

CLAC360

Advance Practical Course on

ROAD CONSTRUCTION SUPERVISION WITH AI

Practical Site Management for Civil Engineers

Course Code:	CLAC-RCSAI-01
Course Type:	Professional Applied Learning
Delivery:	PDF + site forms + case studies + assignments + quizzes + live sessions
Level:	Intermediate / Professional
Core Outcome:	Manage, inspect, document and communicate construction activities through a disciplined site-supervision workflow.

PART I — COURSE IDENTITY

1. COURSE PREMISE

Construction supervision is not simply "watching the contractor."

A competent site engineer/supervisor must continuously connect:

«Contract Documents → Work Method → Materials → Labour → Plant → Inspection → Testing → Measurement → Progress → Quality → Safety → Documentation → Payment/Records»

FHWA construction-management guidance similarly treats inspection and quality assurance as structured management functions involving documentation, inspection, verification and accountability.

2. PRACTICAL OUTCOME

The learner will produce a complete simulated project-supervision package containing:

- project document register
- daily site report
- inspection requests
- material inspection records
- work inspection checklists
- concrete-pour record
- testing register
- nonconformance record
- RFI register
- submittal register
- progress measurement
- photographic record
- delay/issue register
- site instruction record
- weekly report
- progress dashboard
- AI verification log
- final supervision report

3. COMPETENCIES

Learners will be able to:

- understand contract documentation
- establish site-control systems
- plan inspection activities
- verify work against approved information
- monitor materials
- monitor workmanship
- understand testing
- document nonconformance
- track progress
- manage RFIs/submittals
- coordinate stakeholders
- identify emerging risks

- use AI responsibly
- prepare professional site reports

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COURSE MODULES

MODULE 00 — THE SITE ENGINEER'S ROLE

From "Watching Work" to Controlling Evidence

Topics:

- engineer's role
- contractor's responsibility
- consultant
- client
- subcontractor
- laboratory
- supplier
- authority
- chain of communication

Core principle

«Do not certify what you have not established.»

MODULE 01 — UNDERSTANDING CONTRACT DOCUMENTS

Review:

- drawings
- specifications
- BOQ
- conditions of contract
- method statements
- ITPs
- material submittals
- approved shop drawings
- schedules
- addenda
- instructions

Deliverable: Contract/Project Document Register

MODULE 02 — SITE MOBILIZATION & CONTROL

Topics:

- site establishment
- access
- temporary facilities
- survey control
- benchmarks
- setting out
- utilities
- storage
- traffic management

- safety arrangements

MODULE 03 — METHOD STATEMENTS & ITPs

Understand:

- activity sequence
- resources
- hold points
- witness points
- inspection requirements
- testing
- acceptance criteria
- records

Practical Exercise: Convert a construction activity into an Inspection & Test Plan

MODULE 04 — DAILY SITE MANAGEMENT

Daily supervision covers:

- labour
- equipment
- materials
- weather
- activities
- locations
- quantities
- inspections
- tests
- delays
- instructions
- visitors
- incidents
- photographs

Deliverable: Professional Daily Progress Report

MODULE 05 — SETTING OUT & SURVEY CONTROL

Topics:

- benchmarks
- coordinates
- levels
- alignment
- tolerances
- survey records
- checking
- as-built information

AI Application

AI can help organize survey records and identify missing documentation, but cannot substitute for physical measurement or surveying equipment.

MODULE 06 — EARTHWORKS & EXCAVATION

Topics:

- excavation
- formation
- backfill
- compaction
- moisture
- unsuitable material
- dewatering
- slope stability
- trench safety
- testing

Inspection Logic

Location → Material → Level → Condition → Test → Acceptance → Record

MODULE 07 — CONCRETE CONSTRUCTION

Topics:

- materials
- batching
- delivery
- slump
- temperature
- reinforcement
- formwork
- embedded items
- placement
- vibration
- finishing
- curing
- testing

- defects

Concrete Pour Record — Document:

- location
- element
- mix
- quantity
- delivery
- start/end
- test results
- weather
- inspection
- interruptions
- curing

MODULE 08 — REINFORCEMENT & FORMWORK

Review:

- bar size
- spacing
- laps
- cover
- anchorage
- cleanliness
- supports
- dimensions
- alignment
- stability
- openings
- embedded items

Critical principle

«Inspection should occur before the work becomes inaccessible.»

MODULE 09 — MASONRY, FINISHES & ARCHITECTURAL WORK

Topics:

- masonry
- plaster
- screed
- waterproofing
- flooring
- ceilings
- painting
- doors/windows
- finishes
- workmanship tolerances

Practical Tool: Activity Inspection Checklist

MODULE 10 — ROADWORKS & PAVEMENT CONSTRUCTION

Topics:

- subgrade
- subbase
- base
- asphalt
- concrete pavement where applicable
- levels
- compaction
- material testing
- temperature
- thickness
- surface quality
- drainage

This module makes the course particularly useful for civil engineers working across building and infrastructure projects.

MODULE 11 — MATERIALS & QUALITY ASSURANCE

Understand the difference between:

Contractor Quality Control

and

Engineer/Client Quality Assurance / Acceptance

depending on the contract structure.

FHWA describes quality assurance as encompassing systematic quality processes and distinguishes functions such as contractor QC, agency acceptance and independent assurance in its highway-construction framework.

Deliverables:

- material approval register
- test register
- inspection register

- rejection/nonconformance record

MODULE 12 — INSPECTION & TESTING

Topics:

- inspection frequency
- sampling
- testing
- laboratories
- calibration
- test reports
- acceptance criteria
- failed tests
- retesting
- traceability

Principle

«A test result is evidence—not automatically an acceptance decision.»

The applicable specification and contractual acceptance process must govern.

MODULE 13 — NONCONFORMANCE MANAGEMENT

From Defect to Closure

Workflow:

Identify → Document → Contain → Investigate → Determine disposition → Correct → Verify → Close

NCR should establish:

- location
- activity
- requirement
- observed nonconformance
- evidence
- responsible party
- corrective action
- verification
- closure

MODULE 14 — RFI, SUBMITTALS & TECHNICAL COMMUNICATION

Topics:

- RFI
- shop drawings
- material submittals
- method statements
- technical queries
- approvals
- revisions
- response tracking

Critical Principle

«A verbal understanding that is not properly documented may not be a reliable project record.»

MODULE 15 — PROGRESS MONITORING

Track:

- planned quantity
- actual quantity
- planned date
- actual date
- resources
- productivity
- critical activities
- constraints
- delays

Deliverable: Progress Measurement & Tracking Workbook

MODULE 16 — DELAY & ISSUE MANAGEMENT

Distinguish:

- observation
- issue
- delay
- potential delay
- cause
- responsibility
- effect
- mitigation

Avoid prematurely assigning contractual responsibility unless the evidence and contract support it.

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MODULE 17 — PHOTOGRAPHIC DOCUMENTATION

A professional photograph should communicate:

- what
- where
- when
- why it matters

Photo Register

Photo | Date | Location | Activity | Observation | Reference

AI Application

AI can help:

- categorize photographs
- create draft captions
- identify duplicate images
- organize image records

But AI must not invent site conditions not visible or documented.

MODULE 18 — AI FOR SITE SUPERVISION

AI can assist with:

- daily-report drafting
- checklist generation
- RFI classification
- document comparison
- progress-summary drafting
- issue-register organization
- meeting-minute preparation
- photo organization
- spreadsheet automation
- trend detection

AI cannot replace:

- site inspection
- surveying
- material testing
- contractual authority
- safety responsibility
- professional judgment

MODULE 19 — AI DOCUMENT COMPARISON

Compare:

Drawing Revision A vs. Drawing Revision B

or: Specification vs. Method Statement

or: Approved Submittal vs. Site Observation

AI can identify possible discrepancies. The engineer verifies each one against the authoritative document set.

MODULE 20 — AI FOR EARLY WARNING

AI can help analyze project records for emerging patterns:

- repeated failed tests
- recurring NCRs
- repeated delays
- late submittals
- declining productivity
- unresolved RFIs
- repeated inspection failures

Important distinction

AI may identify: «"This pattern deserves investigation."»

It should not automatically conclude: «"The contractor is responsible."»

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MODULE 21 — SITE SAFETY INTERFACE

The course addresses the supervisor's responsibility to recognize and document safety concerns while distinguishing site supervision from formal HSE responsibilities where the contract assigns them differently.

Topics:

- work-zone interfaces
- excavation hazards
- lifting
- temporary works
- access
- public interface
- traffic
- housekeeping
- emergency access

Principle

«Never treat a documentation system as a substitute for immediate action on an obvious safety hazard.»

MODULE 22 — SITE REPORTING SYSTEM

Daily

Daily report.

Weekly

Progress and issues.

Monthly

Progress, quality, risks and commercial/technical status as contractually required.

Event-Based

- incident
- major defect
- delay
- major instruction
- significant change
- failed test

— End of Course Outline —

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