TRAINING TITLE

INSPECTION, ASSESSMENT, REPAIR, AND MAINTENANCE OF CONCRETE STRUCTURE

Training Duration

5 days

Training Venue and Dates

Ref. No. CE121	**Inspection, Assessment, Repair, and Maintenance of Concrete Structure**	**5**	**21-25 Apr. 2025**	**$5,500**	**DUBAI, UAE**

In any of the 4 or 5-star hotels. The exact venue will be informed later.

Training Fees

- **$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Lunch**

Training Certificate

Define Management Consultants Certificate of course completion will be issued to all attendees.

TRAINING DESCRIPTION

The Inspection, Assessment, Repair, and Maintenance of Concrete Structures Course is designed to equip professionals in the construction, civil engineering, and maintenance sectors with the knowledge and skills necessary to evaluate, repair, and maintain concrete structures. Concrete structures are integral to buildings, bridges, roads, and other infrastructure, and their longevity and safety depend on proper inspection and timely maintenance.

This course covers essential topics such as how to conduct thorough inspections of concrete structures, assess structural integrity, determine causes of deterioration, and apply appropriate repair and maintenance techniques. It also emphasizes practical knowledge on the selection of materials and technologies for effective repair and the use of non-destructive testing (NDT) methods.

TRAINING OBJECTIVES

By end of course participants will be able to understand

- Understand Concrete Deterioration Mechanisms: Learn about the common causes of concrete deterioration, including environmental factors, chemical attacks, and physical wear.

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- Perform Structural Inspections: Gain practical knowledge on how to inspect concrete structures, identify signs of damage, and evaluate the condition of concrete through visual and non-destructive methods.
- Assess the Condition of Concrete Structures: Understand the processes for assessing the structural integrity and load-bearing capacity of concrete structures.
- Determine Repair Techniques: Learn about various repair methods, including surface treatments, crack injection, concrete resurfacing, and reinforcement.
- Select Appropriate Materials and Technologies: Get familiar with the selection criteria for repair materials such as mortars, coatings, and epoxy resins, and understand modern technologies in concrete repair.
- Implement Maintenance Strategies: Develop strategies for the ongoing maintenance of concrete structures, focusing on proactive measures to prevent deterioration.
- Understand Safety and Compliance: Ensure that repair and maintenance operations comply with safety standards, codes, and regulations.

WHO SHOULD ATTEND?

- Civil engineers
- Structural engineers
- Building inspectors
- Construction managers and supervisors
- Maintenance engineers and technicians
- Contractors specializing in concrete construction and repair
- Project managers and consultants in the construction industry
- Architects and designers working with concrete structures

COURSE PROGRAM

Day 1: Introduction to Concrete Structures and Deterioration Mechanisms

- **Overview of Concrete Structures**
  - Types of concrete structures (buildings, bridges, roads, etc.)
  - Basic concrete properties and their role in structural performance
  - Common structural components: beams, columns, slabs, foundations, and facades
- **Concrete Deterioration Mechanisms**
  - Environmental factors affecting concrete: moisture, temperature fluctuations, and pollutants

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- Common forms of deterioration: cracking, spalling, corrosion, chemical attack (sulfate attack, alkali-silica reaction)
- Structural and non-structural damage: causes and effects
- Aging and wear and tear on concrete structures

Day 2: Concrete Inspection Techniques and Tools

- **Visual Inspection**
  - How to visually inspect concrete for cracks, surface wear, and staining
  - Identifying signs of stress or overloading
  - Recognizing indicators of corrosion and other environmental damages
- **Non-Destructive Testing (NDT) Methods**
  - Overview of NDT techniques for concrete inspection: Ultrasonic testing, rebound hammer test, impact echo testing, and ground-penetrating radar (GPR)
  - Advantages and limitations of different NDT methods
  - How to select the right NDT method based on structure type and damage suspected
- **Assessing Concrete Strength and Integrity**
  - Measuring compressive strength using core testing and rebound hammers
  - Structural health monitoring using strain gauges and displacement sensors
  - Techniques for assessing internal damage without compromising the structure's safety

Day 3: Condition Assessment and Structural Evaluation

- **Concrete Strength and Durability Assessment**
  - Evaluating the compressive strength of concrete and identifying areas of weakness
  - Methods for determining the durability of concrete: permeability tests, chloride ion concentration, carbonation depth
  - Structural analysis and modeling to assess overall stability and load-bearing capacity
- **Corrosion and Crack Evaluation**
  - Identifying signs of reinforcement corrosion and its effect on concrete
  - Techniques for assessing cracks: crack width measurement, crack propagation analysis
  - Evaluating the impact of cracks on the safety and stability of the structure
- **Condition Grading and Documentation**
  - How to rate the condition of concrete structures using standardized systems
  - Creating inspection reports and damage assessment documentation
  - Prioritizing repairs and maintenance actions based on condition assessment

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Day 4: Repair Techniques for Concrete Structures

- **Surface Preparation for Concrete Repair**
  - Cleaning and preparing concrete surfaces before repair: sandblasting, water-blasting, and acid etching
  - Importance of surface roughness and bonding agent selection
  - Repairing minor cracks vs. larger structural damage
- **Concrete Repair Materials**
  - Introduction to common repair materials: repair mortars, polymer-based products, epoxy resins
  - Selecting the right material based on damage type, exposure conditions, and aesthetic requirements
  - Advantages and limitations of different repair materials
- **Repair Methods and Techniques**
  - Crack injection and patching methods for minor damage
  - Concrete resurfacing techniques for large-scale repairs
  - Structural reinforcement methods: external post-tensioning, carbon fiber wraps, and additional rebar
  - Sealing and waterproofing methods for preventing further damage
- **Modern Concrete Repair Technologies**
  - Emerging technologies in concrete repair: self-healing concrete, advanced coatings, and nanomaterials

Day 5: Maintenance Strategies, Safety, and Best Practices

- **Preventive and Corrective Maintenance Strategies**
  - Establishing a preventive maintenance schedule for concrete structures
  - Identifying high-risk areas and potential failure points in concrete structures
  - Proactive measures to prevent damage and reduce repair costs
- **Monitoring and Maintenance of Concrete Health**
  - Using sensors and monitoring systems for ongoing condition assessment
  - Creating a maintenance management system for long-term monitoring and repair planning
- **Safety in Concrete Repair and Maintenance**
  - Safety protocols for working with damaged or deteriorating concrete structures
  - Personal protective equipment (PPE) requirements and risk mitigation
  - Managing confined spaces and working at heights during repairs
- **Regulatory Compliance and Standards**
  - Understanding international and local standards for concrete repair (e.g., ASTM, ACI, ISO)
  - Legal and regulatory requirements for concrete structure maintenance and repair

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  - Documentation and compliance for insurance and warranty purposes
- **Final Review and Q&A**
  - Recap of key learning points from the course
  - Final Q&A session to address remaining questions and concerns

NOTE:
Pre-& Post Tests will be conducted.
Case Studies, Group Exercises, Group Discussions, Last Day reviews, and assessments will be carried out.

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