

# ExAC 2024 Preparation Guide

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# Introduction

The purpose of the Examination for Architects in Canada (ExAC) is to assess Candidates' competencies acquired during their internship period. It is one of the steps in the process of admission to the profession and part of protecting public safety and promoting the skilled delivery of architectural services. The ExAC has been adopted by all of the architect licensing authorities in Canada, and is administered once per year simultaneously across the country, in English and in French.

This guide is for Candidates who have registered for the ExAC. It presents an overview of the content of the exam, provides practical advice for successful completion, and outlines the rules to be followed during the exam.

Information about eligibility for the ExAC, registration, accommodation requests, reporting of the results, and the conditions for retaking the exam may be found on the [exac.ca](https://exac.ca) website.

If you have specific questions about the exam, please read the ***Frequently Asked Questions*** list on [exac.ca](https://exac.ca) or contact your licensing authority's ExAC administrator.

Good luck to all Candidates!

The ExAC team

# Content of the Examination

## Sections

The ExAC is composed of four sections covering the following topics:

SECTION 1	SECTION 3
<ul style="list-style-type: none"><li>• Programming</li><li>• Site and Environmental Analysis</li><li>• Coordinating Engineering Systems</li><li>• Cost Management</li><li>• Schematic Design</li><li>• Design Development</li></ul>	<ul style="list-style-type: none"><li>• Final Project</li><li>• Sustainable Design Literacy</li></ul>
SECTION 2	SECTION 4
<ul style="list-style-type: none"><li>• National Building Code of Canada</li></ul>	<ul style="list-style-type: none"><li>• Bidding and Contract Negotiations</li><li>• Construction Phase – Office Functions</li><li>• Construction Phase – Field Functions</li><li>• Management of the Project &amp; Business/Practice Management</li></ul>

## General and Specific Objectives

The ExAC questions are based on the General and Specific Objectives listed in **Appendix 1** of this guide. The objectives are aligned with the experience requirements of the Internship in Architecture Program and generally selected in proportions similar to the minimum hours required in the correlated categories included in the Internship in Architecture Program's architectural experience requirements.

## Types of Questions

The ExAC questions are of the following types:

- Multiple choice
- Pairing/matching of components
- Ordering of elements
- Completion of sentences / Fill in the blank
- Short answers

Sample questions are provided in **Appendix 2**.

## Reference Documents

The intent of the ExAC is to assess Candidates' competencies acquired during their internship period. There are many helpful resource documents, which Candidates are strongly encouraged to consult. The primary reference documents are those that help in professional practice and with Intern experience. These documents include:

- The *Canadian Handbook of Practice for Architects* (CHOP), 2020 edition
- The Internship in Architecture Program (IAP)
- The *National Building Code of Canada* (NBC), 2015 edition (without the provincial adaptations)
- The *National Energy Code of Canada for Buildings* (NECB) 2020

A full list of additional reference documents is provided in **Appendix 3 – References and Resources**.

# Exam Format

## Pencil and Paper

The ExAC is a pencil-and-paper exam. Only HB pencils may be used on the answer sheet. You are responsible for ensuring that you use the proper pencil grade. If any other is used, correction of the exam may not be possible.

## Choice of Language

When you register, you will select either English or French as the language in which you will write the exam and in which materials and correspondence will be provided. You must be fluent in the language you choose. Dictionaries and/or translation devices are not permitted during the exam.

## Units of Measurement

The ExAC uses the metric (SI) system, but information provided for some questions may reference imperial units.

# Practical Tips

## How to Answer the Questions

**Read each question carefully and follow the instructions.**

Pay particular attention to terms that are in bold type or otherwise emphasized and answer exactly what is asked. For example, if the question states that your answer must contain two points, enter no more than two, and make sure to clearly differentiate them. If you provide more than two points, only the first two you've provided will be read or marked.

**Manage your time.**

If a question appears too difficult, don't waste time on it. Move on to the next question and come back to the other one later. Give priority to the questions that are worth more points. They are clearly identified.

**Write your answer in the space provided.**

Limited space is provided to answer each question. Answer concisely, and do not write beyond the lines in the booklet. Answers that extend beyond the lines or into the margins or that are written on the scratch paper will not be read or marked.

**Examples of acceptable answers:**

Calculations written on the lines provided.

$$\begin{aligned} 10 + 40 + 65 + 15 + 6 + 12 &= 248 \text{ m}^2 \\ 248 + (0,1 \times 248) &= 248 + 24,8 = 272,8 \text{ m}^2 \\ 400\,000 \$ \div 272,8 \text{ m}^2 &= 1466,27 \$/\text{m}^2 \\ \text{Le budget du client est de } &1466,27 \$/\text{m}^2 \end{aligned}$$

Answer written on the lines provided.

Accumulation of water at the foot of the foundation, which could lead to infiltration between the footing and the slab

**Examples of answers that would be rejected:**

Calculations extending beyond the lines provided.

$$\frac{10 + 140 + 65 + 15 + 6 + 12 + (10\% \times 10 + 140 + 65 + 15 + 6 + 12)}{248 + 24.8} = 272.8$$

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Calculations written entirely outside the lines provided.

Using the following program, what is the customer's budget, per square metre, for the construction of a restaurant in Winnipeg?

Entrance hall / reception:	10m <sup>2</sup>	} 248 m <sup>2</sup>
Dining room:	140 m <sup>2</sup>	
Kitchen:	65m <sup>2</sup>	
Cold storage:	15m <sup>2</sup>	
Garbage room:	6m <sup>2</sup>	
W.C.:	12m <sup>2</sup>	
Circulation, walls, partitions:	10% → 24.8 m <sup>2</sup>	
Construction budget: 400 000\$	% 272.8 m <sup>2</sup>	= 1466.27\$/m <sup>2</sup>

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Two lines written per single-line space allocated.

In the event of the water table rising, this situation could cause water to accumulate at the foot of the foundation, resulting in hydrostatic pressure on the slab.

**Answer the sub-questions in the spaces provided.**

When a question is broken down into sub-questions, you must write your answer to each sub-question in the corresponding answer space.



**Show your calculations.**

Where a question requires calculations, points are awarded for each step leading to the answer. Show all steps of your work in the space allocated, even the simplest calculations (e.g., additions).

**Answer all of the multiple-choice questions.**

A blank space will be considered an incorrect answer.

**Write carefully.**

Make sure your handwriting is legible; this will assist the marker in correcting the exam. If they cannot read your handwriting, they will not be able to award any points.

**Answer clearly.**

The marker will simply read and correct what you have written; they will not interpret your answer. Please structure your answer in a concise manner that provides the answer clearly.

**Erase rather than crossing out.**

If you need to correct something in an answer, erase it instead of crossing it out. This will help you answer the question in the space allotted.

# At the Exam

## Schedule

The ExAC is delivered in four three-hour sessions over two consecutive days. It is held regardless of weather conditions.

You are responsible for arriving in accordance with the instructions provided in your invitation.

You must arrive 30 minutes before the start of the exam to allow for administrative procedures.

## Absences

No refund will be provided if you are absent and fail to show up for the exam for any reason. If you cannot attend, you must follow the registration cancellation procedure as outlined on the [exac.ca](https://www.exac.ca) website.

## Late arrivals

The first minutes of the exam are used to provide instructions to writers; no entry or exit from the room will be permitted during this time. Late entry will be permitted only within the first 30 minutes after the exam begins. No additional time to complete the exam will be granted if you arrive late.

## Welcome and Identification

An exam supervisor/invigilator will verify your identity before admitting you to the examination room. You must provide them with:

- Official photo identification (ID) with signature (e.g., passport, driver's licence, citizenship card)
- Your Letter of Authorization to write the ExAC

If you do not show these documents, you will not be permitted to write the exam.

A supervisor/invigilator will visually verify whether you are the person depicted on the ID photo.

## Permitted Items

### For All Sections of the Exam

- **Calculator**
  - > Only basic (non-programmable, non-communicating, and non-printing) calculators are allowed. Your calculator must not have the capacity to store, send or receive data such as text or formulas.
  - > A supervisor/invigilator may note the type of calculator you use and, if they deem it to be non-compliant, file an incident report.
- **Personal items**
  - > “Personal items” means wallets/billfolds, purses/handbags, briefcases, backpacks and electronic devices, including but not limited to portable music players, smartphones, tablets, smart watches, and laptops.
  - > You may take such items into the examination room, but you must stow them under the desk/table.
  - > Electronic devices must be turned off and placed in a purse/handbag, backpack, or briefcase. You may not use any such device during the exam or during breaks (e.g., if you need to use the bathroom).
  - > You may not access any of your personal items unless authorized to do so by a supervisor/invigilator. Unauthorized accessing or use of a personal item will result in an incident report being filed and, potentially, in your examination results being invalidated.
- **Beverages**
  - > The only beverages allowed in the examination room are water, coffee and tea.
  - > If you wish to consume another type of beverage during the exam, you must make an accommodation request (see instructions on the [exac.ca](https://www.exac.ca) site).
- **Tissues**
  - > Paper tissues must be kept in their transparent packaging or a transparent plastic bag.
- **Foam or rubber earplugs (non-electronic)**
  - > You are responsible for using earplugs in a way that does not interfere with your ability to hear instructions provided verbally during the examination.
- **Watch or silent travel clock**

- **HB pencils, eraser, small pencil sharpener, small ruler**
  - > If these items are in a pencil case, it must be transparent.

## **For Section 2 – *National Building Code of Canada (NBC)* and *National Energy Code of Canada for Buildings (NECB)***

- Paper copies of the *National Building Code of Canada*, 2015 edition, without the provincial adaptations and the and the *National Energy Code of Canada for Buildings*, 2020 edition
  - > If you use any other building code, you do so at your risk.
  - > You are responsible for ensuring that your copy of these documents does not violate the Copyright Act of Canada. If you use a printout of the PDF version(s), you must have the appropriate licence(s).
  - > Your copies may contain handwritten annotations and may be tabbed.
  - > You are not permitted to add pages, e.g., containing an index, table, or references. Any added pages may be confiscated by the supervisor/invigator.
  - > While in the examination room, you are not permitted to make any annotation or mark of any kind in your copies.

## **Prohibited Items**

- **Dictionaries, including bilingual dictionaries** (you must be fluent in the language in which you have chosen to write the exam)
- **Books, notes, or reference documents**
- **Scratch paper** (it will be provided onsite)
- **Headphones or earbuds, whether wired or wireless**
- **Food or candy** (unless approved through an accommodation request; see instructions on the [exac.ca](https://www.exac.ca) site).

The exam supervisors/invigators reserve the right to confiscate any materials or documents that are non-compliant with the stipulations in this guide.

## Candidate Conduct

### Confidentiality Agreement

You must sign the Confidentiality Agreement included with the ExAC registration form, which states that you are forbidden from reproducing or disclosing the nature and contents of the exam.

### Code of Conduct

All Candidates writing the exam are expected to conduct themselves in a professional manner. During the exam session, you must obey the following rules, which exist to safeguard the integrity of the examination process:

- You must remain in your assigned seat, unless authorized to leave it by a supervisor/invigator.
- You must wait for the signal before starting to make marks on the multiple-choice answer sheet or write in the short-answer booklet, and stop when instructed that time is up.
- You may leave the examination room only to use the bathroom or to take a break for health reasons. In the latter case, you must have received prior approval through an accommodation request (see the [exac.ca](https://www.exac.ca) site), and a supervisor/invigator must accompany you.
- If you need additional scratch paper, or want to request permission to leave (e.g., for a bathroom break), you must raise your hand.
- You are forbidden from communicating, in any manner whatsoever, with any other Candidates or with anyone outside the examination room.
- You may not leave the examination room during the final 30 minutes of the exam.
- At the conclusion of the exam, you must wait for all materials to be collected before leaving the examination room. No portion of the ExAC—the multiple choice question booklet, the appendixes, the answer sheets or booklet, the scratch paper, or the envelope—may be copied or removed from the examination room.

*See also the sections Permitted Items and Prohibited Items.*

The ExAC supervisors/invigilators are tasked with observing and monitoring Candidates' behaviour during the examination.

In the event of suspected misconduct during the examination, the Candidate will be permitted to complete the examination, but an incident report will be filed with the Committee for the ExAC.

Cheating or misconduct may result in response(s) from the Committee for the ExAC, which may include:

- Issuing of a formal written warning
- Suspension of future ExAC privileges pending resolution of the matter
- Invalidation of the exam results
- Legal proceedings

# Appendix 1 – List of General and Specific Objectives

## 1. PROGRAMMING

### 1.1. Understand the process involved in developing an architectural program

- 1.1.1. Identify the components of an architectural program.
- 1.1.2. Describe the process involved in developing an architectural program.

### 1.2. Analyze an architectural program

- 1.2.1. Analyze an architectural program from the point of view of project constraints and opportunities.
- 1.2.2. Analyze the program from the point of view of the site components.
- 1.2.3. Analyze the program from the point of view of the proposed budget.
- 1.2.4. Analyze the program from the point of view of the client's objectives.
- 1.2.5. Analyze the program from the point of view of the spatial requirements.
- 1.2.6. Analyze the program from the point of view of sustainable design principles.

## 2. SITE AND ENVIRONMENTAL ANALYSIS

### 2.1. Understand the principles related to the siting of a project

- 2.1.1. Explain the physical, cultural and regulatory factors associated with site planning.
- 2.1.2. Explain urban design issues and planning processes that influence the design of a building on a specific site.
- 2.1.3. Identify strategies for addressing with environmental issues during the evaluation of a site.

### 2.2. Apply the principles of site design

- 2.2.1. Given a specific site, selected physical factors and design criteria, determine the site design options.
- 2.2.2. Apply the principles of grading and storm water management to site design.
- 2.2.3. Describe the relationship between the energy performance of a building, its placement on the site and the site design.
- 2.2.4. Describe impacts of universal accessibility on site design.

### 2.3. Analyze data relevant to the site for a project

- 2.3.1. Explain data obtained from environmental and engineering reports.
- 2.3.2. Explain data obtained from a land surveyor's drawing and a topographical map.
- 2.3.3. Compare site design solutions based on specific criteria.

## 3. COORDINATING ENGINEERING SYSTEMS (structural, mechanical, electrical, civil)

### 3.1. Understand engineering systems

- 3.1.1. Explain the principles and properties of the structural system (foundations, superstructure).
- 3.1.2. Explain the principles and properties of the mechanical system (plumbing, heating, ventilation, air conditioning, fire protection).
- 3.1.3. Explain the principles and properties of the electrical system (lighting, electricity supply and distribution, fire alarm system, security and communications systems).
- 3.1.4. Explain the principles and properties of the civil engineering system (drainage, water supply, infrastructure).

### 3.2. Analyze engineering systems and their impacts on the project

- 3.2.1. Analyze the advantages and limitations of structural systems.
- 3.2.2. Analyze the advantages and limitations of the mechanical systems.
- 3.2.3. Analyze the advantages and limitations of electrical systems.
- 3.2.4. Analyze the advantages and limitations of civil engineering systems.
- 3.2.5. Analyze the impact of the integration of the engineering systems on building performance.

### 3.3. Coordinate engineering systems documentation

- 3.3.1. Describe ways to coordinate with the consultants.
- 3.3.2. Identify the key stages at which coordination should occur.
- 3.3.3. Coordinate the engineering systems documentation with the architectural documentation.

## 4. COST MANAGEMENT

### 4.1. Understand the factors influencing cost

- 4.1.1. Identify the factors influencing cost.
- 4.1.2. Explain how these factors influence cost.

### 4.2. Evaluate costs

- 4.2.1. Evaluate the project cost in relation to the program and the conditions for completing the project.
- 4.2.2. Provide recommendations to a client on following a value analysis.

### 4.3. Compare the various cost estimating methods

- 4.3.1. Differentiate between cost estimating methods.

### 4.4. Apply estimating methods within the framework of a project

- 4.4.1. Identify the resources available for the preparation of a cost estimate.
- 4.4.2. Differentiate between construction costs, project costs and overall costs.
- 4.4.3. Apply the appropriate estimating method to a specific situation.



## 5. NATIONAL BUILDING CODE OF CANADA

### 5.1. Understand the scope and application of the National Building Code of Canada to the design, construction and occupancy of buildings

- 5.1.1. Identify the parts of the Code that apply to various building types.
- 5.1.2. Explain the Division B appendices and notes in Volume 1 and 2 of the Code.
- 5.1.3. Determine the scope and application of the standards which are referenced in the Code.

### 5.2. Apply the minimum standards of the National Building Code to a building governed by part 3 of Division B

- 5.2.1. Apply the classification and construction requirements to a building project.
- 5.2.2. Interpret the Code requirements concerning fire safety.
- 5.2.3. Interpret the Code requirements concerning floor area safety.
- 5.2.4. Interpret the Code requirements concerning barrier-free design.
- 5.2.5. Interpret the Code requirements concerning sound transmission.
- 5.2.6. Interpret the Code requirements concerning exits.
- 5.2.7. Interpret the Code requirements concerning health.

### 5.3. Apply the minimum standards of the National Building Code to a building governed by Part 9 of Division B which is in the construction documents phase

- 5.3.1. Apply prescriptive Code requirements concerning structural design.
- 5.3.2. Apply prescriptive Code requirements concerning safety.
- 5.3.3. Apply prescriptive Code requirements concerning health.
- 5.3.4. Apply prescriptive Code requirements concerning envelope design.

### 5.4. Understand the requirements for achieving design compliance using alternative solutions, as set out in Division A and in subsection 1.1.2 of Division B of the National Building Code

- 5.4.1. Identify the proper application of an alternative solution in a building design.
- 5.4.2. Identify Code objectives and their application.
- 5.4.3. Identify the functional statements associated with a Code requirement.
- 5.4.4. Identify the documents and information required to file an alternative design solution.

### 5.5. Apply the principles of the National Energy Code of Canada for Buildings (NECB)

- 5.5.1. Apply the NECB requirements to the design process for a project.
- 5.5.2. Apply the NECB requirements to the construction documents for a project.

## 6. SCHEMATIC DESIGN

### 6.1. Understand aspects of schematic design

- 6.1.1. Identify the information required for schematic design phase.
- 6.1.2. Determine the engineering services required at the schematic design phase.
- 6.1.3. Identify the documentation required to obtain the client's approval of the schematic design.
- 6.1.4. Explain the scope of the analysis of the building Code and of universal accessibility at the schematic design phase.
- 6.1.5. Explain the principles of sustainable design as they relate to schematic design.

## 7. DESIGN DEVELOPMENT

### 7.1. Understand aspects of design development

- 7.1.1. Identify the information required at the design development phase.
- 7.1.2. Determine the engineering services required at the design development phase.
- 7.1.3. Identify the documentation required to obtain the client's approval of the design development.
- 7.1.4. Describe the impact of the analysis of the building Code and of universal accessibility at the design development phase.
- 7.1.5. Describe the impact of sustainable design at the design development phase.

## 8. FINAL PROJECT

### 8.1. Be knowledgeable about construction materials and their properties

- 8.1.1. Choose the appropriate materials for a project.
- 8.1.2. Identify the properties of load-bearing materials (metal, wood, concrete, masonry).
- 8.1.3. Identify the properties of the main types of insulating materials.
- 8.1.4. Identify the properties of the main types of air, vapour, water barriers.
- 8.1.5. Identify the properties of the main types of finishing materials.
- 8.1.6. Identify the properties of fire resistance materials.
- 8.1.7. Identify the impact of materials and processes on health and the environment.

### 8.2. Understand construction principles and systems in order to be able to choose the most appropriate construction methods

- 8.2.1. Explain the principles of soil mechanics.
- 8.2.2. Describe foundation systems as they relate to soil types and conditions.
- 8.2.3. Explain the design principles for the building envelope and the functions of its components.
- 8.2.4. Explain the principles of acoustical design for a building.
- 8.2.5. Choose construction methods that are appropriate to specific criteria (cost, timing, durability, performance) and environmental conditions.

### **8.3. Evaluate assemblies and details**

- 8.3.1. Evaluate an acoustical assembly.
- 8.3.2. Evaluate a firestop assembly.
- 8.3.3. Evaluate a building envelope in relation to its thermal resistance.
- 8.3.4. Evaluate a building envelope in relation to moisture control.
- 8.3.5. Evaluate a building envelope in relation to its weathertightness.
- 8.3.6. Evaluate a building envelope in relation to its durability.
- 8.3.7. Evaluate a wood frame structural assembly.
- 8.3.8. Evaluate a building envelope in relation to its life cycle.

### **8.4. Understand the components of the construction documents**

- 8.4.1. Describe the contents of the project manual.
- 8.4.2. Describe the role of the project manual.
- 8.4.3. Describe the role of the working drawings.
- 8.4.4. List the main components of the working drawings.
- 8.4.5. Explain how the construction documents are related to each other.
- 8.4.6. Explain the different methods of specifying.

### **8.5. Understand the principles of specification writing**

- 8.5.1. Explain the connection between the MasterFormat and the National Master Specification (NMS).
- 8.5.2. Distinguish which divisions of the NMS are common or specific to each of the disciplines (architectural, structural, mechanical, electrical, etc.)
- 8.5.3. Assign a construction element to the appropriate division of the MasterFormat.
- 8.5.4. Describe the components of a typical MasterFormat specification section.
- 8.5.5. List the maxims which govern the writing of a good specification.

### **8.6. Evaluate the components of the construction documents**

- 8.6.1. Verify that products, materials and assemblies conform to standards and codes.
- 8.6.2. Check that the architectural documents are coordinated and complete.

## 9. Bidding and Contract Negotiations

### 9.1. Compare the different types of construction project delivery

9.1.1. Differentiate between the types of project delivery.

### 9.2. Understand the types of construction contract

9.2.1. Identify the different types of construction contract.

9.2.2. Explain the purpose of the CCDC construction documents.

9.2.3. Describe the responsibilities of the parties to a construction contract.

### 9.3. Understand the procedures for the awarding of a construction contract

9.3.1. Describe the responsibilities of each party involved in the bidding process.

9.3.2. Describe the role of local construction associations and bid depositories in the bidding process.

9.3.3. Describe the methods for awarding a construction contract.

9.3.4. Describe the phases of a typical bidding process.

9.3.5. Describe the documentation required for each phase of the bidding process.

### 9.4. Evaluate the bids submitted by the contractors

9.4.1. Assess the conformity of the bid submissions.

9.4.2. Describe the architect's responsibility in making recommendations.

## 10. CONSTRUCTION PHASE — OFFICE

### 10.1. Understand the roles of the architect and other participants in the administration of the construction contract

10.1.1. Explain the roles and responsibilities of the architect.

10.1.2. Explain the roles and responsibilities of the client/owner.

10.1.3. Explain the roles and responsibilities of the contractor.

### 10.2. Understand the office-function tasks associated with the construction phase

10.2.1. Explain the tasks associated with the construction phase (from the Initial meeting, before, during and at the end of the work, until the end of the warranty period).

10.2.2. Describe the documentation required of the contractor prior to the commencement of construction.

10.2.3. Describe the type of documentation required to effect changes to the construction contract.

10.2.4. Explain the tasks associated with payment for the work.

10.2.5. Explain the tasks associated with the review of shop drawings, other documents and submittals.

10.2.6. Explain the terms and conditions of a contract concerned with deficiencies, take-over procedures, commissioning, indemnification and warranty.

### **10.3. Demonstrate the use of administration forms appropriate to different aspects of construction**

- 10.3.1. Complete a certificate for payment.
- 10.3.2. Complete a change request.
- 10.3.3. Complete relevant forms and reports (field review, substantial completion, etc.).

## **11. CONSTRUCTION PHASE — SITE**

### **11.1. Understand the roles of the architect and the other participants in the administration of a construction contract**

- 11.1.1. Explain the roles and responsibilities of the architect.
- 11.1.2. Explain the roles and responsibilities of the client/owner.
- 11.1.3. Explain the roles and responsibilities of the contractor.
- 11.1.4. Explain the roles and responsibilities of the architect with respect to inspection and testing firms.

### **11.2. Understand the field functions associated with the construction phase**

- 11.2.1. Explain the field functions associated with the construction phase (from the initial construction specific objectives meeting, through construction and close-out, until the end of the warranty period).
- 11.2.2. Explain the procedures for monitoring construction progress.
- 11.2.3. Explain the terms of the construction contract concerned with field review.
- 11.2.4. Explain the terms of the construction contract concerned with the takeover procedures.
- 11.2.5. Explain the terms of the construction contract concerned with issues of hazardous materials and toxic substances.

## **12. MANAGEMENT OF THE PROJECT AND BUSINESS/PRACTICE MANAGEMENT**

### **12.1. Understand the principles of project management and the delivery of professional services**

- 12.1.1. Explain the project management process.
- 12.1.2. Describe the role of the individuals involved in a project (project manager, in-house and external resources).
- 12.1.3. Describe the contents of a project file.
- 12.1.4. Explain the main components of a work plan.
- 12.1.5. Explain the essential elements of effective team management (communications, objectives, etc.).
- 12.1.6. Describe the quality assurance process for a project.
- 12.1.7. Explain the methods used to calculate the architect's fees.

## 13. SUSTAINABLE DESIGN LITERACY

### 13.1. Analyze the impacts of climate change on design

- 13.1.1. Apply predictive climate data to the design process.
- 13.1.2. Analyze climate change risks impacting design (resilience).

### 13.2. Apply the principles of life cycle analysis

- 13.2.1. Explain life cycle analysis process.
- 13.2.2. Modify an assembly to improve the results of the lifecycle analysis of a building.
- 13.2.3. Choose building materials which minimize embodied carbon.
- 13.2.4. Explain how operational carbon can be minimized.

### 13.3. Apply sustainable architectural design strategies

- 13.3.1. Apply strategies to address occupant wellness concerns.
- 13.3.2. Describe green building rating system concepts.
- 13.3.3. Describe renewable and low energy systems used in the design of buildings.
- 13.3.4. Apply results of a whole building energy analysis to the design process.

## Appendix 2 – Sample Examination Questions

The correct answer is followed by an asterisk (\*)

### Objective 1.1.1 Identify the components of an architectural program.

**Question:** In developing a functional program which of the following questions is **MOST** important to answer?

- A) How many maintenance rooms are required on each level?
- B) What is the most appropriate door width for a corridor?
- C) What space is needed to operate the facility efficiently? \*
- D) What lighting level is required for occupied spaces?

### Objective 2.1.2 Explain urban design issues and planning processes that influence the design of a building on a specific site.

**Question:** The design for a new building requires the building to be located 3.79 m from a side property line. The zoning bylaw requires a 4.0 m side yard setback. Which of the following is an appropriate procedure to address this non-conforming setback?

- A) Proceed as designed because the variance is within 5% of the requirement
- B) Proceed as designed because the variance is within 10% of the requirement
- C) Seek approval for a revision to the Official Plan
- D) Seek approval for a variance of the specific requirement of the zoning bylaw\*

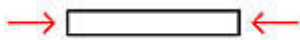
### Objective 3.1.1 Explain the principles and properties of the structural system (foundations, superstructure).

Question: Which of the following loads are NOT permanent (dead) loads?

1. Hydrostatic
2. Uniform
3. Live
4. Concentrated
5. Distributed

- A) 1, 3\*
- B) 1, 5
- C) 2, 4
- D) 3, 5
- E) 1, 2, 3
- F) 1, 3, 5

Question: What is the applied force called in the following diagram?



- A) Shear
- B) Compression\*
- C) Torsion
- D) Traction



### Objective 3.1.2 Explain the principles and properties of the mechanical system (plumbing, heating, ventilation, air conditioning, fire protection).

Question: In the following list, which comfort parameters are provided to the occupants by mechanical systems?

1. Air circulation
  2. Thermal equilibrium between the interior and the exterior
  3. Relative humidity
  4. Barometric pressure
  5. Ambient temperature
- A) 1, 2, 4  
B) 1, 2, 5  
C) 1, 3, 5\*  
D) 2, 3, 4  
E) 3, 4, 5

### Objective 4.3.1 Describe the methods for estimating cost.

Question: Match each of the phases of a construction project to the corresponding estimating method and then select the appropriate answer. The same estimating method may be used more than once.

Project phase	Cost estimation method
1) The functional and technical program for a residential-care centre with 126 beds	a) Elemental cost b) Area
2) The budget validation of the construction documents for a new bank branch	c) Volume
3) The schematic design for a 100-m <sup>2</sup> addition to a residence with a clay-brick cladding	d) Unit use

- A) 1a, 2c, 3b
- B) 1b, 2a, 3c
- C) 1b, 2c, 3c
- D) 1d, 2a, 3b\*
- E) 1d, 2c, 3c

### **Objective 5.2.2 Interpret the Code requirements concerning fire safety.**

**Question: You are providing architectural services for a 4 storey 180 bed acute care hospital in Whitehorse. Based on your code analysis, which of the following spaces do NOT qualify as areas of refuge?**

- A) Delivery rooms
- B) Intensive care suites
- C) Operating and surgical suites
- D) Radiology and x-ray rooms\*

### **Objective 5.3.1 Apply prescriptive Code requirements concerning structural design.**

**The roof structure of a house consists of the following:**

- Rafter spacing of 400 mm O/C
- Span of 4.31 m
- #1 Spruce
- Snow load of 2.5 kPa
- No collar ties are provided
- Roof slope of 1 : 4

**Question: Which of the following is the minimum rafter size permitted by the Building Code?**

- A) 38 x 140 mm
- B) 38 x 184 mm\*
- C) 38 x 235 mm
- D) 38 x 286 mm

### **Objective 6.1.1 Identify the information required for schematic design phase.**

**Question:** In schematic design, what is the client NOT responsible for providing?

- A) Construction budget
- B) Construction methods\*
- C) Geotechnical report
- D) Legal survey

### **Objective 7.1.1 Identify the information required at the design development phase.**

**Question:** A building design for residential apartments has been established with a separation distance of 1.2 m from a building face to a property line. Which one of the following is required for the design of that wall?

- A) Availability of natural light based on adjacent buildings
- B) Encroachment of building projections into the setback
- C) Fire rating requirements for exit stairs
- D) Percentage of unprotected openings permitted in the wall\*

### **Objective 8.1.2 Identify the properties of load-bearing materials (metal, wood, concrete, masonry).**

**Question:** Masonry elements that are bonded together with mortar are stronger in \_\_\_\_\_ than wood.

- A) shear
- B) compression\*
- C) shrinkage
- D) bending
- E) tension

### **Objective 8.2.1 Explain the principles of soil mechanics.**

**Question: Place the following soil types in increasing order of their drainage capacity (from low to high).**

1. Clay
2. Clean gravel
3. Silty sand
4. Peat

- A) 1, 3, 2, 4
- B) 1, 3, 4, 2
- C) 1, 4, 3, 2\*
- D) 4, 1, 3, 2
- E) 4, 3, 2, 1

### **Objective 9.1.1 Differentiate between the types of project delivery.**

**Question: What are the advantages of traditional Design-Bid-Build project delivery?**

- A) Contractor expertise, construction costs, sequential tendering
- B) Competitive tendering, lowest risk factor, most complete design resolution\*
- C) Costs based on quantity, suitable when time is more important than cost, suitable where extraordinary quality is required
- D) Single point of responsibility, suitable when faster results are needed

### **Objective 10.1.1. Explain the roles and responsibilities of the architect.**

**Question: In a CCDC 2 contract, which of the following is responsible for the preparation of a change directive?**

- A) Architect \*
- B) Building Inspector
- C) General Contractor
- D) Owner

### **Objective 11.1.1 Explain the roles and responsibilities of the architect.**

**Question: Which of the following is NOT the responsibility of the architect as prime consultant during the administration of a construction contract?**

- A) Coordination of the services of consultants
- B) Follow up with warranty items during the warranty period
- C) Preparation of field review reports
- D) Safety and workplace regulations on the construction site\*

### **Objective 12.1.1 Explain the project management process.**

**Question: Which of the following tasks must be performed periodically during each phase of a project?**

1. Update the project schedule
2. Update the drawing software
3. Update the program
4. Bill the client

- A) 1, 2, 3
- B) 1, 2, 4
- C) 1, 3, 4\*
- D) 2, 3, 4
- E) 1, 2, 3, 4

## Appendix 3 – References and Resources

The Committee for the ExAC does not guarantee the availability of all references and resources in bookshops. Some resources listed may not be available in both English and French. Where available online, hyperlinks are provided in this guide for your convenience. The Committee for the ExAC does not guarantee that the hyperlinks in this document link to the referenced documents.

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