

# NCARB - Project-Planning-Design - ARE 5.0 Project Planning & Design (PPD) High Hit-Rate New Test Guide



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## NCARB Project-Planning-Design Exam Syllabus Topics:

Topic	Details
Topic 1	<ul style="list-style-type: none"><li>• <b>Project Costs &amp; Budgeting:</b> This section of the exam measures skills of architectural designers and assesses the ability to evaluate design alternatives based on program goals, perform cost evaluations, and manage cost considerations throughout the design process.</li></ul>
Topic 2	<ul style="list-style-type: none"><li>• <b>Codes &amp; Regulations:</b> This section of the exam measures the skills of project architects and focuses on applying zoning laws, environmental rules, and building codes during the planning stage. Candidates are tested on how to integrate multiple regulatory requirements into a project's design effectively.</li></ul>
Topic 3	<ul style="list-style-type: none"><li>• <b>Environmental Conditions &amp; Context:</b> This section of the exam measures skills of architectural designers and covers how to use site analysis information to determine building placement and environmental planning decisions. It emphasizes applying sustainable principles and considering the neighborhood context to guide project design.</li></ul>
Topic 4	<ul style="list-style-type: none"><li>• <b>Project Integration of Program &amp; Systems:</b> This section of the exam measures skills of project architects and focuses on integrating decisions about environmental conditions, codes, and building systems into one cohesive project design. It highlights how to configure the building and incorporate both program requirements and contextual conditions in a unified design approach.</li></ul>
Topic 5	<ul style="list-style-type: none"><li>• <b>Building Systems, Materials, &amp; Assemblies:</b> This section of the exam measures skills of architectural designers and covers the understanding of building systems such as mechanical, electrical, and plumbing, along with structural and specialty systems. It also involves selecting appropriate materials and assemblies to align with program needs, budgets, and regulations.</li></ul>

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## Planning-Design Exam Cram

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### NCARB ARE 5.0 Project Planning & Design (PPD) Sample Questions (Q53-Q58):

#### NEW QUESTION # 53

In order to minimize stratification, in a forced-air heating system, which locations of supply and return grilles should be avoided?

- A. High supply, low return
- B. High supply, high return
- C. Low supply, high return
- **D. Low supply, low return**

**Answer: D**

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

Stratification refers to the layering of air temperatures within a space, where warmer air rises and cooler air stays near the floor. In forced-air heating systems, minimizing temperature stratification is critical to maintaining occupant comfort and energy efficiency. The placement of supply and return air grilles plays a significant role in preventing stratification.

\* Low supply, low return (Option C) should be avoided because supplying warm air near the floor and simultaneously returning air also near the floor limits effective air mixing. Warm air naturally rises, so if the return grille is also low, cooler air remains trapped above, resulting in poor circulation and uneven temperatures throughout the room. This can cause discomfort, with warmer air accumulating near the ceiling and colder air lingering in the occupied zone.

\* High supply, low return (Option B) is often preferred because warm air is supplied from high points, then cools and sinks toward the lower return grille, promoting vertical circulation and mixing, reducing stratification.

\* Low supply, high return (Option A) and high supply, high return (Option D) can be less effective depending on system design, but the critical issue is having both supply and return located low, which restricts air movement and stratification mitigation.

According to NCARB PPD content on building systems and HVAC design, proper grille placement is essential to maintain thermal comfort, minimize energy waste, and comply with indoor environmental quality standards. Effective grille placement harnesses natural convection to ensure even temperature distribution, reducing the potential for hot or cold spots and improving occupant satisfaction.

References:

ARE 5.0 Project Planning & Design: Building Systems, Materials, and Assemblies - HVAC Principles Black Spectacles ARE PPD Study Materials: Forced Air Heating and Cooling Systems The Architect's Handbook of Professional Practice, 15th Edition, Chapter 13: Mechanical Systems and Indoor Environmental Quality

#### NEW QUESTION # 54

A new gallery is being built and requires shading elements to protect the light-sensitive artwork on display.

Which of the following are design criteria relevant to the design of shading components on the west facade of the new gallery?

Check the three that apply.

- **A. Solar Heat Gain Coefficient of the west glazing**
- B. Low-E glazing on the west facade
- **C. Height of the west gallery wall**
- D. Survey of adjacent building heights
- E. Annual temperature data
- **F. Spacing and depth of vertical louvers**

**Answer: A,C,F**

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

For shading design on west facades:

Height of the wall (A): Determines the scale and proportion of shading devices.

Solar Heat Gain Coefficient (SHGC) of glazing (C): Influences how much solar radiation passes through windows.

Spacing and depth of vertical louvers (D): Controls shading effectiveness against low-angle afternoon sun.

Low-E glazing (E) helps but is glazing performance, not shading design.

Annual temperature (B) is climatic but less directly relevant.

Adjacent building heights (F) influence shading from surroundings but are secondary.

References:

ARE 5.0 PPD - Environmental Conditions and Context, Solar Control

The Architect's Handbook of Professional Practice, 15th Edition - Sustainable Design

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### NEW QUESTION # 55

An architect is working with a developer to determine which of three available sites should be the preferred location for a new office building that will primarily utilize passive energy systems. All three sites are located in a cold, northern climate with winter winds predominantly from the north and west.

Site descriptions:

Site A: Located at the top of a hill; small vegetation and brush; expansive views in all directions.

Site B: Located along a river; heavily wooded area on the north side; coniferous trees shading the southern face of the building.

Site C: Located on a rocky, south-facing slope; wooded on the eastern edge; native grasses on southern boundary.

Primary goal: maximize solar energy potential while maintaining winter wind protection.

Which site should be selected?

- A. Site B
- **B. Site C**
- C. Site A

**Answer: B**

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

Site C offers a south-facing slope, which maximizes solar exposure-crucial in cold climates for passive solar heating. The wooded eastern edge provides wind protection from cold morning winds, and native grasses on the south reduce erosion while minimally shading.

Site A, on a hilltop with sparse vegetation, lacks wind protection.

Site B has coniferous trees shading the southern face, reducing solar gain, which is counterproductive for passive solar design.

Thus, Site C optimizes both solar potential and wind protection.

References:

ARE 5.0 PPD - Environmental Conditions and Context, Passive Solar Design The Architect's Handbook of Professional Practice, 15th Edition - Sustainable Site Planning

### NEW QUESTION # 56

An architect is commissioned to design a lodge in a location where the water service is insufficient for a sprinkler system. The architect plans to maximize sight lines by using exposed columns and roof structure in the primary assembly space.

Which of the following systems meet these requirements? Check the three that apply.

- A. 3" light gauge steel columns with 6" "Z" purlins and 28 gauge corrugated metal decking
- **B. 12" diameter peeled log columns with glulam beams and 4" wood decking**
- **C. 6 x 6 cedar columns with 6" light gauge "Z" purlins and fire retardant treated plywood decking**
- D. 6" precast concrete columns, beams, and 8" precast concrete planks
- E. 8" cast-in-place concrete columns and beams and 8" precast planks
- **F. 6" diameter steel columns with open web girders and joists**

**Answer: B,C,F**

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

When designing in locations with insufficient water service to support sprinkler systems, architects must rely on inherently fire-

resistant materials or assemblies that can provide passive fire protection while also meeting the aesthetic and structural needs of the space. This is especially critical in assembly spaces where sight lines are important and exposed structure is desired.

\* Option A: Steel columns with open web girders and joists are acceptable because steel does not combust and can be designed for fire resistance either by inherent fireproofing or applied fireproofing.

The open-web design also supports maximizing sight lines by minimizing visual obstruction.

\* Option B: Large peeled log columns with glulam beams and wood decking are commonly used in lodge designs. Although wood is combustible, large timber members like glulam beams char on the surface and maintain structural capacity for a predictable duration under fire conditions, which often meets code for exposed timber in assembly spaces without sprinkler systems.

\* Option F: Cedar columns with light gauge steel purlins and fire retardant treated plywood decking can be suitable where fire retardant treatment extends the fire resistance of wood members. This is an accepted strategy in areas lacking sprinkler protection, particularly for visual warmth and compatibility with lodge aesthetics.

\* Options C and D: Concrete columns and beams are noncombustible but tend to be bulky and can obstruct sight lines.

Additionally, precast planks with concrete may not fit the desired exposed wood or open aesthetic.

\* Option E: Light gauge steel columns with corrugated metal decking are lightweight and minimal, but

3" steel columns are structurally insufficient for large assembly spaces and metal decking without proper fireproofing is less common in exposed wood aesthetic projects.

These design choices align with NCARB's Project Planning & Design content regarding material selection for fire resistance, visual requirements, and assembly occupancy considerations. Specifically, the guidelines recommend using heavy timber, fire-retardant-treated wood, or protected steel systems where sprinkler systems are not feasible to comply with fire and life safety codes while addressing architectural intent.

References:

ARE 5.0 PPD Content Outline: Building Systems, Materials, and Assemblies (NCARB) The Architect's Handbook of Professional Practice, 15th Edition, Chapter 13: Building Codes, Standards, and Regulations NCARB ARE 5.0 Guidelines: Fire Protection and Material Performance in Assembly Spaces

### NEW QUESTION # 57

An architect is designing a multistory student housing project to be built of light wood framing. The following criteria must be met:

Minimize the floor assembly thickness

Maximize ceiling height

No individual HVAC room controls

No exposed ductwork

Which HVAC system should be selected for this project?

- A. Variable air volume (VAV)
- **B. Four-pipe fan-coil system**
- C. Packaged terminal units (PTAC)

**Answer: B**

Explanation:

For multistory residential buildings such as student housing with light wood framing, HVAC system selection must balance space constraints and occupant comfort. The requirement to minimize floor thickness and maximize ceiling height typically rules out bulky ductwork or ceiling-mounted systems.

Packaged Terminal Air Conditioners (PTACs) provide individual room control and require wall penetrations, conflicting with the "no individual HVAC room controls" and likely leading to more complex maintenance.

Variable Air Volume (VAV) systems typically require extensive ductwork and ceiling space, contradicting the goal to minimize floor thickness and eliminate exposed ductwork.

The Four-pipe fan-coil system is an efficient choice for this application: it uses small fan coil units within the ceiling or wall cavities with chilled and hot water supply pipes running vertically. This system minimizes the thickness of mechanical floors and allows centralized control rather than individual room controls. The fan coil units can be concealed, addressing the "no exposed ductwork" criterion.

This approach aligns with NCARB's guidance on HVAC system selection for multifamily and residential occupancies where ceiling height and floor thickness are critical constraints, and centralized control systems are preferred for ease of maintenance and energy management.

References:

ARE 5.0 PPD Study Guide - Building Systems and Assemblies

The Architect's Handbook of Professional Practice, 15th Edition - Mechanical Systems NCARB Guidelines on HVAC Systems for Residential Buildings

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