NCEES
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NCEES Principles and Practice of Engineering Examination
CIVIL–GEOTECHNICAL CBT 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 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 U.S. Customary System (USCS).
- The exam is developed with questions that 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. Site Characterization	**8–12**
A. Identification, validation, and interpretation of site data and proposed site development data (e.g., aerial photography, geologic and topographic maps, GIS and geotechnical data, as-built plans, planning studies and reports)	
B. Subsurface exploration planning	
C. Exploration techniques (e.g., hollow stem auger, cased boring, mud rotary, air rotary, rock coring, sonic drilling, Cone Penetrometer Test, geophysics, and test pits)	
D. Sampling techniques (e.g., split-barrel sampling, thin-walled tube sampling, handling and storage)	
E. In situ testing (e.g., standard penetration testing, cone penetration testing, pressure meter testing, pore pressure dissipation testing, dilatometer testing, dynamic cone penetration, plate load testing, field vane shear)	
F. Description and classification of soils (e.g., Burmeister, Unified Soil Classification System, AASHTO, USDA, and visual/manual)	
G. Rock classification and characterization (e.g., recovery, rock quality designation, rock mass rating systems, weathering, discontinuity)	
H. Groundwater exploration, sampling, and characterization	
2. Soil Mechanics, Laboratory Testing, and Analysis	**8–12**
A. Soil phase relationship and index property	
B. Chemical, electrical, and thermal properties (e.g., non-HAZMAT)	
C. Stress in soil mass (e.g., total, effective)	
D. Stress/strain, strength	
E. Permeability (e.g., falling head test, constant head test, grain-size correlations)	

3. Construction Observation, Monitoring, and Quality Assurance/Quality Control and Safety **6–9**

A. Earthwork (e.g., excavation, subgrade preparation, lab and field compaction, borrow studies, fill placement)
B. Trench and construction safety
C. Geotechnical instrumentation (e.g., inclinometer, settlement plates, piezometer, vibration monitoring)
D. Temporary and permanent soil erosion and scour protection measures

4. Earthquake Engineering and Dynamic Loads **5–8**

A. Seismic site characterization
B. Seismic analyses and design (e.g., liquefaction, pseudo static, earthquake loads)

5. Earth Structures, Ground Improvement, and Pavement **9–14**

A. Ground improvement (e.g., grouting, soil mixing, preconsolidation/wick drains, lightweight materials, lime/cement stabilization, rigid inclusions, aggregate piers)
B. Geosynthetic applications (e.g., separation, strength, filtration, drainage, reinforced soil slopes, internal stability of MSE)
C. Slope stability evaluation and slope stabilization
D. Embankments, earth dams, and levees (e.g., stress, settlement)
E. Landfills and caps (e.g., interface stability, settlements, lining systems)
F. Pavement and slab-on-grade design (e.g., rigid, flexible, porous, unpaved)
G. Utility design and construction

6. Groundwater and Seepage **4–6**

A. Dewatering, seepage analysis, groundwater flow, and impact on nearby structures
B. Drainage design/infiltration and seepage control

7. Problematic Soil and Rock Conditions **4–6**

A. Karst, collapsible, expansive, peat, organic, and sensitive soils
B. Reactive/corrosive soils (e.g., identification, protective measures)
C. Frost susceptibility
D. Rock slopes and rockfalls

8. Retaining Structures (ASD or LRFD) **10–15**

A. Lateral earth pressure and load distribution
B. Rigid retaining wall analysis (e.g., CIP, gravity, external stability of MSE, soil nail, crib, bin)
C. Cantilevered, anchored, and braced retaining wall analysis (e.g., soldier pile and lagging, sheet pile, secant pile, tangent pile, diaphragm walls, temporary support of excavation, and beams and column elements)
D. Cofferdams
E. Underpinning methods and effects on adjacent infrastructure
F. Ground anchors, tie-backs, soil nails, and rock anchors (e.g., design and quality control)

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NCEES Principles and Practice of Engineering Examination
CIVIL–GEOTECHNICAL Design Standards

Effective Beginning with the April 2024 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
ASCE 7-16	*Minimum Design Loads for Buildings and Other Structures,* 2017, American Society of Civil Engineers, Reston, VA, www.asce.org.
EM 1110-2-1902	*USACE Engineering and Design: Slope Stability*, 2003, U.S. Army Corp of Engineers, Washington D.C., www.publications.usace.army.mil.
FHWA NHI-05-037	*FHWA Geotechnical Aspects of Pavements*, 2006, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., www.fhwa.dot.gov.
FHWA NHI-06-088	*FHWA Soils and Foundations Reference Manual – Volume I*, 2006, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., www.fhwa.dot.gov.
FHWA NHI-06-089	*FHWA Soils and Foundations Reference Manual – Volume II*, 2006, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., www.fhwa.dot.gov.
FHWA-NHI-11-032 GEC No. 3	*FHWA LRFD Seismic Analysis and Design of Transportation Geotechnical Features and Structural Foundations Reference Manual*, 2011, Geotechnical Engineering Circulars, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., www.fhwa.dot.gov.
FHWA NHI-16-009 GEC No. 12	*FHWA Design and Construction of Driven Pile Foundations – Volume I*, 2016, Geotechnical Engineering Circulars, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., www.fhwa.dot.gov.

FHWA NHI-16-010
GEC No. 12
FHWA Design and Construction of Driven Pile Foundations – Volume II, 2016, Geotechnical Engineering Circulars, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., www.fhwa.dot.gov.

FHWA NHI-16-072
GEC No. 5
FHWA Geotechnical Site Characterization, 2017, Geotechnical Engineering Circulars, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., www.fhwa.dot.gov.

FHWA NHI-18-024
GEC No. 10
FHWA Drilled Shafts: Construction Procedures and Design Methods, 2018, Geotechnical Engineering Circulars, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., www.fhwa.dot.gov.

NAVFAC DM-7.02
Foundations & Earth Structures, Design Manual 7.02, 1986, U.S. Army Corps of Engineers, Naval Facilities Engineering Command

CFR TITLE 29
Part 1926
U.S. Department of Labor, Washington, D.C., July 2020.
Safety and Health Regulations for Construction

- Subpart CC, Cranes and Derricks in Construction, Part 1926:1400–1926:1442 with Appendix A–Appendix C
- 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

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.

UFC 3-220-10N
Unified Facilities Criteria (UFC): Soil Mechanics, 2022, U.S. Army Corps of Engineers, Naval Facilities Engineering Command, Air Force Civil Engineer Center, Washington D.C.