluation of existing concrete structures and to outline the processes to be followed to make such evaluations. Such motivations range from the need to change use or re-plan to the situation where signs of distress in those buildings are detected
- Learn that evaluations of existing structures start with understanding the new criteria which the structure is to be measured against and is then followed by testing of the

existing properties which in turn is followed by analysis to determine whether the set criteria are met.

- Gain solutions using traditional material such as steel and concrete are discussed.
- Testing and inspection techniques of engineering materials
- The workmanship in building construction
- The critical characteristics of a given structure
- The types and causes of common deficiencies (even failures) of structures
- How to explain methods of observation, instrumentation and testing
- The workout preventive measures to counteract deterioration of structures
- How to comprehend workable temporary and permanent repairs for any particular structure
- Non – destructive evaluation (NDE) for the steel and welding
- The capability to inspect the finishing work activity
- Testing and inspection for road construction
- The ways and skills for the inspector

Course Outline

• DAY 01

Structural evaluation of buildings for:

- For the purposes of change in use
- For addition of floors or other structural changes
- Due to apparent signs of distress
- Cracks in building.
- Types of cracks, early thermal shrinkage, drying shrinkage and thermal cracks
- Inspection and diagnosis
- Repair of cracks, material and system • Monitoring of cracks

• Day 02

Seismic rehabilitation of existing buildings

- Seismic vulnerability of buildings
- Seismic strengthening of existing buildings
- Cost, functional and aesthetic considerations

- Retrofitting of structural system by enhancing strength and continuity
- Decreasing demand of an existing system
- Rehabilitation of nonstructural elements

• Day 03

Retrofitting using steel and concrete

- Use of plates with bolts and/or epoxy fixing
- Jacketing of columns
- Use of new
- technologies such as carbon fibers and resin
- Application to enhance flexure and shear
- Use as column confinement
- ACI requirements for the evaluation of existing structures
- Analysis of buildings using available information
- Report writing

• Day 04

Foundation movement inspection and interpretation

- Options for intervention: direct and indirect
- Underpinning of building structures
- Chemical attacks
- Chloride attack
- Sulfate attack
- Carbonation
- Mechanism, perpetuation, mitigation and repair
- Marine environment
- Durability of concrete as influenced by the used material and systems

• Day 05

Repair of historic and heritage buildings

- High level of uncertainty
- Constraints on available retrofitting systems: reversibility is a must
- Changed use of a building
- New and more stringent snow load requirement
- Archeological site

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
May 26, 2025	May 30, 2025	5 days	4250.00 \$	UAE - Dubai
Sept. 1, 2025	Sept. 5, 2025	5 days	4950.00 \$	Italy - Milan
Dec. 29, 2025	Jan. 2, 2026	5 days	4250.00 \$	UAE - Dubai
May 25, 2025	May 29, 2025	5 days	4250.00 \$	Oman - Muscat