

# ARE<sup>®</sup> 4.0 Overview

What is the ARE?

## WHAT IS THE ARE<sup>®</sup>?

Benefits of NCARB  
Certification

Key Organizations

Exam Content  
Confidentiality

Using the ARE 4.0  
Exam Guides

Units, Standards,  
and Terms

Rolling Clock and  
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Scheduled  
Appointment Times

Six Steps to  
Completing  
the ARE

Multiple-  
Choice  
Sections

Graphic  
Vignette  
Sections



The registration of architects is one of the means by which U.S. registration boards and Canadian provincial and territorial associations **fulfill their mission to safeguard public health, safety, and welfare**. Any individual may apply to one of the U.S. state or territorial boards or one of the Canadian provincial or territorial associations (together referred to as Boards of Architecture, or Boards, in this publication) for registration as an architect. However, to become registered, a person must demonstrate that he or she is qualified to render architectural services by meeting education, training, and examination standards established by each Board.

The Architect Registration Examination<sup>®</sup> (ARE<sup>®</sup>) is developed by the National Council of Architectural Registration Boards (NCARB). The ARE has been adopted for use by all U.S. state and territorial registration member boards and by various Canadian provincial and territorial architectural associations as the registration examination for all candidates for architectural registration.

The ARE assesses a candidate's knowledge, skills, and abilities to provide various services required in the practice of architecture. No single examination can test for competency in all aspects of architectural practice; the ARE is not intended for that purpose. The ARE concentrates on the professional services that affect the public health, safety, and welfare. The intent of the examination is to evaluate a candidate's competence to protect the public by providing the architectural services of pre-design, site design, building design, building systems, and construction documents and services as they relate to social, cultural, natural and physical forces, and to other related external constraints.

In addition to testing for competence in specific subject areas, NCARB is aware of the responsibilities an architect may have for coordinating the activities of others involved in the design/

construction process. The ARE attempts to determine a candidate's qualifications not only in performing measurable tasks, but also in exercising the skills and judgment of a generalist working with numerous specialists. In short, the objective is to reflect the practice of architecture as an integrated whole.

The ARE is administered exclusively on computers at a network of test centers across the United States, its territories, and Canada. Scores for each division will be sent to the Board of Architecture that qualified the candidate for the examination. That Board of Architecture has the ultimate authority to determine a candidate's qualifications to practice architecture within its jurisdiction.

Prior to taking the ARE, you must be made eligible by one of NCARB's member registration boards or one of the Canadian provincial architectural associations. It is not possible to "sign-up" for the exam with NCARB or NCARB's testing consultant. Only individuals who have been made eligible for the ARE will be permitted to take the exam.

### ARE 4.0 consists of the following seven divisions:

- ▶ Programming, Planning & Practice
- ▶ Site Planning & Design
- ▶ Building Design & Construction Systems
- ▶ Schematic Design
- ▶ Structural Systems
- ▶ Building Systems
- ▶ Construction Documents & Services

To help candidates prepare for the examination, the content areas and references for each division are available to be downloaded from NCARB's website at [www.ncarb.org/en/ARE/Preparing-for-the-ARE.aspx](http://www.ncarb.org/en/ARE/Preparing-for-the-ARE.aspx)

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PROGRAMMING, PLANNING & PRACTICE			
Intro Time	:15		
MC Testing Time	2:00	85 items	
Scheduled Break	:15		
Intro Time	:15		
Graphic Testing Time	1:00	Site Zoning	
Exit Questionnaire	:15		
<b>Scheduled Appointment Time</b>	<b>4:00</b>		

SITE PLANNING & DESIGN			
Intro Time	:15		
MC Testing Time	1:30	65 items	
Scheduled Break	:15		
Intro Time	:15		
Graphic Testing Time	2:00	Site Grading, Site Design	
Exit Questionnaire	:15		
<b>Scheduled Appointment Time</b>	<b>4:30</b>		

BUILDING DESIGN & CONSTRUCTION SYSTEMS			
Intro Time	:15		
MC Testing Time	1:45	85 items	
Scheduled Break	:15		
Intro Time	:15		
Graphic Testing Time	2:45	Accessibility/Ramp, Stair Design, Roof Plan	
Exit Questionnaire	:15		
<b>Scheduled Appointment Time</b>	<b>5:30</b>		

SCHEMATIC DESIGN			
Intro Time	:15		
Graphic Testing Time	1:00	Interior Layout	
Scheduled Break	:15		
Intro Time	:15		
Graphic Testing Time	4:00	Building Layout	
Exit Questionnaire	:15		
<b>Scheduled Appointment Time</b>	<b>6:00</b>		

STRUCTURAL SYSTEMS			
Intro Time	:15		
MC Testing Time	3:30	125 items	
Scheduled Break	:15		
Intro Time	:15		
Graphic Testing Time	1:00	Structural Layout	
Exit Questionnaire	:15		
<b>Scheduled Appointment Time</b>	<b>5:30</b>		

BUILDING SYSTEMS			
Intro Time	:15		
MC Testing Time	2:00	95 items	
Scheduled Break	:15		
Intro Time	:15		
Graphic Testing Time	1:00	Mechanical & Electrical Plan	
Exit Questionnaire	:15		
<b>Scheduled Appointment Time</b>	<b>4:00</b>		

CONSTRUCTION DOCUMENTS & SERVICES			
Intro Time	:15		
MC Testing Time	2:00	100 items	
Scheduled Break	:15		
Intro Time	:15		
Graphic Testing Time	1:00	Building Section	
Exit Questionnaire	:15		
<b>Scheduled Appointment Time</b>	<b>4:00</b>		



# Structural Systems



## KNOWLEDGE / SKILLS

### KNOWLEDGE / SKILLS

The division has been broken down into a listing of knowledge and skills directly related to each major content area.

#### 1. GENERAL STRUCTURES

(38-42 percent of scored items)

##### A. Principles

Apply general structural principles to building design and construction.

##### 1. Building Design

Achieve required building design by applying principles, theory, and calculations needed to analyze and design structural systems and components, calculating forces on members (loads, shear, moments, reactions, and truss analysis), and applying basic engineering principles including but not limited to: moment of inertia, section modulus, and deflection.

##### 2. Building Systems and their Integration

Apply principles, theory, and calculations related to a building's structural system and its individual components by selecting a structural system or component that is appropriate for its application including but not limited to: post and beam, frames, trusses, arches, shells, plates, and skins.

##### 3. Implications of Design Decisions

Assess the impact of structural design decisions on cost, schedule, and building systems including: material, span, height, use, historic preservation, architectural form, acoustical properties, sustainability, vibration susceptibility, MEP considerations, etc.

#### B. Materials & Technology

Consider impact of design decisions on the selection of systems, materials, and construction details on general structural design.

##### 1. Construction Details and Constructability

Apply principles, theory, and calculations related to the design of connections of the various elements of the structure, including connections, fasteners, hangers, and plates. Assess the impact of structural decisions on the construction process: including underpinning, shoring, temporary structures, stabilization, and construction methods.

##### 2. Construction Materials

Understand properties of materials that may affect the structural characteristics including section modulus, moment of inertia, thermal movement, fatigue, creep, and information gathered from material test reports, or manuals and apply the knowledge to the design.

#### C. Codes & Regulations

Incorporate building codes, specialty codes, and other regulatory requirements in the design of general structural systems

##### 1. Government and Regulatory Requirements and Permit Processes

Examine building and fire codes and other regulations affecting structural systems. Apply conditions, constraints, and the permit approval process to structural issues, including: life safety, testing, inspections, loads, connections, allowable stresses, erection, and safety factors.

# Structural Systems

## KNOWLEDGE / SKILLS

## 2. SEISMIC FORCES

(28-32 percent of scored items)

### A. Principles

Apply seismic forces principles to building design and construction.

#### 1. Building Design

Examine behavior of building structural systems when subjected to seismic forces, including load path, loading effects and building response, seismic load resisting systems, and nature of seismic loads on structures.

#### 2. Building Systems and their Integration

Consider seismic force resisting systems and elements including braced frames, shear walls, rigid frames, flexible and rigid membranes, foundations, and retaining walls to integrate into the design.

#### 3. Implications of Design Decisions

Consider impact of design for seismic forces considering cost, building configuration and function, historic preservation, and construction schedule.

### B. Materials & Technology

Consider the impact of applying design decisions on the selection of systems, materials, and construction details to accommodate for seismic forces.

#### 1. Construction Details and Constructability

Examine construction details and non-structural elements pertaining to seismic forces.

#### 2. Construction Materials

Select construction materials pertaining to their resistance to seismic forces.

### C. Codes & Regulations

Incorporate building codes, specialty codes, and other regulatory requirements in the design for seismic forces.

#### 1. Government and Regulatory Requirements and Permit Processes

Examine construction details and non-structural elements pertaining to their resistance to seismic forces.

## 3. WIND FORCES

(14-17 percent of scored items)

### A. Principles

Apply lateral force principles into the design and construction of buildings to resist wind.

#### 1. Building Design

Analyze behavior of building structural systems when subjected to wind load, including load path, loading effects and building response, nature of wind loads on structures, and causes and characteristics of wind.

#### 2. Building Systems and their Integration

Consider wind force resisting systems and elements including braced frames, shear walls, rigid frames, flexible and rigid membranes, and foundations to integrate into the design.

#### 3. Implications of Design Decisions

Examine impact of design for wind forces considering cost, building configuration, building function, historic preservation, and construction schedule.

# Structural Systems



## KNOWLEDGE / SKILLS

### B. Materials & Technology

Analyze the impact of design decisions on the selection of systems, materials, and construction details related to wind forces.

#### 1. Construction Details and Constructability

Examine construction details and non-structural elements pertaining to resistance to wind.

#### 2. Construction Materials

Ascertain construction materials pertaining to resistance to wind.

### C. Codes & Regulations

Incorporate building codes and other regulatory requirements related to wind forces.

#### 1. Government and Regulatory Requirements and Permit Processes

Incorporate building and life safety codes and regulations for inclusion in design of structures for resistance to wind.

## 4. LATERAL FORCES

(13-16 percent of scored items)

### A. Principles

Apply lateral forces principles to the design and construction of buildings.

#### 1. Building Design

Analyze behavior of building structural systems when subjected to lateral loads, including load path, loading effects and building response, lateral load resisting systems, and nature of lateral loads on structures.

### 2. Building Systems and their Integration

Consider lateral load resisting systems and elements including braced frames, shear walls, rigid frames, flexible and rigid membranes, foundations, and retaining walls to integrate into the design.

### 3. Implications of Design Decisions

Assess impact of lateral loads design decisions such as cost, building configuration, building function, and construction sequencing and schedule.

### B. Materials & Technology

Apply lateral forces principles to the design and construction of buildings.

#### 1. Construction Details and Constructability

Examine construction details and non-structural elements pertaining to lateral forces.

#### 2. Construction Materials

Select construction materials that resist lateral forces.

# Structural Systems

## STRUCTURAL LAYOUT VIGNETTE

### Program

The preliminary floor plan for an urban mini-mall has been completed and approved, and you are now required to develop a roof framing layout for the building or portion of the building shown on the work screen. The layout must accommodate the conditions and requirements given below.

#### *Site/Foundation*

1. The site has no seismic activity and wind pressures are negligible.
2. The soils and foundation system should be assumed adequate for all standard and normal loads.
3. The distribution of concentrated or special loads need not be considered.

#### *Construction/Materials*

1. Structural steel/open web steel joist construction has been chosen for the roof structure type.
2. Steel beam sections are to be rolled or built-up.
3. The metal roof deck is capable of carrying the design loads on spans up to and including 4 ft.
4. Joists are sized to carry roof loads only.

#### *General Requirements*

1. All portions of the roof framing are flat.
2. Cantilevers are prohibited.
3. Structural members must not extend beyond the building envelope, except to frame a designated covered entry.

4. Columns may be located within walls, including the window wall and the clerestory window wall.
5. Walls shown on the background floor plan may be designated as bearing walls. Additional bearing walls are not allowed.
6. Lintels are required to be shown in bearing walls only. Other lintels shall not be indicated.
7. The opening located between the common area and the seating area must be unobstructed and column-free.
8. The common area must be column-free.
9. The window wall and the clerestory window extend to the underside of the structure above. All other openings have a head height of 7 ft above finish floor.
10. The roof over the high ceiling space must be higher than the roof over the low ceiling spaces.
  - ▶ The common area requires a high ceiling with a top of structure height of 18 ft.
  - ▶ The remaining spaces require a low ceiling with a top of structure height of 12 ft.
11. The structure must accommodate a clerestory window to be located along the full length of the north wall of the common area.