RESIDENTIAL DESIGN EXAMINATION STUDY GUIDE

NEVADA STATE BOARD OF ARCHITECTURE, INTERIOR DESIGN & RESIDENTIAL DESIGN

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Las Vegas, NV 89119

INTRODUCTION

Under the provisions in *Rules and Regulations*, Chapter 623, as adopted by the Nevada State Board of Architecture, Interior Design and Residential Design (NSBAIDRD), an applicant must pass a written examination covering the following subject areas to qualify as a residential designer:

- Structural Technology
- Materials & Methods of Construction
- Building Systems & Life Safety
- Graphics

The applicant's competence in each of these subject areas will be assessed by separate exams. Applicants must receive a passing score of at least 74 percent on all exams. These guidelines are designed to help applicants prepare for the written exams: Structural Technology, Materials & Methods of Construction, and Building Systems & Life Safety.

Each written exam consists of 50 multiple choice questions. All questions on the exams are weighted equally and are worth one point, regardless of difficulty. Applicants will have three hours to complete each exam.

The guidelines contain a list of recommended references. The list of references is broken into the following two types of references:

- References used to develop exam questions
- References recommended for further study

References of the first type were used by residential design experts to develop the questions on the exams. These references have been cited as sources for most of the correct responses to exam questions. The second type of reference, those that are recommended for further study, were not cited as sources for the correct responses to exam questions but cover a broad range of material found on the exam. Applicants are encouraged to familiarize themselves with both types of references listed below.

The Structural Technology, Materials & Methods of Construction, and Building Systems & Life Safety exams are open book, meaning that applicants may bring a copy of the *2018 International Residential Code,* the *2018 International Building Code*, and *Architectural Graphic Standards (*11th or 14th editions) to the exam administration. Applicants may also use a silent, nonprinting, nonprogrammable calculator.

STRUCTURAL TECHNOLOGY
EXAMINATION

Exam Purpose: To determine an individual's ability to understand, evaluate, and select materials and methods of construction for single and multiple-family dwelling structures (composed of not more than four dwellings units in each structure) not exceeding two stories in height.

Individuals must be able to take into consideration factors such as economy, ease of erection, and minimum construction standards as imposed by the ICC. Types of materials include wood, masonry, concrete, finishes, doors/windows, and earthwork. Individuals must be able to estimate labor and material costs of various applications.

STRUCTURAL TECHNOLOGY
OBJECTIVES

Objective 1: Identify standard engineering principles and the functional requirements of structural systems relevant to a residential design project.

- Distinguish between multiple structural systems in order to select a system that meets known project requirements or constraints.
- Demonstrate knowledge of engineering principles and their application to design and construction.
- Distinguish between multiple types of trusses in order to select the truss system that meets known project requirements or constraints.

Objective 2: Identify the conditions that impact the structural solution for a residential design project.

- Identify standard load conditions and their impact on building design.
- Identify climatic and site conditions that impact a building's structural system.
- Identify aspects of the project's design that require non-standard structural solutions.

Objective 3: Identify soil types and conditions and their effect on building design for a residential design project.

- Distinguish between soil types and conditions as indicated in a soils report or similar documentation.
- Identify an appropriate structural system to be used in a given soil type and condition.

STRUCTURAL TECHNOLOGY
REFERENCES

REFERENCES USED TO DEVELOP EXAM QUESTIONS				
Title	**Edition**	**Year**	**Author**	**Publisher**
Architectural Graphic Standards	11th edition	2007	The American Institute of Architects	John Wiley & Sons
Architectural Graphic Standards	14th edition	2016	The American Institute of Architects	John Wiley & Sons
International Residential Code for One- and Two-Family Dwellings		2018	International Code Council (ICC)	ICC

STRUCTURAL TECHNOLOGY
REFERENCES (CONTINUED)

REFERENCES RECOMMENDED FOR FURTHER STUDY				
Title	**Edition**	**Year**	**Author**	**Publisher**
Building Code Requirements for Structural Concrete and Commentary	3rd printing	2020	American Concrete Institute (ACI) Committee 318	ACI
Carpentry and Building Construction Student Edition	1st edition	2016		McGraw-Hill Education
Construction Materials, Methods, and Techniques	5TH edition	2021	Eva Kultermann & William Spence	Cengage
Design and Control of Concrete Mixtures	17th edition	2021	Michelle Wilson & Paul Tennis	Portland Cement Association
Essential Guide to Framing	1st edition	2005	Editors of the Journal of Light Construction	Hanley Wood
International Residential Code Study Companion		2018	International Code Council (ICC)	ICC
Modern Masonry	9th edition	2020	Clois Kicklighter & Timothy Andera	Goodheart-Willcox
Placing Reinforcing Bars	10th edition	2019	Concrete Reinforcing Steel Institute (CRSI)	CRSI
Statics and Strength of Materials for Architecture and Building Construction	4th edition	2011	Barry Onouye & Kevin Cane	Pearson
Structural Design: A Practical Guide for Architects	2nd edition	2007	James Underwood & Michele Chiuni	John Wiley & Sons

MATERIALS & METHODS OF CONSTRUCTION EXAMINATION

Exam Purpose: To determine an individual's ability to understand, evaluate, and select materials and methods of construction for single and multiple-family dwelling structures (composed of not more than four dwelling units in each structure) not exceeding two stories in height.

Individuals must be able to take into consideration factors such as economy, ease of erection, and minimum construction standards as imposed by the ICC. Types of materials include, but are not limited to, wood, masonry, concrete, finishes, doors/windows, and earthwork. Individuals must be able to estimate labor and material costs of various applications.

MATERIALS & METHODS OF CONSTRUCTION
OBJECTIVES

Objective 1 (10%): Calculate project costs using common estimating methods.

- Understand standard techniques for estimating project costs using available project information.
- Determine a cost estimate for a project at different phases of design.
- Modify a previous cost estimate based on project development.

Objective 2 (12%): Identify the functional requirements and impacts of thermal and moisture control systems in a residential design project.

- Demonstrate knowledge of the purpose of a thermal and moisture control system as a component in the building design.
- Demonstrate knowledge of the impact of a thermal and moisture control system on a building's mechanical systems.
- Identify an appropriate thermal and moisture control system based on a project's location and other requirements.

Objective 3 (19%): Identify the functional requirements, properties, and impacts of building materials and systems in a residential design project.

- Understand how the selection of materials and assemblies for a residential project impacts other aspects of that project.
- Demonstrate knowledge of the requirements and appropriate uses of various building systems, e.g., roofing, doors, windows, etc.
- Demonstrate knowledge of various building materials, e.g., wood, stone and masonry, concrete, glass, metal, etc.

Objective 4 (11%): Identify sustainability considerations and their impact on materials and constructability for a residential design project.

- Identify building technology solutions that are energy efficient and meet project requirements for occupant comfort and life safety.
- Demonstrate knowledge of the impact of sustainable design decisions on materials selection and the construction process.

Objective 5 (13%): Interpret the constructability of design solutions using standard means and methods for residential construction.

- Demonstrate knowledge of the impact of design decisions on the construction process.
- Identify typical means and methods in standard residential construction.
- Perform constructability reviews throughout the design process.

Objective 6 (13%): Select the appropriate building materials, finishes, and systems to meet client, project, and jurisdictional requirements.

- Identify required specifications for a selected building material, finish, or system.
- Select materials, finishes, and systems based on technical properties and aesthetic requirements.
- Select materials, color pallets, and coordination in accordance with HOA/ARC approvals.

Objective 7 (8%): Identify common hazardous materials and mitigation procedures for residential site and building conditions.

- Identify standard mitigation procedures for typical hazardous materials and conditions.
- Understand hazardous materials and mitigation procedures as provided in a hazardous materials report.

Objective 8 (14%): Analyze field reports, third-party inspections, and other test results to determine whether there is conformance or further action needed.

- Identify circumstances noted in field reports, third party inspections, or other test results that require further action by the residential designer or another party.
- Review results from field reports, third-party inspections, and other test results for conformance with contract documents.
- Identify strategies for documenting construction observations.
- Complete field reports to document field observations from construction site visit.

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Architectural Graphic Standards	14th edition	2016	The American Institute of Architects	John Wiley & Sons
Dictionary of Construction	4th edition	2006	Cyril Harris	McGraw-Hill
Estimating in Building Construction	9th edition	2018	Steven Peterson & Frank Dagostino	Pearson
International Building Code		2018	International Code Council (ICC)	ICC
International Residential Code for One- and Two-Family Dwellings		2018	International Code Council (ICC)	ICC

MATERIALS & METHODS OF CONSTRUCTION
REFERENCES (CONTINUED)

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Modern Masonry	9th edition	2020	Clois Kicklighter & Timothy Andera	Goodheart-Willcox
The Contractor's Guide to Quality Concrete Construction	3rd	2014	American Society of Concrete Contractors (ACSS)	ACSS & American Concrete Institute

BUILDING SYSTEMS & LIFE SAFETY EXAMINATION

Exam Purpose: To determine an individual's ability to understand and apply code requirements, principles of design, and life safety related to single and multiple-family dwelling structures (composed of not more than four dwellings units in each structure) not exceeding two stories in height.

Individuals must be able to understand general systems terminology, applications, principles, and applicable codes.

BUILDING SYSTEMS & LIFE SAFETY
OBJECTIVES

Objective 1: Demonstrate the ability to coordinate the services of needed consultants and engineers in the delivery of professional residential design services.

- Identify qualified consultants needed to fulfill a project's scope of work.
- Coordinate the work of building systems engineers, landscape architects, interior designers, and other project consultants.

Objective 2: Identify building engineering systems for a residential design project with appropriate consultants.

- Determine building engineering systems that meet client and project requirements in collaboration with a consultant.

Objective 3: Identify the functional requirements and factors that influence the selection of mechanical, electrical, and plumbing systems relevant to a residential design project.

- Understand various technologies that provide solutions for comfort, life safety and energy efficiency.
- Identify factors involved in selection of building systems and components.
- Demonstrate knowledge of functional requirements of heating, ventilation, and air conditioning systems, plumbing systems, and electrical systems.

Objective 4: Identify the functional requirements of fire suppression and electronic safety and security systems relevant to a residential design project.

- Understand various technologies that provide solutions for comfort, life safety and energy efficiency.
- Demonstrate knowledge of functional requirements of fire suppression systems, electronic safety systems, and security systems.

Objective 5: Identify principles of building operations for a residential design project.

- Demonstrate knowledge of building operation, including materials maintenance and systems operations and maintenance.

Objective 6: Predict the environmental impacts of design decisions for a residential design project.

- Assess how design decisions impact building use, occupant comfort, and system energy usage.

Objective 7: Identify the applicable codes, ordinances, standards, and covenants required to be followed for a project.

- Determine applicable codes and standards for a project.
- Demonstrate knowledge of differing jurisdiction requirements within the state of Nevada.

Objective 8: Identify appropriate steps for conducting a code analysis.

- Demonstrate ability to read, interpret, and apply required codes.
- Demonstrate knowledge of protocols and procedures for conducting a code analysis.

BUILDING SYSTEMS & LIFE SAFETY
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International Building Code		2018	International Code Council (ICC)	ICC
International Residential Code for One- and Two-Family Dwellings		2018	International Code Council (ICC)	ICC
International Wildland-Urban Interface Code		2018	International Code Council (ICC)	ICC
NFPA 70 National Electrical Code		2017	National Fire Protection Association (NFPA)	NFPA
Uniform Plumbing Code		2018	International Association of Plumbing and Mechanical Officials (IAPMO)	IAPMO

BUILDING SYSTEMS & LIFE SAFETY
REFERENCES (CONTINUED)

REFERENCES RECOMMENDED FOR FURTHER STUDY				
Title	**Edition**	**Year**	**Author**	**Publisher**
American Electricians' Handbook	17th edition	2021	Frederic Hartwell	McGraw-Hill
Carpentry and Building Construction Student Edition	1st edition	2016		McGraw-Hill Education
International Residential Code Study Companion		2018	International Code Council (ICC)	ICC
Landscaping: Principles & Practices	8th edition	2018	Jack Ingels & Alissa Smith	Cengage Learning
Modern Carpentry	13th edition	2021	R. Jack Jones, Willis Wagner, et al.	Goodheart-Wilcox
Modern Refrigeration and Air Conditioning	21st edition	2019	Althouse/ Turnquist/ Bracciano	Goodheart-Wilcox
National Electrical Code 2017 Handbook	29th edition	2017	Frederic Hartwell, Joseph McPartland, et al.	McGraw-Hill
Uniform Mechanical Code		2018	International Association of Plumbing and Mechanical Officials (IAPMO)	IAPMO