NCEES
advancing licensure for engineers and surveyors

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

Effective Beginning with the April 2011 Examination

- The 4-hour **Lateral Forces (Wind/Earthquake)** breadth examination is offered on Saturday morning and focuses on wind/earthquake loads. It contains 40 multiple-choice questions.
- The exam uses the US Customary System (USCS) of units.
- The exam 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.
- Score results are combined with depth exam results for final score of this component.

	Approximate Number of Questions
I. Analysis of Structures	**15**
A. Lateral Forces	4
1. Wind	
2. Horizontal seismic	
3. Vertical seismic	
4. Dynamic earth pressure	
B. Lateral Force Distribution	9
1. Statics (e.g., determinate and indeterminate, location of forces and moments, free-body diagrams)	
2. Seismic design categories (C and lower)	
3. Seismic design categories (D and higher)	
4. Seismic static force procedures	
5. Seismic dynamic force procedures	
6. Configuration of a structural system to resist effects of horizontal torsional moments	
7. Relative rigidity force distribution	
8. Horizontal/plan and vertical irregularities	
9. Flexible diaphragms	
10. Rigid diaphragms	
11. Simplified wind	
12. Wind analytic procedures	
13. Wind components and cladding	
14. Main wind force resisting systems	
C. Methods	2
1. Computer-generated structural analysis techniques (e.g., modeling, interpreting, and verifying results)	
2. Simplified analysis methods (e.g., influence lines, portal frame method/cantilever method)	

II. Design and Detailing of Structures — 24

A. General Structural Considerations — 3
   1. Load combinations
   2. Serviceability requirements: building drift
   3. Anchorage of a structural system to resist uplift and sliding forces
   4. Components, attachments, and cladding
   5. Redundancy factors
   6. Overstrength
   7. Ductility requirements
   8. Abutment/pier seat width

B. Structural Systems Integration — 2
   1. Structural systems to resist effects of lateral forces
   2. Constructability
   3. Strengthening existing systems: seismic retrofit
      a. Details
      b. System compatibility

C. Structural Steel — 4
   1. Ordinary moment frames
   2. Intermediate moment-resisting frames
   3. Special moment-resisting frames
   4. Bracing
   5. Ordinary concentric braced frames
   6. Special concentric braced frames
   7. Eccentric braced frames
   8. Bridge piers

D. Light Gage/Cold-Formed Steel — 1
   1. Metal deck diaphragms
   2. Light-framed wall systems (e.g., shearwall systems)

E. Concrete — 5
   1. Ordinary or intermediate shear walls
   2. Special shear walls
   3. Ordinary or intermediate moment-resisting frames
   4. Special moment-resisting frames
   5. Diaphragms
   6. Reinforcement details (e.g., ductile detailing, anchorage)
   7. Bridge piers
   8. Tilt-up construction

F. Wood — 3
   1. Shear walls
   2. Plywood diaphragms (e.g., drag struts, chords)
   3. Plywood sub-diaphragms

G. Masonry 3
1. Flexural-compression members
2. Slender walls
3. Ordinary or intermediate shear walls
4. Special shear walls
5. Anchorage for walls (e.g., out-of-plane)
6. Attachment of elements to masonry

H. Foundations and Retaining Structures 3
1. Spread footings
2. Piles (concrete, steel, timber)
3. Drilled shafts/drilled piers/caissons

III. Construction Administration 1

A. Structural observation

NCEES
advancing licensure for engineers and surveyors

STRUCTURAL ENGINEERING Design Standards[1]

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

Effective Beginning with the April 2017 Examinations

Revisions are shown in red.

ABBREVIATION	DESIGN STANDARD TITLE
AASHTO	*AASHTO LRFD Bridge Design Specifications,* 7th edition, American Association of State Highway & Transportation Officials, Washington, DC.
IBC	*International Building Code,* 2012 edition (without supplements), International Code Council, Falls Church, VA.
ASCE 7	*Minimum Design Loads for Buildings and Other Structures,* 3rd printing, 2010, American Society of Civil Engineers, Reston, VA.
ACI 318	*Building Code Requirements for Structural Concrete*, 2011, American Concrete Institute, Farmington Hills, MI.
AISC	*Steel Construction Manual,* 14th edition, American Institute of Steel Construction, Inc., Chicago, IL.
AISC	*Seismic Design Manual,* 2nd edition, American Institute of Steel Construction, Inc., Chicago, IL.
AISI	*North American Specification for the Design of Cold-Formed Steel Structural Members*, 2007 edition with Supplement No. 2 (2010), American Iron and Steel Institute, Washington, DC.
NDS	*National Design Specification for Wood Construction ASD/LRFD,* 2012 edition & *National Design Specification Supplement, Design Values for Wood Construction,* 2012 edition, American Forest & Paper Association, Washington, DC.
NDS	*Special Design Provisions for Wind and Seismic with Commentary,* 2008 edition, American Forest & Paper Association, Washington, DC.
PCI	*PCI Design Handbook: Precast and Prestressed Concrete,* 7th edition, 2010, Precast/Prestressed Concrete Institute, Chicago, IL.
TMS 402/602	*Building Code Requirements and Specifications for Masonry Structures* (and related commentaries), 2011; The Masonry Society, Boulder, CO; American Concrete Institute, Detroit, MI; and Structural Engineering Institute of the American Society of Civil Engineers, Reston, VA.

Notes

1. Solutions to exam questions that reference a standard of practice are scored based on this list. Solutions based on other editions or standards will **not** receive credit. All questions use the US Customary System (USCS) of units.