NCEES
advancing licensure for engineers and surveyors

NCEES Principles and Practice of Engineering Examination
CIVIL–WATER RESOURCES AND ENVIRONMENTAL Exam Specifications
Effective Beginning April 2024

- The exam is computer-based. It is closed book with electronic references. The NCEES *PE Civil Reference Handbook* is included in the exam along with the design standards 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	
E. Economic and sustainability analysis (e.g., present worth, lifecycle costs, comparison of alternatives)	
2. Soil Mechanics	**3–5**
A. Lateral earth pressure	
B. Soil consolidation and compaction	
C. Bearing capacity	
D. Settlement	
E. Slope stability	
3. Materials	**4–6**
A. Soil classification and boring log interpretation	
B. Soil properties (e.g., strength, permeability, compressibility, phase relationships)	
C. Concrete (e.g., nonreinforced, reinforced)	
D. Piping materials	
E. Material test methods and specification conformance	
4. Analysis and Design	**6–9**
A. Mass balance	
B. Hydraulic loading	
C. Solids loading (e.g., sediment loading, sludge)	
D. Hydraulic flow measurement	

5. Hydraulics–Closed Conduit **7–11**

A. Energy and/or continuity equation (e.g., Bernoulli, grade line analyses, momentum equation)
B. Pressure conduit (e.g., single pipe, force mains, Hazen-Williams, Darcy-Weisbach, major and minor losses)
C. Pump application and analysis, including wet wells, lift stations, and cavitation
D. Pipe network analysis (e.g., series, parallel, loop networks)

6. Hydraulics–Open Channel **7–11**

A. Open-channel flow
B. Hydraulic grade lines and energy dissipation (e.g., plunge pool, drop structure, culvert outlet)
C. Stormwater collection and drainage (e.g., culvert, stormwater inlets, gutter flow, street flow, storm sewer pipes)
D. Sub- and supercritical flow

7. Hydrology **8–12**

A. Storm characteristics (e.g., storm frequency, rainfall measurement, distribution)
B. Runoff analysis (e.g., rational and SCS/NRCS methods)
C. Hydrograph development and applications, including synthetic hydrographs
D. Rainfall intensity, duration, frequency, and probability of exceedance
E. Time of concentration
F. Rainfall and stream gauging stations
G. Depletions (e.g., evaporation, detention, percolation, diversions)
H. Stormwater management and treatment (e.g., detention and retention ponds, infiltration, swales, constructed wetlands)

8. Groundwater and Wells **4–6**

A. Aquifers
B. Groundwater flow
C. Well and drawdown analysis

9. Surface Water and Groundwater Quality **5–8**

A. Stream degradation and oxygen dynamics
B. Total maximum daily load (TMDL) (e.g., nutrient contamination, DO, load allocation)
C. Biological and chemical contaminants

10. Drinking Water Distribution and Treatment **6–9**

A. Drinking water distribution systems
B. Drinking water treatment processes
C. Present, short-term, and long-term demands
D. Storage
E. Sedimentation
F. Coagulation and flocculation
G. Membrane processes and media filtration
H. Disinfection, including disinfection byproducts
I. Hardness and softening
J. Other treatment (e.g., ion exchange, carbon adsorption, ozone, UV, specific constituent removal)

11. Wastewater Collection and Treatment **7–11**

A. Wastewater collection systems (e.g., lift stations, sewer networks, infiltration, inflow, smoke testing, maintenance, odor control)
B. Wastewater treatment systems
C. Preliminary treatment
D. Primary treatment
E. Secondary treatment (e.g., physical, chemical, biological processes)
F. Nutrient removal
G. Solids treatment, handling, and disposal
H. Disinfection
I. Advanced treatment (e.g., advanced oxidation process, effluent filtration, adsorption, reclaimed water)

12. Project Sitework **9–14**

A. Excavation and embankment (e.g., grading, 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)
F. Basic horizontal and vertical curve elements
G. Retaining walls
H. Construction methods

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NCEES Principles and Practice of Engineering Examination
CIVIL–WATER RESOURCES AND ENVIRONMENTAL Design Standards

Effective Beginning with the April 2027 Examination

In addition to the NCEES *PE Civil Reference Handbook*, the following codes and standards will be supplied in the exam as searchable, electronic pdf files with links for easy navigation. This NCEES YouTube video shows how standards will be presented on the exam. Standards will be provided as individual chapters on the exam, and only one chapter at a time can be opened and searched. This ensures the exam software runs large files effectively. The handbook and design standards will be available the entire exam.

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 design standards or printed copies of the NCEES handbook. The NCEES handbook is accessible from your MyNCEES account.

ABBREVIATION	DESIGN STANDARD TITLE
CFR TITLE 29 Part 1926	U.S. Department of Labor, Washington, D.C., 2024. Safety and Health Regulations for Construction • Subpart B • Subpart C • Subpart D • Subpart E, Personal Protective and Life Saving Equipment, Part 1926.95–1926.107 • Subpart F • Subpart G • Subpart H • Subpart E, Personal Protective and Life Saving Equipment, Part 1926.95–1926.107 • Subpart M, Fall Protection, 1926.500–1926.503 with Appendix A–Appendix E • Subpart P, Excavations, 1926.650–1926.652 with Appendix A–Appendix F • Subpart S • Subpart Z • Subpart AA
EM 1110-2-1902	*USACE Engineering and Design: Slope Stability*, 2003, U.S. Army Corps of Engineers, Washington D.C., www.publications.usace.army.mil.

FHWA HIF-12-026 *Hydraulic Design of Highway Culverts,* Hydraulic Design Series Number 5, 3rd edition, April 2012, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., www.fhwa.dot.gov.

FHWA NHI-06-086 HEC No. 14 *Hydraulic Design of Energy Dissipators for Culverts and Channels,* 3rd edition, July 2006, Hydraulic Engineering Circulars, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., www.fhwa.dot.gov.

TSS Wastewater Facilities 2014 *Recommended Standards for Wastewater Facilities*, 2014, Great Lakes—Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers.

TSS Water Works 2022 *Recommended Standards for Water Works*, 2022, Great Lakes—Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers

UFC 3-220-05 *Unified Facilities Criteria (UFC): Dewatering and Groundwater Control*, 2004, U.S. Army Corps of Engineers, Naval Facilities Engineering Command, Air Force Civil Engineer Center, Washington D.C.