

**NCEES Principles and Practice of Engineering Examination  
 CIVIL–STRUCTURAL 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–Structural exam are shown on the last two pages.
- 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.

		<b>Number of Questions</b>
<b>1. Project Planning</b>		<b>4–6</b>
A. Quantity take-off methods		
B. Cost estimating		
C. Project schedules		
D. Activity identification and sequencing		
<b>2. Means and Methods</b>		<b>3–5</b>
A. Construction loads		
B. Construction methods		
C. Temporary structures and facilities		
<b>3. Soil Mechanics</b>		<b>5–8</b>
A. Lateral earth pressure		
B. Soil consolidation		
C. Effective and total stresses		
D. Bearing capacity		
E. Foundation settlement		
F. Slope stability		
<b>4. Structural Mechanics</b>		<b>5–8</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>5.</b>	<b>Hydraulics and Hydrology</b>	<b>6–9</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>6.</b>	<b>Geometrics</b>	<b>3–5</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>7.</b>	<b>Materials</b>	<b>5–8</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>8.</b>	<b>Site Development</b>	<b>4–6</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)	
<b>9.</b>	<b>Analysis of Structures</b>	<b>13–20</b>
A.	Loads and load applications	4–6
1.	Dead loads	
2.	Live loads	
3.	Construction loads	
4.	Wind loads	
5.	Seismic loads	
6.	Moving loads (e.g., vehicular, cranes)	
7.	Snow, rain, ice	
8.	Impact loads	
9.	Earth pressure and surcharge loads	
10.	Load paths (e.g., lateral and vertical)	
11.	Load combinations	
12.	Tributary areas	

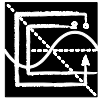
B. Forces and load effects	9–14
1. Diagrams (e.g., shear and moment)	
2. Axial (e.g., tension and compression)	
3. Shear	
4. Flexure	
5. Deflection	
6. Special topics (e.g., torsion, buckling, fatigue, progressive collapse, thermal deformation, bearing)	
<b>10. Design and Details of Structures</b>	<b>16–24</b>
A. Materials and material properties	4–6
1. Concrete (e.g., plain, reinforced, cast-in-place, precast, pre-tensioned, post-tensioned)	
2. Steel (e.g., structural, reinforcing, cold-formed)	
3. Timber	
4. Masonry (e.g., brick veneer, CMU)	
B. Component design and detailing	12–18
1. Horizontal members (e.g., beams, slabs, diaphragms)	
2. Vertical members (e.g., columns, bearing walls, shear walls)	
3. Systems (e.g., trusses, braces, frames, composite construction)	
4. Connections (e.g., bearing, bolted, welded, embedded, anchored)	
5. Foundations (e.g., retaining walls, footings, combined footings, slabs, mats, piers, piles, caissons, drilled shafts)	
<b>11. Codes and Construction</b>	<b>6–10</b>
A. Codes, standards, and guidance documents	4–6
1. International Building Code (IBC)	
2. American Concrete Institute (ACI 318, 530)	
3. Precast/Prestressed Concrete Institute (PCI Design Handbook)	
4. Steel Construction Manual (AISC)	
5. National Design Specification for Wood Construction (NDS)	
6. LRFD Bridge Design Specifications (AASHTO)	
7. Minimum Design Loads for Buildings and Other Structures (ASCE 7)	
8. American Welding Society (AWS D1.1, D1.2, and D1.4)	
9. OSHA 1910 General Industry and OSHA 1926 Construction Safety Standards	
B. Temporary structures and other topics	2–4
1. Special inspections	
2. Submittals	
3. Formwork	
4. Falsework and scaffolding	
5. Shoring and reshoring	
6. Concrete maturity and early strength evaluation	
7. Bracing	
8. Anchorage	
9. OSHA regulations	
10. Safety management	

**NCEES Principles and Practice of Engineering Examination  
 CIVIL–STRUCTURAL 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 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. All questions use the US Customary System (USCS) of units. NCEES does not sell printed copies of the handbook or design standards. Design standards are available through the publisher.

<b>ABBREVIATION</b>	<b>DESIGN STANDARD TITLE</b>
<b>AASHTO</b>	<i>AASHTO LRFD Bridge Design Specifications</i> , 7th edition, 2014, with 2016 Interim Revisions, American Association of State Highway & Transportation Officials, Washington, DC., <a href="http://www.transportation.org">www.transportation.org</a> .
<b>IBC</b>	<i>International Building Code</i> , 2015 edition (without supplements), International Code Council, Falls Church, VA, <a href="http://www.iccsafe.org">www.iccsafe.org</a> .
<b>ACI 318</b>	<i>Building Code Requirements for Structural Concrete and Commentary</i> , 2014, American Concrete Institute, Farmington Hills, MI, <a href="http://www.concrete.org">www.concrete.org</a> .
<b>AISC</b>	<i>Steel Construction Manual</i> , 14th edition, 2011, American Institute of Steel Construction, Inc., Chicago, IL, <a href="http://www.aisc.org">www.aisc.org</a> .
<b>ASCE 7</b>	<i>Minimum Design Loads for Buildings and Other Structures</i> , 3rd printing, 2010, American Society of Civil Engineers, Reston, VA, <a href="http://www.asce.org">www.asce.org</a> .
<b>AWC NDS<sup>1</sup></b>	2015 Wood Design Package, 2015, American Wood Council, Leesburg, VA, <a href="http://www.awc.org">www.awc.org</a> . <ul style="list-style-type: none"> <li>• <i>National Design Specification for Wood Construction with Commentary</i></li> <li>• <i>National Design Specification Supplement, Design Values for Wood Construction</i></li> <li>• <i>Special Design Provisions for Wind and Seismic with Commentary</i></li> </ul>
<b>CFR TITLE 29 Part 1910</b>	U.S. Department of Labor, Washington, D.C., July 2020. Occupational Safety and Health Standards <ul style="list-style-type: none"> <li>• Subpart I, Personal Fall Protection Systems, 1910.140</li> <li>• Subpart D, Walking-Working Surfaces, 1910.28–1910.30</li> <li>• Subpart F, Powered Platforms, Manlifts, and Vehicle-Mounted Work Platforms, 1910.66–1910.68, with Appendix A–Appendix D to 1910.66</li> </ul>
<b>Part 1926</b>	Safety and Health Regulations for Construction. <ul style="list-style-type: none"> <li>• Subpart E, Personal Protective and Life Saving Equipment, 1926.104</li> <li>• Subpart L, Scaffolding Specifications, Appendix A</li> <li>• Subpart M, Fall Protection, 1926.500–1926.503, Appendix B–Appendix D</li> <li>• Subpart Q, Concrete and Masonry Construction, 1926.703–1926.706, with Appendix A</li> <li>• Subpart R, Steel Erection, 1926.752 &amp; 1926.754–1926.758</li> </ul>



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<b>PCI</b>	<i>PCI Design Handbook: Precast and Prestressed Concrete</i> , 7th edition, 2010, Precast/Prestressed Concrete Institute, Chicago, IL, <a href="http://www.pci.org">www.pci.org</a> .
<b>TMS 402/602<sup>2</sup></b>	<i>Building Code Requirements and Specification for Masonry Structures</i> (and companion commentaries), 2013, The Masonry Society, Longmont, CO, <a href="http://www.masonrysociety.org">www.masonrysociety.org</a> .

## Notes

1. Examinees will use only the Allowable Stress Design (ASD) method for wood design.
2. Formerly also called ACI 530. Examinees will use only the ASD method, except strength design Section 9.3.5 may be used for walls with out-of-plane loads.