



Pile Foundation Design and Load Testing

Course: Bored, Driven and CFA Piles



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Introduction:

Pile foundation design and load testing for bored, driven and CFA piles is the subject of this 5-day course for geotechnical, structural and site engineering staff, ending with a Pile Design Check and Load Testing Plan for a case building. Piled projects often lose time and money when shaft friction is overestimated, downdrag is ignored, boreholes collapse before concreting or integrity results arrive too late to act on. Nominees already design, supervise or test foundations, and the course is taught as a modelling build of capacity, settlement and test acceptance calculations. CoreConcept Training Center delivers this pile foundation design course.

Course Objectives:

- Select a pile system among bored, driven, CFA and micropile options for the loads, ground model and site constraints of a project
- Calculate axial pile capacity from shaft friction and end bearing using Eurocode 7 design approaches and CPT or SPT derived parameters
- Assess laterally loaded piles with p-y curves and estimate pile group settlement, including downdrag from negative skin friction
- Specify and supervise bored and CFA pile construction, including support fluid control, tremie concreting and rig instrumentation records
- Plan and interpret static, high strain dynamic and integrity tests and set acceptance criteria for each result
- Diagnose defective piles and difficult ground conditions and select remediation or redesign measures

Target Audience:

- Geotechnical design staff responsible for pile capacity and settlement calculations on building and infrastructure projects
 - Structural design staff responsible for pile group layouts and load transfer from superstructures into piles
 - Site engineering staff responsible for supervising pile installation, concreting and construction records
 - Testing and quality staff responsible for specifying, witnessing and reporting pile load and integrity tests
 - Checking engineers responsible for reviewing piling submittals, test reports and non-conformance proposals
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Course Outline:

Day 1: Deep Foundation Selection, Pile Systems and Ground Model Inputs

- Foundation Option Matrix for Raft, Piled Raft and Pile Groups
- Driven Precast and Steel Piles With Hammer and Set Criteria
- Bored Cast-in-Place Piles With Under-Reamed Bases and Casing
- CFA and Micropile Systems for Restricted Access and Low Vibration
- Geotechnical Report Extracts Converted Into a Pile Design Ground Model

Day 2: Axial Capacity, Lateral Response and Group Behaviour Under Eurocode 7

- Eurocode 7 Pile Design Approaches and Partial Resistance Factors
- Alpha and Beta Methods for Shaft Friction Calculation
- N_q and N_c Bearing Factors for Pile End Bearing
- P-y Curves for Laterally Loaded Single Pile Response
- Group Efficiency and Equivalent Raft Method for Settlement

Day 3: Construction Quality Control and Pile Load Testing Methods

- EN 1536 Bored Pile Execution With Casing and Support Fluid
- Tremie Concreting Sequence With Base Cleaning and Cage Centralisers
- CFA Rig Instrumentation Records of Concrete Pressure and Volume
- ASTM D1143 Static Load Test With Kentledge or Reaction Frame
- ASTM D4945 High Strain Dynamic Testing and Signal Matching

Day 4: Integrity Results, Downdrag, Difficult Ground and Defective Pile Remediation

- ASTM D5882 Low Strain and ASTM D6760 Cross-Hole Sonic Logging
- Bi-Directional Static Load Test With Embedded Jack Cells
- Neutral Plane Analysis for Negative Skin Friction and Downdrag
- Karst Cavities, Soft Clay and Aggressive Sulphate Soil Piling Measures
- Defective Pile Remediation by Coring, Grouting or Replacement Piles

Day 5: Modelling Build of a Pile Design Check and Load Testing Plan

- Case Building Brief With Column Loads and Ground Model Review
 - Modelling Build of Axial Capacity and Group Settlement Spreadsheet
 - Lateral Load and Downdrag Verification for Case Pile Group
 - Test Pile Selection, Frequency and Acceptance Criteria Schedule
 - Pile Design Check and Load Testing Plan Completion
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Skills You Will Gain:

- Pile System Selection
- Axial Capacity Calculation
- Lateral Pile Analysis
- Pile Group Settlement Estimation
- Support Fluid Control
- Load Test Interpretation
- Integrity Test Evaluation
- Defective Pile Remediation

Why Attend This Course:

- Hand the project foundation lead or engineer of record a Pile Design Check and Load Testing Plan for a case building, ready for review
- Decide whether a static, dynamic or integrity test result accepts a pile, calls for further testing or requires redesign
- Avoid collapsed boreholes, necked shafts and late test failures that stop superstructure work and lead to replacement piles
- Share capacity spreadsheets, concreting checklists and test acceptance schedules with design and site colleagues

Conclusion:

Once back at work, the participant gives the foundation lead and site team a Pile Design Check and Load Testing Plan that records the chosen pile system, axial and lateral capacity, group settlement, downdrag allowance, construction hold points and the test schedule with acceptance criteria. Designers use it to confirm pile lengths before drawings are issued, and site and testing staff use it to accept or query each pile. After the first preliminary test piles are loaded, the team should compare measured capacity and settlement with the design assumptions and adjust pile lengths where needed.

Frequently Asked Questions FAQ:

What should participants know before the pile foundation design and load testing course?

Participants should already design, supervise or test foundations and read geotechnical reports and structural drawings. Familiarity with soil mechanics, limit state design and spreadsheet calculations helps, because capacity, settlement and test acceptance calculations are built step by step during the course.

How does the pile foundation design and load testing course differ from a geotechnical site investigation course?

It starts where the ground investigation ends: pile selection, axial and lateral capacity, groups, downdrag, installation control and load and integrity testing. A site investigation course covers boreholes, soil testing and earthworks, and treats piles only at overview level.

When is pile foundation design preferred over shallow foundations?

Piles are preferred when near-surface soils are weak or compressible, loads are high, settlement limits are tight, uplift or lateral loads are large, or swelling soils and nearby excavations threaten footings. Shaft friction and end bearing then carry loads down to stronger strata.

What does a participant take back from the pile foundation design and load testing course?

Each participant takes back a Pile Design Check and Load Testing Plan for a case building, with axial capacity and group settlement spreadsheets, lateral and downdrag checks, construction hold points and a test schedule with acceptance criteria.
