

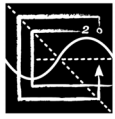
**Lateral Forces (Wind/Earthquake) Component of the
 Structural Engineering BREADTH CBT Exam Section Specifications**

Effective Beginning April 2024

- **The exam section topics have not changed since April 2018 when they were originally published.**
- The exam section is computer-based. It is closed book with electronic references. The NCEES *PE Structural Engineering Reference Handbook* is included in the exam along with the design standards shown on the last page.
- Examinees have 6 hours to complete this exam section, which contains 55 multiple-choice questions. The section will contain scored and unscored (pretest) questions. The 6-hour time includes a tutorial and a scheduled break. Examinees work all questions.
- The exam section uses the U.S. Customary System (USCS) of units.
- The exam section is developed with questions that will require a variety of approaches and methodologies, including design, analysis, and application.
- The knowledge areas specified as examples of kinds of knowledge are not exclusive or exhaustive categories.

	Number of Questions
I. Analysis of Structures	17–26
A. Generation of Loads	8–12
1. Horizontal seismic	
2. Vertical seismic	
3. Dynamic seismic lateral earth pressure	
4. Wind loads on buildings—MWFRS (directional procedure)	
5. Wind loads on buildings—MWFRS (envelope procedure)	
6. Wind loads on other structures and building appurtenances—MWFRS	
7. Wind loads—components and cladding (C&C)	
8. Wind loads on bridges	
9. Load combinations	
B. Load Distribution and Analysis Methods	9–14
1. Statics (e.g., determinate and indeterminate, location of forces and moments, free-body diagrams)	
2. Approximate frame analysis methods	
3. Computer-generated structural analysis techniques (e.g., modeling, interpreting, and verifying results)	
4. Seismic static force procedures	
5. Seismic dynamic force procedures	
6. Seismic irregularities (e.g., horizontal and vertical)	
7. Horizontal torsional moments	
8. Relative rigidity force distribution	
9. Flexible diaphragms	
10. Rigid diaphragms	
11. Wind load distribution	

II. Design and Details of Structures	28–46
A. General Structural Considerations	3–5
1. Construction administration (procedures for correcting nonconforming work, testing methods, inspection methods, structural observation)	
2. Serviceability requirements (i.e., deflection, building drift)	
3. Anchorage of a structural system to resist uplift and sliding forces	
4. Components, attachments, and cladding	
5. Seismic coefficients (e.g., response modification factor, redundancy factor, overstrength factor, deflection amplification factor)	
6. Abutment/pier seat width	
B. Structural Systems Integration	2–4
1. General structural systems selection based on design criteria (e.g., height limits, foundation considerations)	
2. Specifications, quality controls, and coordination with other disciplines	
3. Constructability	
4. Strengthening existing systems (e.g., details, system compatibility, reinforcing methods)	
C. Structural Steel	6–9
1. Braced frames	
2. Moment resisting frames	
3. Dual systems	
4. Cantilever columns	
5. Bridge piers	
6. Bridge bracing elements	
D. Cold-Formed Steel	2–4
1. Steel diaphragms	
2. Bearing wall systems (e.g., shear wall systems, flat strap bracing)	
E. Concrete	6–9
1. Shear walls	
2. Moment resisting frames	
3. Diaphragms	
4. Bridge piers/abutments	
5. Bridge reinforcement details (e.g., ductile detailing, anchorage)	
F. Wood	3–5
1. Diaphragms (e.g., drag struts, chords)	
2. Sub-diaphragms	
3. Shear walls	
G. Masonry	3–5
1. Out-of-plane (i.e., slender walls)	
2. Shear walls	
3. Anchorage of walls (e.g., out-of-plane, uplift)	
4. Attachment of elements to masonry	
H. Foundations and Retaining Structures	3–5
1. Retaining walls and abutments	
2. Spread footings	
3. Piles (e.g., concrete, steel, timber)	
4. Drilled shafts/drilled piers/caissons	



STRUCTURAL ENGINEERING Design Standards

These standards apply to the Vertical and Lateral components of the Structural Engineering exam.

Effective Beginning April 2024

In addition to the NCEES *PE Structural Engineering Reference Handbook*, the following codes and standards will be supplied in the exam as searchable, electronic pdf files with links for easy navigation. 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.

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 U.S. Customary System (USCS) of units.

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
AASHTO	<i>AASHTO LRFD Bridge Design Specifications</i> , 8th edition, American Association of State Highway & Transportation Officials, Washington, DC.
IBC	<i>International Building Code</i> , 2018 edition, International Code Council, Falls Church, VA.
ASCE 7	<i>Minimum Design Loads and Associated Criteria for Buildings and Other Structures</i> , 2016 edition, American Society of Civil Engineers, Reston, VA.
ACI 318	<i>Building Code Requirements for Structural Concrete</i> , 2014 edition, American Concrete Institute, Farmington Hills, MI.
AISC	<i>Steel Construction Manual</i> , 15th edition, American Institute of Steel Construction, Chicago, IL.
AISC	<i>Seismic Design Manual</i> , 3rd edition, American Institute of Steel Construction, Chicago, IL.
AISI S100	<i>North American Specification for the Design of Cold-Formed Steel Structural Members</i> , 2016 edition, with AISI S240-15 and AISI S400-15/S1-16, American Iron and Steel Institute, Washington, DC.
NDS	<i>National Design Specification for Wood Construction with NDS Supplement: Design Values for Wood Construction</i> , 2018 edition, American Wood Council, Leesburg, VA.
NDS	<i>Special Design Provisions for Wind and Seismic</i> , 2015 edition, American Wood Council, Leesburg, VA.
TMS 402/602	<i>Building Code Requirements and Specification for Masonry Structures</i> , 2016 edition, The Masonry Society, Longmont, CO.