

Course No. 1537

# Civil Engineering Design & Applications Training Course

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**CIVIL & STRUCTURAL ENGINEERING  
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS**

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DURATION

**5 Days**

DELIVERY

**Classroom**



## Course Overview

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The Civil Engineering Design & Applications Training Course is a specialized professional program designed to develop the technical knowledge and practical skills required to plan, analyze, design, review, and implement civil engineering projects effectively. The course focuses on connecting engineering principles with real-world applications across buildings, infrastructure, transportation, foundations, concrete structures, and site development, enabling participants to make sound technical decisions while improving design quality, constructability, safety, and project performance.

The program provides an integrated understanding of the civil engineering design process, beginning with project requirements, site investigations, engineering data, and design criteria, and progressing toward the selection and development of appropriate engineering solutions. Participants examine the relationship between architectural requirements, structural systems, geotechnical conditions, civil infrastructure, construction methods, and project constraints.

A major focus of the course is the practical application of civil engineering principles to reinforced concrete structures, foundations, soil-related works, roads, drainage systems, utilities, and infrastructure. Participants develop the ability to interpret engineering drawings, specifications, design calculations, technical documentation, and project requirements while considering structural performance, durability, constructability, cost, and long-term operational requirements.

The course also addresses professional design review, technical verification, engineering risk assessment, design coordination, and the identification of potential errors and conflicts before construction. Participants explore systematic approaches for reviewing calculations and drawings, evaluating alternative design solutions, coordinating multidisciplinary requirements, and managing design changes that may affect construction cost, schedule, quality, and project performance.

Through practical exercises, engineering case studies, and project-based activities, participants strengthen their ability to evaluate civil engineering solutions and develop practical recommendations for improving design quality and implementation. The course is suitable for professionals working on government projects, commercial developments, industrial facilities, infrastructure programs, oil and gas facilities, transportation projects, and major construction developments.

## Objectives

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- Analyze project requirements, site information, design criteria, and engineering constraints within the duration of the course.
- Evaluate loads, forces, soil conditions, material properties, and other technical factors affecting civil engineering design.
- Apply civil engineering design principles to develop appropriate solutions for structures, foundations, infrastructure, and site works.
- Assess reinforced concrete design requirements for fundamental structural elements and determine suitable engineering approaches.
- Evaluate foundation alternatives based on soil characteristics, structural requirements, loading conditions, and site constraints.
- Apply engineering principles to the preliminary design of roads, drainage systems, utilities, and infrastructure components.
- Analyze engineering drawings, specifications, calculations, and technical documentation to identify inconsistencies and potential design issues.
- Evaluate alternative engineering solutions based on safety, durability, constructability, sustainability, cost, and long-term performance.
- Apply systematic design review and verification techniques to improve the technical quality of civil engineering deliverables.
- Assess technical risks associated with design and construction and develop appropriate mitigation measures.
- Strengthen coordination between civil engineers, structural engineers, architects, consultants, contractors, and project management teams.
- Develop practical recommendations for improving civil engineering design quality, constructability, reliability, and project delivery.

## Who Should Attend

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This course is designed for civil engineers, design engineers, structural engineers, construction engineers, project engineers, site engineers, infrastructure engineers, highway engineers, geotechnical engineers, foundation engineers, and professionals involved in the design, review, supervision, and implementation of civil engineering projects. It is particularly relevant to engineers responsible for preparing or reviewing drawings, calculations, specifications, technical submissions, and construction requirements.

The program is also suitable for engineering and construction managers, project managers, site managers, technical office engineers, engineering consultants, design coordinators, construction supervisors, quality professionals, contract engineers, and technical procurement specialists. Professionals involved in design coordination, construction planning, technical review, value engineering, quality assurance, and project execution will benefit from the practical and multidisciplinary approach of the course.

The course is highly relevant to professionals working in government entities, ministries, public infrastructure organizations, engineering consultancies, construction companies, property developers, industrial facilities, oil and gas organizations, transportation authorities, utilities, airports, commercial developments, and organizations responsible for major civil engineering and infrastructure projects.

## **Learning Outcomes**

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- Explain the fundamental principles of civil engineering design and their application to different types of projects.
- Analyze project requirements, site conditions, engineering data, and design constraints to support appropriate technical decisions.
- Interpret civil engineering drawings, specifications, design calculations, and technical documentation accurately.
- Analyze fundamental loads and forces affecting civil engineering structures and infrastructure components.
- Evaluate foundation solutions based on soil characteristics, structural requirements, and site conditions.
- Apply fundamental principles for the design and review of reinforced concrete structural elements.
- Evaluate road, drainage, utility, and infrastructure design requirements from both technical and constructability perspectives.
- Review engineering calculations and drawings to identify potential errors, inconsistencies, and design conflicts.
- Assess construction materials and engineering systems according to performance, durability, and project requirements.

- Identify technical risks associated with civil engineering design and recommend appropriate mitigation measures.
- Improve technical coordination between design teams, consultants, contractors, site teams, and project management.
- Prepare practical engineering recommendations for improving design quality, constructability, safety, and project performance.

## Course Outline

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### DAY 01

## Fundamentals of Civil Engineering Design and Project Requirements

- Principles of civil engineering and their applications in modern projects
- Civil engineering project lifecycle from initial requirements to design and construction
- Collection and analysis of site data and engineering requirements
- Interpretation of civil engineering drawings and technical specifications
- Identification of design loads, forces, and engineering constraints
- Principles of selecting appropriate structural and civil engineering systems
- Coordination between architectural, structural, and civil engineering requirements
- Safety, durability, serviceability, and constructability considerations in design
- Application of engineering codes, standards, specifications, and design criteria

### PRACTICAL APPLICATION

Analysis of a representative civil engineering project and identification of key design requirements

### DAY 02

## Reinforced Concrete Design, Foundations, and Ground Engineering

- Fundamentals of reinforced concrete design
- Properties of concrete, reinforcement, and construction materials

## DAY 02 — CONTINUED

- Design principles for basic reinforced concrete elements
- Design considerations for slabs, beams, columns, and concrete walls
- Fundamentals of foundation design
- Types of foundations and selection criteria
- Soil properties and their influence on foundation design
- Bearing capacity, settlement, and foundation performance
- Excavation, backfilling, ground improvement, and site preparation

**PRACTICAL APPLICATION**

Development of a preliminary reinforced concrete and foundation design solution for a representative project

## DAY 03

**Roads, Infrastructure, and Drainage Design Applications**

- Fundamentals of road planning and engineering design
- Road components and design requirements
- Pavement structure and material selection
- Traffic considerations and their influence on road design
- Site grading, levels, slopes, and earthworks
- Fundamentals of stormwater drainage design
- Water supply, wastewater, and utility network considerations
- Site levels, network alignment, and coordination requirements
- Identification and management of conflicts between infrastructure services
- Integration of roads, drainage, utilities, and other civil works

**PRACTICAL APPLICATION**

Development of a preliminary infrastructure and drainage concept for a representative site

**DAY 04**

## **Design Review, Engineering Analysis, and Technical Risk Management**

- Principles and methodologies for reviewing engineering designs
- Verification of design assumptions, criteria, and calculations
- Identification of errors, inconsistencies, and conflicts in engineering drawings
- Evaluation of design constructability and site implementation requirements
- Technical risk identification throughout the design and construction process
- Influence of material selection and specifications on project performance
- Quality requirements for civil engineering design and documentation
- Coordination between engineers, consultants, contractors, and construction teams
- Management of design changes and their impact on cost and schedule
- Documentation of technical comments, findings, and engineering recommendations

**PRACTICAL APPLICATION**

Review of representative drawings and calculations to identify technical risks, conflicts, and corrective actions

**DAY 05**

## **Advanced Civil Engineering Applications and Project Performance Improvement**

- Integration of civil engineering design with project management and construction
- Improving constructability and reducing design-related construction problems
- Evaluation of engineering alternatives based on cost, performance, durability, and sustainability
- Sustainable design principles and efficient use of materials and resources
- Application of digital engineering tools in design development and review
- Engineering information, documentation, and technical data management
- Performance indicators for design quality and engineering effectiveness
- Improving coordination between design teams, site teams, consultants, and contractors
- Development of design verification and quality control procedures

## DAY 05 — CONTINUED

- Strategies for reducing technical risks, rework, and design changes during construction

**FINAL WORKSHOP**

Integrated case study involving the development and review of a civil engineering design and preparation of an action plan for improving design and project execution

## Register or Request More Information

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Course page: <https://quest-training.com/courses/civil-engineering-design-applications-training-course>

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