

**NCEES Principles and Practice of Engineering Examination
 CIVIL–CONSTRUCTION CBT Exam Specifications**

Effective Beginning April 1, 2022

- **The exam topics have not changed since April 2015 when they were originally published.**
- The exam is computer-based. It is closed book with electronic references. Design standards applicable to the PE Civil–Construction exam are shown on the last page.
- Examinees have 9 hours to complete the exam, which contains 80 questions. The 9-hour time includes a tutorial and an optional scheduled break. Examinees work all questions.
- The exam uses both the International System of units (SI) and the US Customary System (USCS).
- The exam is developed with questions that will require a variety of approaches and methodologies, including design, analysis, and application.
- The examples specified in knowledge areas are not exclusive or exhaustive.

| | Number of Questions |
|---|----------------------------|
| 1. Project Planning | 4–6 |
| A. Quantity take-off methods | |
| B. Cost estimating | |
| C. Project schedules | |
| D. Activity identification and sequencing | |
| 2. Means and Methods | 3–5 |
| A. Construction loads | |
| B. Construction methods | |
| C. Temporary structures and facilities | |
| 3. Soil Mechanics | 5–8 |
| A. Lateral earth pressure | |
| B. Soil consolidation | |
| C. Effective and total stresses | |
| D. Bearing capacity | |
| E. Foundation settlement | |
| F. Slope stability | |
| 4. Structural Mechanics | 5–8 |
| A. Dead and live loads | |
| B. Trusses | |
| C. Bending (e.g., moments and stresses) | |
| D. Shear (e.g., forces and stresses) | |
| E. Axial (e.g., forces and stresses) | |
| F. Combined stresses | |
| G. Deflection | |
| H. Beams | |
| I. Columns | |
| J. Slabs | |

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| K. Footings | |
| L. Retaining walls | |
| 5. Hydraulics and Hydrology | 6–9 |
| A. Open-channel flow | |
| B. Stormwater collection and drainage (e.g., culvert, stormwater inlets, gutter flow, street flow, storm sewer pipes) | |
| C. Storm characteristics (e.g., storm frequency, rainfall measurement and distribution) | |
| D. Runoff analysis (e.g., Rational and SCS/NRCS methods, hydrographic application, runoff time of concentration) | |
| E. Detention/retention ponds | |
| F. Pressure conduit (e.g., single pipe, force mains, Hazen-Williams, Darcy-Weisbach, major and minor losses) | |
| G. Energy and/or continuity equation (e.g., Bernoulli) | |
| 6. Geometrics | 3–5 |
| A. Basic circular curve elements (e.g., middle ordinate, length, chord, radius) | |
| B. Basic vertical curve elements | |
| C. Traffic volume (e.g., vehicle mix, flow, and speed) | |
| 7. Materials | 5–8 |
| A. Soil classification and boring log interpretation | |
| B. Soil properties (e.g., strength, permeability, compressibility, phase relationships) | |
| C. Concrete (e.g., nonreinforced, reinforced) | |
| D. Structural steel | |
| E. Material test methods and specification conformance | |
| F. Compaction | |
| 8. Site Development | 4–6 |
| A. Excavation and embankment (e.g., cut and fill) | |
| B. Construction site layout and control | |
| C. Temporary and permanent soil erosion and sediment control (e.g., construction erosion control and permits, sediment transport, channel/outlet protection) | |
| D. Impact of construction on adjacent facilities | |
| E. Safety (e.g., construction, roadside, work zone) | |
| 9. Earthwork Construction and Layout | 5–8 |
| A. Excavation and embankment (e.g., cut and fill) | |
| B. Borrow pit volumes | |
| C. Site layout and control | |
| D. Earthwork mass diagrams and haul distance | |
| E. Site and subsurface investigations | |
| 10. Estimating Quantities and Costs | 5–8 |
| A. Quantity take-off methods | |
| B. Cost estimating | |
| C. Cost analysis for resource selection | |
| D. Work measurement and productivity | |

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| 11. Construction Operations and Methods | 6–9 |
| A. Lifting and rigging | |
| B. Crane stability | |
| C. Dewatering and pumping | |
| D. Equipment operations (e.g., selection, production, economics) | |
| E. Deep foundation installation | |
| 12. Scheduling | 5–8 |
| A. Construction sequencing | |
| B. Activity time analysis | |
| C. Critical path method (CPM) network analysis | |
| D. Resource scheduling and leveling | |
| E. Time-cost trade-off | |
| 13. Material Quality Control and Production | 5–8 |
| A. Material properties and testing (e.g., soils, concrete, asphalt) | |
| B. Weld and bolt installation | |
| C. Quality control process (QA/QC) | |
| D. Concrete proportioning and placement | |
| E. Concrete maturity and early strength evaluation | |
| 14. Temporary Structures | 6–9 |
| A. Construction loads, codes, and standards | |
| B. Formwork | |
| C. Falsework and scaffolding | |
| D. Shoring and reshoring | |
| E. Bracing and anchorage for stability | |
| F. Temporary support of excavation | |
| 15. Health and Safety | 3–5 |
| A. OSHA regulations and hazard identification/abatement | |
| B. Safety management and statistics | |
| C. Work zone and public safety | |

NCEES Principles and Practice of Engineering Examination CONSTRUCTION Design Standards

Effective Beginning with the April 2022 Examinations

In addition to the *PE Civil Reference Handbook*, the following codes and standards will be supplied to examinees on exam day as a searchable, electronic pdf file with linked chapters for easy navigation. Solutions to exam questions that reference a standard of practice are scored based on this list and the revision year shown. Solutions based on other standards will not receive credit. NCEES does not sell printed copies of the handbook or design standards. Design standards are available through the publisher.

| ABBREVIATION | DESIGN STANDARD TITLE |
|---------------------|--|
| ACI 347R | <i>Guide to Formwork for Concrete</i> , 2014, American Concrete Institute, Farmington Hills, MI, www.concrete.org . |
| ACI SP-4 | <i>Formwork for Concrete</i> , 8th ed., 2014, American Concrete Institute, Farmington Hills, MI, www.concrete.org . |
| AISC | <i>Steel Construction Manual</i> , 14th ed., 2011, American Institute of Steel Construction, Inc., Chicago, IL, www.aisc.org . |
| ASCE 37-14 | <i>Design Loads on Structures During Construction</i> , 2nd ed., 2015, American Society of Civil Engineers, Reston, VA, www.asce.org . |
| CMWB | <i>Standard Practice for Bracing Masonry Walls Under Construction</i> , 2012, Council for Masonry Wall Bracing, Mason Contractors Association of America, Lombard, IL, www.masoncontractors.org . |
| MUTCD-Pt 6 | <i>Manual on Uniform Traffic Control Devices for Streets and Highways — Part 6 Temporary Traffic Control</i> , 2009, including Revisions 1 and 2 dated May 2012, US Department of Transportation, Federal Highway Administration, Washington, DC, www.fhwa.dot.gov . |
| CFR TITLE 29 | U.S. Department of Labor, Washington, D.C., July 2020. |
| Part 1903 | Inspections, Citations, and Proposed Penalties |
| Part 1904 | Recording and Reporting Occupational Injuries and Illnesses |
| Part 1926 | Safety and Health Regulations for Construction |
| PCA EB001 | <i>Design and Control of Concrete Mixtures</i> , 17th ed., 2021, Portland Cement Association, Skokie, IL, www.cement.org . |

Reference categories for **Construction** depth module

- Construction surveying
- Construction estimating
- Construction planning and scheduling
- Construction equipment and methods
- Construction materials
- Construction design standards (see above)