

**NCEES Principles and Practice of Engineering Examination  
 CIVIL BREADTH and CONSTRUCTION DEPTH Exam Specifications**

**Effective Beginning with the April 2015 Examinations**

- The civil exam is a breadth and depth examination. This means that examinees work the breadth (AM) exam and one of the five depth (PM) exams.
- The five areas covered in the civil exam are construction, geotechnical, structural, transportation, and water resources and environmental. The breadth exam contains questions from all five areas of civil engineering. The depth exams focus more closely on a single area of practice in civil engineering.
- Examinees work all questions in the morning session and all questions in the afternoon module they have chosen. Depth results are combined with breadth results for final score.
- The exam is an 8-hour open-book exam. It contains 40 multiple-choice questions in the 4-hour AM session, and 40 multiple-choice questions in the 4-hour PM session.
- 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. Some problems may require knowledge of engineering economics.
- The knowledge areas specified as examples of kinds of knowledge are not exclusive or exhaustive categories.
- The specifications for the **AM exam** and the **Construction PM exam** are included here. The **design standards** applicable to the Construction PM exam are shown on the last page.

**CIVIL BREADTH Exam Specifications**

|   | <b>Approximate<br/>Number of<br/>Questions</b> |
|---|--|
| <b>I. Project Planning</b>                | <b>4</b>                                       |
| A. Quantity take-off methods              |  |
| B. Cost estimating                        |  |
| C. Project schedules                      |  |
| D. Activity identification and sequencing |  |
| <b>II. Means and Methods</b>              | <b>3</b>                                       |
| A. Construction loads                     |  |
| B. Construction methods                   |  |
| C. Temporary structures and facilities    |  |
| <b>III. Soil Mechanics</b>                | <b>6</b>                                       |
| A. Lateral earth pressure                 |  |
| B. Soil consolidation                     |  |
| C. Effective and total stresses           |  |
| D. Bearing capacity                       |  |
| E. Foundation settlement                  |  |
| F. Slope stability                        |  |

|  |          |
|--|----------|
| <b>IV. Structural Mechanics</b>  | <b>6</b> |
| 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   |          |
| K. Footings  |          |
| L. Retaining walls   |          |
| <b>V. Hydraulics and Hydrology</b>   | <b>7</b> |
| 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)   |          |
| <b>VI. Geometrics</b>  | <b>3</b> |
| 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)   |          |
| <b>VII. Materials</b>  | <b>6</b> |
| 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  |          |
| <b>VIII. Site Development</b>  | <b>5</b> |
| 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)  |          |

## CIVIL–CONSTRUCTION DEPTH Exam Specifications

|   | Approximate<br>Number of<br>Questions |
|---|---------------------------------------|
| <b>I. Earthwork Construction and Layout</b>                         | <b>6</b>                              |
| 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                               |                                       |
| <b>II. Estimating Quantities and Costs</b>                          | <b>6</b>                              |
| A. Quantity take-off methods  |                                       |
| B. Cost estimating  |                                       |
| C. Cost analysis for resource selection                             |                                       |
| D. Work measurement and productivity                                |                                       |
| <b>III. Construction Operations and Methods</b>                     | <b>7</b>                              |
| A. Lifting and rigging  |                                       |
| B. Crane stability  |                                       |
| C. Dewatering and pumping   |                                       |
| D. Equipment operations (e.g., selection, production, economics)    |                                       |
| E. Deep foundation installation                                     |                                       |
| <b>IV. Scheduling</b>   | <b>5</b>                              |
| A. Construction sequencing  |                                       |
| B. Activity time analysis   |                                       |
| C. Critical path method (CPM) network analysis                      |                                       |
| D. Resource scheduling and leveling                                 |                                       |
| E. Time-cost trade-off  |                                       |
| <b>V. Material Quality Control and Production</b>                   | <b>6</b>                              |
| 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                  |                                       |
| <b>VI. Temporary Structures</b>                                     | <b>7</b>                              |
| 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                                  |                                       |
| <b>VII. Health and Safety</b>                                       | <b>3</b>                              |
| 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 2017 Examinations

*Revisions are shown in red.*

| ABBREVIATION      | DESIGN STANDARD TITLE   |
|-------------------|---|
| <b>ASCE 37</b>    | <i>Design Loads on Structures During Construction</i> , 2014, American Society of Civil Engineers, Reston, VA, <a href="http://www.asce.org">www.asce.org</a> .   |
| <b>NDS</b>        | <i>National Design Specification for Wood Construction</i> , 2012, American Forest & Paper Association/American Wood Council, Washington, DC, <a href="http://www.awc.org">www.awc.org</a> .  |
| <b>CMWB</b>       | <i>Standard Practice for Bracing Masonry Walls Under Construction</i> , 2012, Council for Masonry Wall Bracing, Mason Contractors Association of America, Lombard, IL, <a href="http://www.masoncontractors.org">www.masoncontractors.org</a> . |
| <b>AISC</b>       | <i>Steel Construction Manual</i> , 14th ed., 2011, Parts 1–3, 8, and 16.2, American Institute of Steel Construction, Inc., Chicago, IL, <a href="http://www.aisc.org">www.aisc.org</a> .  |
| <b>ACI 318</b>    | <i>Building Code Requirements for Structural Concrete</i> , 2014, Chapters 19, 20, and 26, American Concrete Institute, Farmington Hills, MI, <a href="http://www.concrete.org">www.concrete.org</a> .  |
| <b>ACI 347R</b>   | <i>Guide to Formwork for Concrete</i> , 2014, American Concrete Institute, Farmington Hills, MI, <a href="http://www.concrete.org">www.concrete.org</a> (in ACI SP-4, 8th edition appendix).  |
| <b>ACI SP-4</b>   | <i>Formwork for Concrete</i> , 8th ed., 2014, American Concrete Institute, Farmington Hills, MI, <a href="http://www.concrete.org">www.concrete.org</a> .   |
| <b>OSHA</b>       | <b>Construction Industry Regulations: 29 CFR Parts 1903, 1904, and 1926</b> (US federal version, <b>January 2016</b> ), US Department of Labor, Washington, DC.   |
| <b>MUTCD-Pt 6</b> | <i>Manual on Uniform Traffic Control Devices—Part 6 Temporary Traffic Control</i> , 2009, US Federal Highway Administration, <a href="http://www.fhwa.dot.gov">www.fhwa.dot.gov</a> .   |

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)