A PDF of presentation can be downloaded at YoungArchitect.com/AIAPortlandBDCS and you can also find links to everything mentioned.
BIO: Michael Riscica

• Grew up in the Beaverton and Gresham’s of New York City.

• Graduated 2007 from the New York Institute of Technology with a BARCH

• Immediately after graduation bicycled across the country from Bar Harbor, Maine to Portland Oregon to start a new life.

• Worked for Merryman Barnes Architects from 2007 – 2011, working on many projects for the City of Portland during the recession.

• 2011 was hired by the City of Portland as a Capital Improvement Project Manager, still there today.

• Became an Oregon Licensed Architect December 13th 2013

• January 2014 started the blog YoungArchitect.com and began writing about architecture and the ARE’s
Young Architect

A website for
Architecture students
ARE Candidates
Young Architecture Professionals

YoungArchitect.com/ARE
has links to everything I ever wrote about the Architect Exam.
How To Pass the Architecture Registration Exam is not another study material book.

It examines:

• What is the ARE and how to wrap your head around it.
• Is taking the ARE even right for you?
• How to use all the study material.
• Dealing with failure
• How to mentally think about the ARE.
• Understanding how you learn.
• How to break down multiple choice questions.
• Things to consider on testing day
• How to survive the long haul commitment of getting through 7 exams.
• Finishing the process and becoming licensed.
How far along in the ARE’s are you?
Michael Riscica

BIO: Michael Riscica – ARE Story

- Took first test April 2009, in the middle of the ARE 3.1 to ARE 4.0 transition.
- Failed 4 exams
- Took an almost 2 year break, stupid decision.
- Spent entire 2013 studying and taking 4 ARE’s. Nothing else happened in 2013 besides the architect exam.

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BDCS AIA Portland – Young Architect.com
Recent ARE News

New Study Materials

• Architect Exam Prep
• ARE Advisor
• Gang Chen
• Ultimate lists of ARE prep
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IDP Hours Reduced
• NCARB Shaved 1 year off IDP Hours from 5,600 to 3,740 hours—Except the Oregon Board of Architect Examiners did not adopt. – May 17th hearing in Salem. Good luck!
The AIAS Pass Scholarship supports those on the path to architectural licensure to make a plan and get started!

$1,726 USD raised by 12 people in 26 days

3% funded, 34 days left

Your contribution: $5, $10, $100

CONTRIBUTE NOW

SELECT A PERK

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# Building Design & Construction Systems

## Overview

### Division Statement

The application of knowledge and skills of building design and construction, including environmental, social, and economic issues, project and practice management.

### Content Areas

<p>| | |</p>
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| 1. | **PRINCIPLES**
|   | (27-33 percent of scored items) |
| 2. | **ENVIRONMENTAL ISSUES**
|   | (6-9 percent of scored items) |
| 3. | **CODES & REGULATIONS**
|   | (10-13 percent of scored items) |
| 4. | **MATERIALS & TECHNOLOGY**
|   | (43-49 percent of scored items) |
| 5. | **PROJECT & PRACTICE MANAGEMENT**
|   | (4-7 percent of scored items) |

### Vignettes

- **ACCESSIBILITY/RAMP**
  Design a ramp and stairway connecting two levels that complies with accessibility and code requirements

- **STAIR DESIGN**
  Design a stairway connecting multiple levels that complies with accessibility and code requirements

- **ROOF PLAN**
  Design a sloped-roof plan for the removal of rainwater and locate accessories and equipment.
The division has been broken down into a listing of knowledge and skills directly related to each major content area.

1. **PRINCIPLES**  
   (27-33 percent of scored items)

   A. Incorporate the implications of human behavior, historic precedent, and design theory in the selection of systems, materials, and methods related to building design and construction.

   1. **Building Design**  
      Analyze and evaluate those tasks, procedures, and methodologies influencing building design during schematic design and design development, including building systems and materials.

   2. **Design Principles and Design Impact on Human Behavior**  
      Analyze and evaluate design principles that influence human behavior in the built environment.

   3. **Building Systems and their Integration**  
      Analyze, evaluate, and integrate appropriate building systems considering design and engineering principles.

   4. **Implications of Design Decisions**  
      Evaluate how decisions made in schematic design and design development, relating to orientation, area, materials, cost, code, sustainability, and/or phasing, impact later phases of design, construction, and building use.

   5. **Space Planning and Facility Planning/Management**  
      Utilize principles of space planning and facility planning/management.

   6. **Fixtures, Furniture, Equipment, and Finishes**  
      Evaluate and select fixtures, furniture, equipment, and finishes and determine the impact on building design.

2. **ENVIRONMENTAL ISSUES**  
   (6-9 percent of scored items)

   A. Consider the principles of sustainable design including adaptive re-use, thermal and moisture protection, and hazardous material mitigation.

   1. **Hazardous Conditions and Materials**  
      Survey and reconcile hazardous conditions and materials relating to building and site.

   2. **Indoor Air Quality**  
      Determine and assess factors that affect indoor air quality.

   3. **Sustainable Design**  
      Evaluate and apply principles of sustainability relating to building materials and construction.

   4. **Natural and Artificial Lighting**  
      Evaluate and apply natural and artificial lighting principles and their application to design and construction.

   5. **Alternative Energy Systems and New Material Technologies**  
      Select and evaluate emerging and alternative systems and new material technologies.

7. **Adaptive Reuse of Buildings and/or Materials**  
   Evaluate constraints, issues, methodologies, programmatic concerns and cost impacts associated with adaptive reuse of buildings and materials.

8. **Architectural History and Theory**  
   Apply architectural history, precedent, and theory to building design.
CODES & REGULATIONS
(10-13 percent of scored items)

A. Incorporate building and specialty codes, zoning, and other regulatory requirements in building design and construction systems.

1. Government and Regulatory Requirements and Permit Processes
   Demonstrate comprehension of building codes and planning requirements and assess their effect on building design.

2. Specialty Codes and Regulations including Accessibility Laws, Codes and Guidelines
   Demonstrate comprehension of specialty codes and guidelines, such as accessible design, seismic code, life safety, and fair housing requirements, and assess their effect on building design.

4. MATERIALS & TECHNOLOGY
(43-49 percent of scored items)

   Analyze the implication of design decisions in the selection of systems, materials, and methods incorporated in building design and construction.

A. MASONRY
   Identify the properties and characteristics of masonry structures and finish materials.

1. Building Systems and their Integration
   Analyze characteristics of masonry systems and materials and their appropriate integration into building design.

2. Implications of Design Decisions
   Evaluate the selection of masonry components to determine their effects on design, cost, engineering, and/or scheduling.

3. Construction Details and Constructability
   Demonstrate comprehension of masonry details and their application in building design and construction.

4. Construction Materials
   Determine the appropriate use of masonry in building design and construction.

5. Product Selection and Availability
   Evaluate and prioritize the selection of masonry systems, materials, and availability.

   Demonstrate knowledge of cost estimating, value engineering, and lifecycle costing related to masonry.

7. Thermal and Moisture Protection
   Assess the use of masonry components in thermal and moisture protection.
B. METALS
Identify the properties and characteristics of structural and miscellaneous metals.

1. Building Systems and their Integration
   Analyze characteristics of metal systems and materials and their appropriate integration into building design.

2. Implications of Design Decisions
   Evaluate the selection of metal components to determine their effects on design, cost, engineering, and/or scheduling.

3. Construction Details and Constructability
   Demonstrate comprehension of metal details and their application in building design and construction.

4. Construction Materials
   Determine the appropriate use of metal in building design and construction.

5. Product Selection and Availability
   Evaluate and prioritize the selection of metal systems, materials, and availability.

   Demonstrate knowledge of cost estimating, value engineering, and lifecycle costing related to metal.

7. Thermal and Moisture Protection
   Assess the use of metal components in thermal and moisture protection.

C. WOOD
Identify the properties and characteristics of wood structures, rough carpentry, finish carpentry, and millwork assemblies.

1. Building Systems and their Integration
   Analyze characteristics of wood systems and materials and their appropriate integration into building design.

2. Implications of Design Decisions
   Evaluate the selection of wood components to determine their effects on design, cost, engineering, and/or scheduling.

3. Construction Details and Constructability
   Demonstrate comprehension of wood details and their application in building design and construction.

4. Construction Materials
   Determine the appropriate use of wood in building design and construction.

5. Product Selection and Availability
   Evaluate and prioritize the selection of wood systems, materials, and availability.

   Demonstrate knowledge of cost estimating, value engineering, and lifecycle costing related to wood.

7. Thermal and Moisture Protection
   Assess the use of wood components in thermal and moisture protection.
D. CONCRETE
Identify the properties and characteristics of concrete structures and finishes.

1. Building Systems and their Integration
   Analyze characteristics of concrete systems and materials and their appropriate integration into building design.

2. Implications of Design Decisions
   Evaluate the selection of concrete components to determine their effects on design, cost, engineering, and/or scheduling.

3. Construction Details and Constructability
   Demonstrate comprehension and application of concrete details and their use in building design and construction.

4. Construction Materials
   Determine the appropriate use of concrete in building design and construction.

5. Product Selection and Availability
   Evaluate and prioritize the selection of concrete systems, materials, and availability.

   Demonstrate knowledge of cost estimating, value engineering, and lifecycle costing related to concrete.

7. Thermal and Moisture Protection
   Assess the use of concrete components in thermal and moisture protection.

E. OTHER
Identify the properties and characteristics of miscellaneous systems, assemblies, membranes, claddings, coatings, and finish materials (e.g., plastics, composites, glass, tensile, pneumatic, EIFS, etc.).

1. Building Systems and their Integration
   Analyze the relationship of building systems and materials (other than masonry, metal, concrete, and wood) and their appropriate selection and integration into building design.

2. Implications of Design Decisions
   Evaluate the selection of building components (other than masonry, metal, concrete, and wood) to determine their effects on design, cost, engineering, and/or scheduling.

3. Construction Details and Constructability
   Demonstrate comprehension of the relationship of building systems and materials (other than masonry, metal, concrete, and wood) and their use in building design and construction.

4. Construction Materials
   Determine the appropriate use of building systems and materials (other than masonry, metal, concrete, and wood) in building design and construction.

5. Product Selection and Availability
   Evaluate and prioritize the selection of building systems and materials (other than masonry, metal, concrete, and wood) and availability.

   Demonstrate knowledge of cost estimating, value engineering, and lifecycle costing related to building systems and materials (other than masonry, metal, concrete, and wood).

7. Thermal and Moisture Protection
   Assess the use of building systems and materials (other than masonry, metal, concrete, and wood) in thermal and moisture protection.
F. SPECIALTIES
Analyze and select accessories, equipment, and fittings.

1. Building Systems and their Integration
Analyze the relationship of accessories, equipment, and fittings and their appropriate selection and integration into building design.

2. Implications of Design Decisions
Evaluate the selection of accessories, equipment, and fittings to determine their effects on design, cost, engineering, and/or scheduling.

3. Construction Details and Constructability
Demonstrate comprehension of the relationship of accessories, equipment, and fittings, details and their application in building design and construction.

4. Construction Materials
Determine the appropriate use of accessories, equipment, and fittings in building design and construction.

5. Product Selection and Availability
Evaluate and prioritize the selection of accessories, equipment, and fittings and availability.

Demonstrate knowledge of cost estimating, value engineering, and lifecycle costing related to accessories, equipment, and fittings.

7. Thermal and Moisture Protection
Assess the use of accessories, equipment, and fittings in thermal and moisture protection.

5. PROJECT & PRACTICE MANAGEMENT
(4-7 percent of scored items)

A. Determine the impact of construction sequencing, scheduling, cost, and risk management on selection of systems, materials, and methods.

1. Construction Sequencing
Evaluate the selection of systems, materials, and methods and their impact on construction sequencing.

2. Cost Estimating, Value Engineering, and Life-Cycle Costing
Demonstrate comprehension of cost estimating, value engineering, and lifecycle costing methods and principles.

3. Project Schedule Management
Demonstrate comprehension and use of project scheduling, staffing projections, contracts, and project management principles.

4. Risk Management
Apply risk management principles and demonstrate methods of conflict resolution.
NCARBS blog post this week:

- Almost half the questions on this division cover building materials: how they're used and how they coordinate with other materials. But don't forget about another big section—Principles. Be sure you understand the types of decisions that are made during the schematic design and design development phases of a project, the various factors to be considered, and the many implications of such decisions.

http://www.ncarb.org/sitecore/content/Blog/Blog/2015/April/ARE4-BDCS.aspx

NEVER DISCLOSE WHAT YOU SAW ON ANY EXAM.
It’s only 85 questions.
Tips For The MC

It’s only 85 questions.

Use the NCARB content areas to dictate what to study – Hit each one.
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Ballast takes it to the extreme
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  • Do 3 questions at a time.
  • Focus on the questions you get wrong.
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  • See YA article on flashcards

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BDCS is the perfect test for flashcards
• See YA article on flashcards

Study multiple sources
• See Ultimate list Part 2 BDCS
Tips For The Vignettes
Tips For The Vignettes

Start on vignettes before the MC
Tips For The Vignettes

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Understand the vignettes inside and out before you take the exam
  • Stair vignette is one of the trickiest vignettes there is
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  • Dorf
  • ARE Advisor or Gang chen
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Make a chart
  • Ft – inches
  • Program
Chart

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Ramp design must do the following:

- Meet Egress widths
- Meet proper slope
- Size of landings and stairs
- Proper riser and treads
- Include a door with proper clearances
- Include guardrails and handrails with extensions
- And more!
Ramp

- Drawing in the Ramps (Continued)

Ramp: x: 5'-0" y: 12'-0"

- Continue to draw in the remaining length of ramp that you need to hit the floor level.

- In this case, you only need 12 linear feet of ramp in order to reach the Lobby level with the 0'-0" elevation. Fortunately, the west wall of the Lobby is 13'-0" long (from the edge of the landing) so you have sufficient space for the ramp design.

- If you did not have enough room to complete the U-shape, you would have needed to design a switchback ramp until you could reach 12 linear feet of ramp.

- Once all of your ramps are in place, go back and make sure that you have set the elevations of each landing. Compare the elevations to the linear feet of ramp between them.
13 – Final Check

- Time permitting, go back and check your final design for possible Programmatic and Code violations.
- Verify that your path of egress width does not narrow in any locations, specifically at the bottom of the stair.
- Use the "Check" tool to determine if there are any overlapping elements in your drawing.
- Use the "ID" tool to quickly select and object in order to view its properties. This is a good idea if you want to double-check the length and widths of ramps or landings.
- Take a little bit of time to check these items but be careful not to waste too much time since you have 3 vignettes to complete in a certain amount of time for the BDCS vignettes.
Stair

From a plan view only Stair design must do the following:

- Indicate the floor height of all landings
- Indicate elevations of stair flights
- Indicate proper riser and tread sizes
- Show guardrails, handrails and extensions.
- Show Area of Refuge
- Provide minimum stair width for occupant load
- And more!
A Step-By-Step Walkthrough of the Vignette
(Stair Design)

1. Reviewing the Background Plans

- Remember, all of the tips and steps that relate to the Program and Code are specific to this vignette only. You will need to check the Program and Code that is given to you on your actual exam to make sure that you are following everything.

- You will be provided with 2 background floor plans: one for the ground floor and the other for an upper floor.

- Pay close attention to the elevation changes between the levels! In most cases, there will even be an Intermediate level that you will have to pay attention to.

- Depending on the Program and the background plans, the stair that you design will need to connect all 3 levels together.

- In this case, notice the Janitor elevation is 1'-9" higher than the Lobby, Stairwell and Sidewalk.

- Note the Path of Egress to the stairwell! Having an idea of how people will exit the stairwell now will help you later when you’re laying out your stair design.

Stairwell EL: 0'-0" (0 mm)
Sidewalk
GROUND FLOOR PLAN
‘Determining the Minimum Stair Width’ (Continued)

3. CAPACITY OF EXIT COMPONENTS

The total occupant loads and number of exits for each level of the building are as follows:

<table>
<thead>
<tr>
<th>Building Level</th>
<th>Total Occupant Load</th>
<th>Number of Exits</th>
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<tbody>
<tr>
<td>Ground Floor</td>
<td>360</td>
<td>3</td>
</tr>
<tr>
<td>Janitor</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Second Floor</td>
<td>180</td>
<td>2</td>
</tr>
</tbody>
</table>

- The final factor you need to determine relates to the Occupant Load at EACH floor level multiplied by a factor listed in the Code. For example, take the Occupant Load of the first floor (360) and divide it by the number of exits (3). Then take that number and multiply it by 0.3 (given in step #2 of the code). This number would be the Minimum Stair width required at the ground floor. You need to calculate the Occupant Load at each level because your stair width requirement may change depending on what level you are on.
  - Ground Floor - (360/3)(0.3) = 36
  - Janitor - (9/3)(0.3) = 2.7
  - Second Floor - (180/2)(0.3) = 27

- In this case, none of these stair minimums would govern over either of the other 2 determining factors (44” in Factor #1 and 56” in Factor #2). In some cases, this factor may govern so it’s important to note that you need to calculate the width at ALL levels. See how the stair width requirement could vary depending on the level? Pay attention to this on the exam.

- To conclude the thoughts on determining Minimum Stair Widths, you need to determine your width before you start laying out your stair design. To do this, compare all 3 determining factors to figure out which width is the LARGEST (in our example, we will use 56” from the Area of Refuge factor to use as our Minimum Stair Width).

- Again, please keep in mind that a different factor may govern on your actual exam so it’s important to familiarize yourself with how to determine your width.
Before drawing in the final run of stairs that will complete the stair design, it’s important to take a step back and review what you’ve drawn so far.

The biggest item to check is to make sure your stairs and landings are drawn on the appropriate layers.

This will become important because in the next step, the “Cut Stair” tool will be introduced, which will basically allow you to “connect” your two plans.

The Cut Stair tool is specifically designed to help you draw and design switchback stairs, but it should be used in your solution REGARDLESS of if you “need” it or not.

In this solution, the Cut Stair tool would not necessarily be needed because all stair elements are visible from one plan (nothing overlaps). Nonetheless, the Cut Stair tool should be used to break floor plans at the 4'-0" elevation and connect the two plans together.
Roof

From a plan view only Roof design must do the following:

- Provide proper drainage, especially around chimney
- Show window and account for the sill and head height in roof planes.
- Place HVAC Unit on roof
- Show downspouts
- Indicate flashing location at roof penetrations
- And more!
2 - Drawing in the Low Roof

- The key to this vignette is making sure you have the most efficient solution possible by working on the lower roof first before working on the high roof. This will keep you from over-designing your solution.

- Using the "Roof Plane" tool, draw in the outline of your lower roof.

- There are multiple solutions that can be accepted in this example. It's typically a good idea to keep your roof orthogonal and avoid diagonal lines, but in this solution, a ridge at the corner is used.

- The low roof is drawn in 2 different pieces. This will allow you to adjust the slope orientation of each piece individually in the next several steps.
9 - Adding in the Clerestory Window

Now that you’ve drawn in the roof planes, set the slopes and the elevations, you can begin to add the secondary elements to your roof plan.

By this point in the process, you’ve done most of the “design” work. The rest of the items you need to add are simply needed to satisfy the requirements of the Program.

Use the “Clerestory” tool to draw in your clerestory window along the west wall of the high roof (Per the Program so check the Program on the actual exam).

The element you draw is literally a line with a fixed length so you don’t need to worry about setting the length (See the yellow line).

When you place the clerestory, make sure you align it in the CENTER of the wall that it needs to be placed in (West wall in this case).
Questions??!

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