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PRACTICE EXAM

ARCHITECT REGISTRATION EXAMINATION® 5.0

Project Management
division



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Question 1

During ongoing construction, the contractor informs the architect of a suspected hazardous material at the project site of an existing vacant building.

According to AIA contracts, what should the architect do?

- A. Prepare documents to isolate the suspected hazardous material.
- B. Direct that all construction work on the project be stopped.
- C. Inform the owner of the suspected hazardous material.
- D. Take samples of the suspected hazardous material.

Correct answer: C

CORRECT RESPONSE

Inform the owner of the suspected hazardous material.

It is the architect's responsibility to inform the owner of hazardous materials so they can take the required steps to verify the presence of the material.

Section: Contracts

Question 2

An architect is executing a field survey for the renovation of an existing facility constructed in 1962 and unmodified since 1987. The architect observes what appears to be utility piping insulation that is original to the building.

How should the architect address this observation?

- A. Alert the local building official of the potential hazardous materials.
- B. Advise the owner to engage a third-party hazardous materials testing consultant.
- C. Direct the plumbing consultant to include potential hazardous materials abatement in their bid drawings.

Correct answer: B

CORRECT RESPONSE

Advise the owner to engage a third-party hazardous materials testing consultant.

Material at risk of containing asbestos should be tested by an owner-engaged third-party company and mitigated appropriately if found to be hazardous.

Section: Contracts

Question 3

An owner is assembling a project team for the conceptual design phase of an eight-story, greenfield office building development that will include underground parking.

Which team members would be required for this project team? **Check the four that apply.**

- A. Architect
- B. Construction manager
- C. MEP engineers
- D. Structural engineer
- E. Geotechnical engineer
- F. Landscape architect

Correct answer: ACDE

CORRECT RESPONSES

Architect

Because they will provide building design services.

MEP engineers

Because they will provide consulting services given the planned size and complexity of the building.

Structural engineer

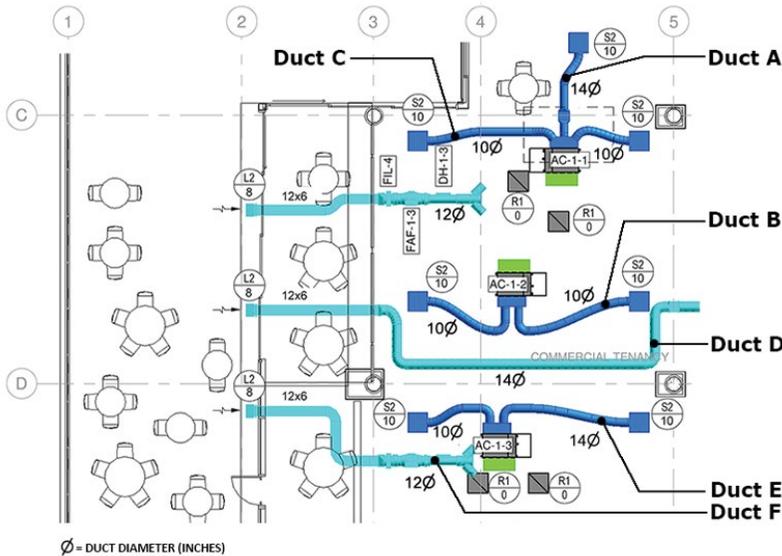
Because they will provide consulting services given the structural requirements of the building.

Geotechnical engineer

Because they will identify the necessary below grade conditions that will inform the project.

Section: Resource Management

Question 4



Refer to the exhibit.

An architect is conducting a coordination review of the mechanical drawings to ensure that ducts fit within the space above the finished ceiling. Assume the following:

- Floor-to-floor height: 13'-2"
- Ceiling height: 10'-0"
- Beam depth at gridlines: 14"
- Concrete floor thickness: 10"
- Ceiling thickness: 3/4"
- Listed duct dimensions include insulation

Which duct dimensions need to be revised by the mechanical engineer? **Check the two that apply.**

- A. Duct A
- B. Duct B
- C. Duct C
- D. Duct D
- E. Duct E
- F. Duct F

Correct answer: AD

CORRECT RESPONSES

Duct A
Duct D

Duct sizes 12 inches in diameter or smaller are allowed to go under the beams. The 14-inch-diameter ducts that cross under beams would not fit above the ceiling and will need to be revised.

CALCULATIONS

1. $13'-2''$ (floor-to-floor height) - $10'-0''$ (ceiling height) - $14''$ (largest beam depth) - $10''$ (floor thickness) - $3/4''$ (ceiling thickness) = $1'-1 1/4''$ or $13 1/4''$ maximum space available for ducts passing under beams.

Section: Project Quality Control

Question 5

An architect hires an electrical engineer using AIA C401. The electrical engineer, in turn, hires a specialty subconsultant. Review comments from the AHJ note that there are significant electrical code oversights that need to be addressed. The architect must inform the owner that these revisions will cause a delay in the overall project schedule.

Who is responsible to the owner for the delay in the project schedule?

- A. The architect
- B. The electrical engineer
- C. The specialty subconsultant

Correct answer: A

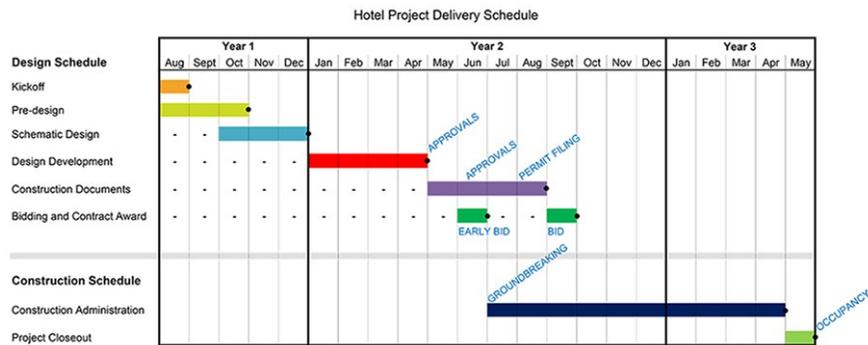
CORRECT RESPONSE

The architect

This option is correct because the architect and electrical engineer used AIA C401, through which the architect is liable to the owner for consultant work and for informing the consultant about code requirements for the consultant's respective portion of the work.

Section: Contracts

Question 6



Refer to the exhibit.

A developer hires an architect for a project that includes additional cost estimating beyond the basic scope of design services. The architect must provide a cost estimate at the end of each design phase for cost control measures.

Which estimating technique is most appropriate at the end of April, Year 2?

- A. Order of magnitude
- B. Unit price
- C. Assemblies

Correct answer: C

CORRECT RESPONSE

Assemblies

An assemblies cost estimate is more precise than the order of magnitude approach and is possible after early detailed information about project construction is defined during the design development phase. A unit price estimating approach requires a greater level of detail that is not defined until after the design development phase. An assemblies estimate may also be referred to as a systems estimate.

Section: Project Quality Control

Question 7

An architect is reviewing the contractor's bids for the renovation of an early education school located within an historic district. The owner asks the architect to issue an addendum stating the following:

- "The Historic Preservation Agency has committed to provide the owner up to \$500,000 towards the renovation costs, if the owner agrees to restore furnishing and landscaping in an adjacent park."

According to the AIA B101, which service is included in the architect's standard service?

- A. Provide the client with costs of site furnishing and landscaping.
- B. Request that contractors include furnishing and landscaping costs in their bids.
- C. Provide the client a list of historic preservation criteria and standards.

Correct answer: B

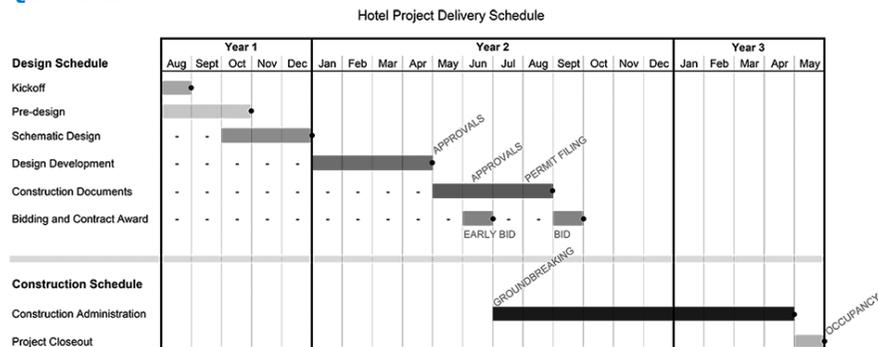
CORRECT RESPONSE

Request that contractors include furnishing and landscaping costs in their bids.

AIA B101 states that an architect must assist the owner in negotiation with prospective contractors.

Section: Project Execution

Question 8



Refer to the exhibit.

A project is on schedule and just beginning in the design development phase. The architect is developing the workplan for February and March of Year 2.

Which one of the following activities should the architect include in the workplan?

- A. Development of the outline specification based on the design and project requirements.
- B. Definition of the cost of work through a guaranteed maximum price in preparation of issuing the project to bid.
- C. Coordination of design narratives between the architect and consultants to define basic project characteristics.

Correct answer: A

CORRECT RESPONSE

Development of the outline specification based on the design and project requirements.

The outline specifications should be developed during design development to identify specific products and anticipated assemblies.

Section: Project Work Planning

Question 9

Working under an AIA B101, an architect is hired by an owner to renovate an existing performing arts center. A design-bid-build delivery method will be used. The owner has contracts with an advising construction manager and a series of consultants who each coordinate their scope of work with the architect.

Instead of the agreed-upon 21 days, the owner's theatrical lighting consultant sends updated drawings to the architect for final coordination 14 days prior to completing the construction documents. The consultant's updated drawings show significantly more lighting equipment and materials than the previous coordination drawings. The start of bidding cannot be delayed.

What should the architecture firm do first after receiving the updated drawings?

- A. Send the owner a request for compensation for additional coordination services.
- B. Instruct the electrical engineer to prioritize the coordination of the new lighting drawings.
- C. Ask the construction manager to update the theatrical lighting submittals.

Correct answer: A

CORRECT RESPONSE

Send the owner a request for compensation for additional coordination services.

The architect should coordinate their services with the services provided by the owner's consultants. However, neither the architect nor the architect's consultants should immediately perform any additional services as a result of a failure of performance on the part of the owner's consultants. After recognizing the need for additional services, the architect must explain the facts and circumstances and establish an agreement in writing with the owner before proceeding.

Section: Contracts

Question 10

Early in the construction documents phase of a project, a fire protection engineer alerts the architect that the architect improperly classified the materials planned to be stored in a warehouse space. The architect will need to revise the analysis of the materials so that the fire protection engineer can correctly plan sprinkler coverage and fire pump sizing.

What should the architect do first to respond to the lack of coordination?

- A. Develop and submit a request for additional services.
- B. Identify and take corrective actions to modify the project work plan.
- C. Advise the owner of the design conditions and any impact on the schedule.

Correct answer: B

CORRECT RESPONSE

Identify and take corrective actions to modify the project work plan.

Identifying and taking corrective action if a project is not performing according to the project work plan is the first step the architect should take. The architect must alert the owner of the situation but should *first* identify the root cause of the error and define a path forward to resolve it prior to the discussion with the owner.

Section: Project Work Planning

Question 11

According to AIA B101, which one of the following project changes can the architect authorize during construction?

- A. Modifying door functionality to meet the opening date.
- B. Changing the roofing material to a more expensive system.
- C. Extending the construction schedule to redesign the means of egress system.

Correct answer: A

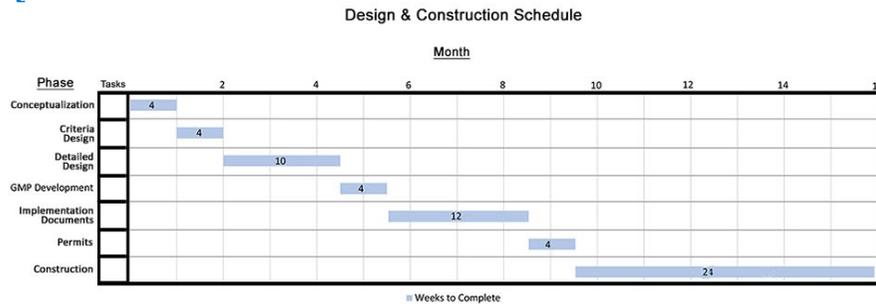
CORRECT RESPONSE

Modifying door functionality to meet the opening date.

The architect can authorize minor changes that do not impact the time or the contract sum if they are in line with the intent of the construction documents.

Section: Contracts

Question 12



Refer to the exhibit.

An architect is assigning tasks to the phases of the above project schedule. The project will use integrated project delivery (IPD).

Which of the following tasks needs to be completed in the Criteria Design phase?

- A. Create performance specifications and confirm sustainability targets.
- B. Develop concept ideas into constructible forms and conduct detailed code study for compliance.
- C. Issue substantial completion and final completion documents.
- D. Prepare a design schedule and identify potential design and sustainability goals.

Correct answer: A

CORRECT RESPONSE

Create performance specification and confirm sustainability targets.

The performance specifications and sustainability goals for the project are confirmed during the "Criteria Design" phase. The design team then proceeds to work toward these goals and specifications in the following phases.

Section: Project Execution

Question 13

An architect is working on a project under an AIA B101 agreement. During the construction phase of the project, the architect notices that brick masons are performing their work in an unsafe manner.

How should the architect address this situation? **Check the two that apply.**

- A. Deliver OSHA guidelines to subcontractor.
- B. Inform the general contractor of the unsafe conditions.
- C. Instruct subcontractor to stop work immediately.
- D. Inform the building official of the unsafe conditions.
- E. Document the situation in a field report.
- F. Stop visiting the construction site until the safety issue is corrected.

Correct answer: BE

CORRECT RESPONSES

Inform the general contractor of the unsafe conditions.

The general contractor is responsible for job site safety. The architect should report their observations of the situation to the general contractor.

Document the situation in a field report.

The architect should use a field report to document their observations of the situation.

Section: Contracts

Question 14

During construction of a design-bid-build commercial office building, an owner asks the architect to subdivide a meeting room to create three offices. This modification will add office doors, revise ceiling types, and increase power locations. As a result, drawings will also need to be modified by the electrical and HVAC consultants to capture the

new scope. The general contractor will use these revised drawings to seek pricing from the subcontractors and vendors for owner approval.

If the owner approves the change, what record documents related to this modification must the contractor provide for the architect's review as part of the project closeout? **Check the three that apply.**

- A. Contractor's payment application
- B. Construction change order
- C. Supplemental drawings
- D. Product submittals
- E. Punch list
- F. Addenda

Correct answer: BCD

CORRECT RESPONSES

Construction change order

The approved modifications and related price are documented in a construction change order that is reviewed by the architect and approved by the owner. Change orders are considered record documents that are assembled by the contractor for review by the architect.

Supplemental drawings

Supplemental drawings are issued during construction and can be issued with supplemental instructions. Supplemental drawings are considered record documents that are assembled by the contractor for review by the architect.

Product submittals

The approved and reviewed product submittals prepared by the contractor are considered record documents that are assembled by the contractor for review by the architect.

Section: Project Execution

Question 15

A renovation project is under construction. According to the general contractor's schedule, the owner's hazardous materials remediation contractor is to remove a plaster ceiling that contains asbestos. The owner's contractor does not appear, delaying other construction work.

How should the general contractor respond?

- A. Stop all work until the ceiling is removed.
- B. Make a claim for delay and/or additional cost incurred as a result.
- C. Hire another remediation contractor and submit a change order to cover the cost.

Correct answer: B

CORRECT RESPONSE

Make a claim for delay and/or additional cost incurred as a result.

The A201 agreement allows for a contractor to make a claim when a delay is caused by the owner or by the owner's consultants. The making of a claim is the appropriate response to a situation where a contractor hired by the owner, who reserves the right to hire that contractor, causes a delay to the project.

Section: Contracts

Question 16

An architect is designing a new apartment building. The owner has a separate contract with the structural engineer. After the 100% CD set is issued to the contractor for construction, the structural engineer increases the floor beam size due to a miscalculation of the seismic load. As a result, the plumbing engineer needs to reroute the sanitary stack and the architect must redesign the bathroom layouts to accommodate a new chase.

What should the architect do first?

- A. Incorporate the changes into the drawings and issue a revision to the contractor.
- B. Revise the drawings and send an invoice to the structural engineer for additional design fee due to their errors.
- C. Submit an additional service request to the owner for approval prior to incorporating changes into the drawings.

Correct answer: C

CORRECT RESPONSE

Submit an additional service request to the owner for approval prior to incorporating changes into the drawings.

The architect must request an additional service for approval by the owner before performing the work because the additional work is due to a performance error by the owner's consultant.

Section: Contracts

Question 17

An architect completes the design development phase for a new apartment complex. The client approves the design pending minor changes to the three-bedroom unit. During the meeting with the architect, the client requests that a pool be added to the project scope.

How should the architect reduce risks associated with this request?

- A. Call the client to confirm the changes and determine the amount of additional services to include the pool.
- B. Update the consultant's action items list with tasks related to the three-bedroom unit and pool design.
- C. Send the client meeting minutes via e-mail for approval noting the discussed pool addition to the project.

Correct answer: C

CORRECT RESPONSE

Send the client meeting minutes via e-mail for approval noting the discussed pool addition to the project.

E-mail documentation is an effective way to mitigate risk. According to the *Architect's Handbook of Professional Practice*, it is necessary to document conversations that can meaningfully affect the project. It is important to keep a written record of who generated decisions and directions, as well as when and where these actions were taken.

Section: Project Quality Control

Question 18

An architect hires a structural engineer consultant for a new condominium project. Five days before the design document drawings are due, the owner requests that a rooftop garden and patio be included in the project. The structural engineer sends an e-mail to the architect, requesting additional time and compensation for the incorporation of the new roof modifications.

If an e-mail is an approved form of documentation according to the consultant contract, what action should the architect take?

- A. Forward the e-mail request with a description to the owner for review and approval.
- B. Attach the e-mail to the owner's design document deliverables and invoice for payment.
- C. Reply to the e-mail asking the engineer to send their request to the architect in the form of a letter.

Correct answer: A

CORRECT RESPONSE

Forward the e-mail request with a description to the owner for review and approval.

Per the AIA B101 agreement, any adjustments to the schedule and estimate must be submitted to the owner for approval. As e-mail has been deemed an approved form of documentation in the architect-consultant agreement, so the architect should not request correspondence in the form of a letter. The architect should incorporate the engineer's communication into their correspondence with the owner.

Section: Contracts

Question 19

Click on the name of the team member in the meeting minutes with whom the architect should confirm Schedule item 4.d.

Correct answer:

ATTENDEES:	Deb Masterson Lindy Scralin Mike David Jim Dealer Jen Mills	Appleton College County Fair Board Springfield County Parks and Recreation	Springfield City Park Covered Arena Kick-off Meeting
MEETING NOTES:	<p>The purpose of this meeting was to kick-off the covered arena project at Springfield City. The following items were discussed:</p> <ol style="list-style-type: none"> 1. Basic project scope to include the following: <ol style="list-style-type: none"> a. Pre-fabricated covered arena with steel structure and metal roof b. Size approximately 100' x 130', maximize to fit existing space and topography c. Site south of existing horse barn, and align as possible – consider centers or west side d. Keep existing sand floor 2. Arena shall be used for: <ol style="list-style-type: none"> a. Shows b. Temporary bleachers 3. Budget: <ol style="list-style-type: none"> a. The county has \$20,000 budgeted for design in FY14 and \$200,000 budgeted for construction in FY15 b. Cost sharing by the horse council will be coordinated by Jim Dealer 4. Schedule: <ol style="list-style-type: none"> a. Refer to attached milestone schedule <ol style="list-style-type: none"> i. Aug 2014 – begin conceptual design ii. Nov 2014 – commission – conceptual approval iii. Mar 2015 – commission – construction approval iv. May 2015 – construction start <ol style="list-style-type: none"> 1. Alternate – July 2015 v. Jun 2015 – construction complete <ol style="list-style-type: none"> 1. Alternate August 2015 b. Site plan review may impact the schedule and needs to be confirmed c. No construction can be done during fair and fair preparation, mid-June to mid-July d. Goal will be to complete construction before fair, though construction may have to start after fair <p>ACTION ITEMS:</p> <ul style="list-style-type: none"> • Jen Mills <ul style="list-style-type: none"> ○ Confirm site plan review requirements • Deb Masterson <ul style="list-style-type: none"> ○ Confirm horse council representation and main contact 		

CORRECT RESPONSE

Lindy Scralin

Schedule item 4.d involves the timing of construction in relation to the beginning of the county fair. Lindy Scralin is associated with the "County Fair Board" and is the only team member to have such an association. Thus, Lindy Scralin is the person with whom the architect should confirm Schedule item 4.d.

Section: Project Work Planning

Question 20

	Original Material	Alternate Material
Cost:	\$6/sf	\$13/sf
Project Delay:	14 weeks	2 weeks

Refer to the exhibit.

During construction, the construction manager submits an alternate material for approval due to supply chain delays for 6,000 square feet of exterior wall finishes. The owner has asked the architect to determine the cost savings. Per the contract, overhead costs for project delays are \$4,000 per week.

What are the cost savings of using the alternate material?

- A. \$6,000
- B. \$14,000
- C. \$42,000

Correct answer: A

CORRECT RESPONSE

\$6,000

CALCULATIONS

Original Material

1. $\$6 \times 6,000 \text{ sf} = \$36,000$
2. Cost due to project delay: $14 \times \$4,000 = \$56,000$
3. Total cost for original material: $\$36,000 + \$56,000 = \$92,000$

Alternate 1

4. $\$13 \times 6,000 \text{ sf} = \$78,000$
5. Cost due to project delay: $2 \times \$4,000 = \$8,000$
6. Total cost for alternate 1: $\$78,000 + \$8,000 = \$86,000$

Savings

7. \$92,000 (original) - \$86,000 (alternate) = \$6,000 savings

Section: Project Execution

Question 21

During an architect's quality control review, the architect discovers the following code provisions for the minimum dimensions for all handrail extensions beyond the top riser of an egress stair:

- The state building code stipulates a minimum dimension that is two inches less than that required by the International Building Code.
- The local AHJ code stipulates a minimum dimension that is four inches greater than that required by the International Building Code.

Which code requirement must the architect follow for handrail extensions in the construction documents?

- A. International Building Code
- B. State building code
- C. Local AHJ code

Correct answer: C

CORRECT RESPONSE

Local AHJ code

When multiple codes conflict, the most stringent code always takes precedence. Because the local AHJ code requires the extension to be four inches greater than the IBC, and therefore six inches greater than the state building code, the local AHJ code takes precedence as the most stringent code.

Section: Project Quality Control

Question 22

An architect is contracted with an owner using an AIA B101 agreement. During construction, the owner informs the architect in writing to change the configuration of the restrooms. The architect responds that this work will require a \$2,000 fee and one week will be required to make changes to the drawings. The owner agrees to the fee and timeline, noting an urgency to complete the work.

What should the architect do next?

- A. Invoice the owner for the added service and confirm receipt of the payment before starting the work.
- B. Begin the work immediately and issue an add service proposal to formalize the change in scope.
- C. Provide an add service proposal for the owner's signature prior to starting the work.

Correct answer: B

CORRECT RESPONSE

Begin the work immediately and issue an add service proposal to formalize the change in scope.

This course of action is appropriate as the change has been agreed to in written correspondence and it accommodates the owner's request in a timely fashion.

Section: Project Work Planning

Question 23

An architect is creating the workplan and schedule for a 3,200-square-foot tenant infill project. The project will have a documentation phase and a construction phase. The architect's fee is \$20,000 and the project must be ready for permit in six weeks.

What schedule type should be used for this project?

- A. Critical path method
- B. Milestone chart
- C. Fast-track schedule

Correct answer: B

CORRECT RESPONSE

Milestone chart

This method is used for short-duration projects with relatively few tasks and fees typically under \$35,000.

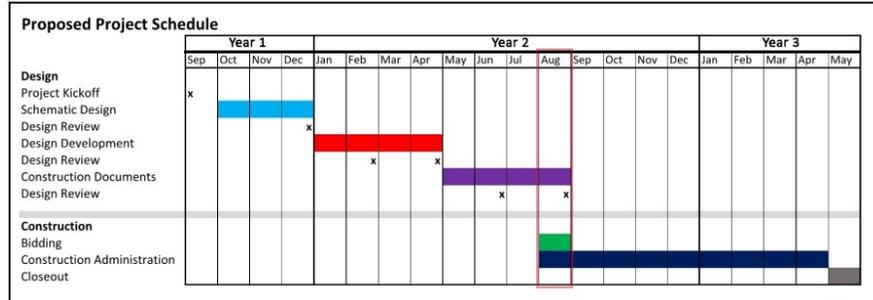
Section: Project Work Planning

Question 24

Following a review of the Proposed Project Schedule, the owner adds a one-month programming effort and a one-week delay for each 100% design review.

Click on the month column in the schedule that will now achieve 50% construction documents. Assume each month is four weeks.

Correct answer:



CORRECT RESPONSE

August, Year 2

50% construction documents will now occur in August, Year 2.

CALCULATION

1. 4 weeks (for programming) + 1 week (for 100% SD review) + 1 week (for 100% DD review) = 6 weeks added to the schedule at 50% CDs, bringing the new midpoint to August, Year 2.

Section: Project Execution

Question 25

During the design of a restaurant, a local Design Review Board (DRB) must approve the building elevations before the AHJ can issue a permit, which the owner wants to obtain as soon as possible. The DRB reviews the rendered elevations and rejects the branded signage shown on the restaurant as inappropriate for the neighborhood. The signage is not part of the architect's scope of design work.

How should the architect proceed?

- A. Submit the drawings to the AHJ without DRB approval.
- B. Submit the drawings to the AHJ and apply for a variance from the DRB review requirement.
- C. Remove the signage from the permit drawings to get DRB approval and submit the signage under a separate sign permit.
- D. Provide elevations without signage for DRB review and issue a separate construction set to the contractor that includes the signage.

Correct answer: C

CORRECT RESPONSE

Remove the signage from the permit drawings to get DRB approval and submit the signage under a separate sign permit.

This will allow permitting to proceed, and it will allow the discussion about the signage to continue with the board until it is resolved. Under the International Building Code, signage is treated as a trade permit, and since it is excluded from the architect's scope, it is reasonable to remove it from permit documents. Jurisdictional approvals for signage are considered separate from building, and the configuration of signage will rarely impact the building.

Section: Project Quality Control

Question 26

An architect has been selected to design an elementary school. The project will be delivered through the design-bid-build methodology using standard AIA contract documents.

Which of the following consultants should the architect select for the design team? **Check the two that apply.**

- A. Electrician

- B. Facilities Manager
- C. Geotechnical Subconsultant
- D. Mechanical Engineer
- E. Structural Engineer
- F. Window Installer

Correct answer: DE

CORRECT RESPONSES

Mechanical Engineer

The mechanical engineer is part of the design team and contracts with the architect using an AIA C401 agreement between architect and consultant.

Structural Engineer

The structural engineer is part of the design team and contracts with the architect using an AIA C401 agreement between architect and consultant.

Section: Resource Management

Question 27

An architect planned 1,000 hours for the design development (DD) phase of a project with an average rate of \$50 per hour. The project has a planned multiplier of 3.05 and a total DD phase compensation of \$152,500. At the end of DD, the architect finds that an excess of 240 labor hours were needed for DD.

What is the additional project cost?

- A. \$3,050
- B. \$12,000
- C. \$36,600
- D. \$50,000

Correct answer: C

CORRECT RESPONSE

\$36,600

CALCULATION

1. $240 \text{ (additional hours)} \times \$50 \text{ (average hourly rate)} \times 3.05 \text{ (multiplier)} = \$36,600$ in additional project costs

Section: Resource Management

Question 28

An architect is preparing an initial project budget using the following fee information:

- There is a total fee of \$300,000 for the entire project team.
- 40% of the total fee is allocated for all consultants.
- 8% of the net fee is allocated for the architect's non-reimbursable expenses.
- 7% of the net fee is allocated for the architect's contingency.

What is the available budget for project labor?

- A. \$153,000
- B. \$165,000
- C. \$180,000

Correct answer: A

CORRECT RESPONSE

\$153,000

This response results from a calculation that accounts for the net fee.

CALCULATIONS

1. Consultant fee: $40\% \times \$300,000 \text{ (total fee)} = \$120,000$

2. Net fee: $\$300,000 - \$120,000 \text{ (consultant fee)} = \$180,000$

3. Non-reimbursable expenses and contingency: $15\% \times \$180,000 \text{ (net fee)} = \$27,000$

4. Total available for labor: $\$180,000 \text{ (net fee)} - \$27,000 \text{ (combined percentage of fee for contingency and non-reimbursable expenses)} = \$153,000$

Section: Resource Management

Question 29

DESIGN AND CONSTRUCTION SCHEDULE																								
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Schematic Design	■	■	■																					
Owner review and approval			■	■	■																			
Design Development				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Research materials and products																								
Develop outline specifications																								
Owner review and approval																								
Develop Construction Documents																								
Finalize Specifications																								
Building Permit																								
Construction Start																								◆

Refer to the exhibit.

An architect develops a proposed schedule prior to the beginning of design. After the schedule is developed, the following changes occur:

- One week is added to Owner review and approval of the DD package.
- Develop Construction Documents is extended by two weeks.
- Finalize Specifications is extended by one week.

When will construction start?

- A. Week 25
- B. Week 26
- C. Week 28

Correct answer: B

CORRECT RESPONSE

Week 26

Adding two weeks to CDs will cause permitting (Building permit) to start in Week 22. Permitting takes four weeks and will end in Week 25. Construction is to start the week after permitting, so the new construction start date is Week 26, two weeks later than scheduled. Extra weeks for owner review of the DD package and for finalizing specifications (Finalize specifications) will not impact the week in which construction will start.

CALCULATIONS

1. Add two extra weeks of CDs to the original end date of CDs: Week 19 + 2 extra weeks = Week 21
2. Add four weeks for permitting: Week 21 + 4 weeks of permitting = Week 25
3. Construction starts the following week: Week 26

Section: Project Work Planning

Question 30

An owner receives a grant to construct a community center. The owner informs the architect that the total project budget, including soft costs, must not exceed the amount of the grant. Therefore, maintaining the budget is established as a primary design objective. As a result, the architect hires a third-party estimator to help monitor costs throughout the design process.

During a review of the design development documents, the owner directs the architect to include a playground that was not in the original program. The estimated value for the playground will exceed the owner’s budget.

How should the architect respond first to the owner's directive?

- A. Document the owner's directive and solicit alternative funding.
- B. Notify the owner of fees for additional services due to scope creep.
- C. Inform the owner the directive will require a contract change order.

Correct answer: B

CORRECT RESPONSE

Notify the owner of fees for additional services due to scope creep.

Upon recognizing the need to perform additional services, the architect must notify the owner promptly and explain the facts giving rise to the need. In this instance, scope creep results from a change to the owner’s original program.

Section: Project Execution

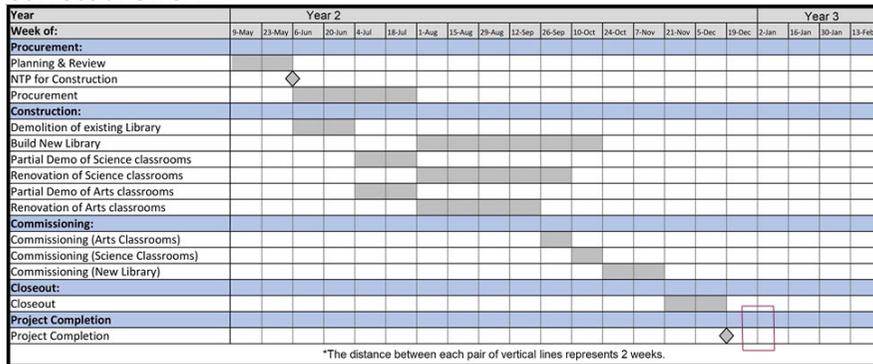
Question 31

An elementary school project includes the renovation of existing Science Classrooms, existing Arts Classrooms, and the construction of a new Library.

- A material delivery issue leads to a two-week delay in the construction of the new Library.
- The discovery of asbestos in the Science Classrooms adds two weeks to the demolition.

Click on the schedule to indicate the new project completion date.

Correct answer:



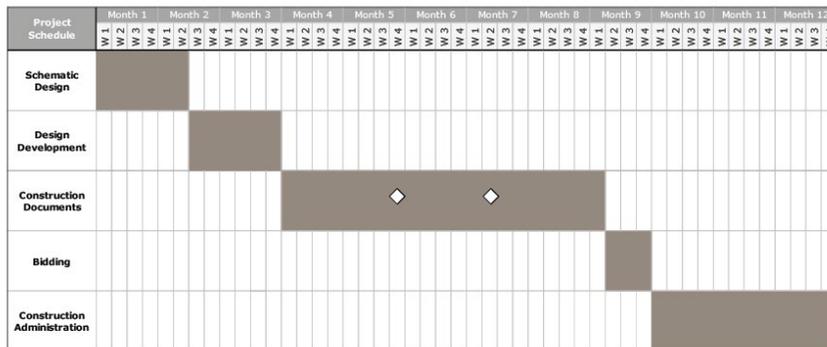
CORRECT RESPONSE

2-Jan, Year 3

Even though two weeks are added to the demolition of the Science Classrooms, which delays their construction and commissioning, the two-week delay on the Build New Library happens concurrently. The commissioning of the Science Classrooms and New Library are each delayed two weeks, which pushes out Closeout by two weeks. This brings the project completion date to 2-Jan in Year 3.

Section: Project Work Planning

Question 32



◇ Code Compliance Reviews

Refer to the exhibit.

An architect has incorporated code compliance review dates on a quality control schedule and now needs to identify internal review dates based on the following criteria:

- An internal review will be conducted after each design phase is 80% complete
- Construction documentation will have an additional internal review when 50% complete.
- An internal review will be conducted three weeks after a code compliance review.

Based on the requirements above, when should internal reviews occur? **Check the four that apply.**

- A. Month 2, Week 1
- B. Month 3, Week 3

- C. Month 6, Week 3
- D. Month 8, Week 1
- E. Month 9, Week 3
- F. Month 12, Week 2

Correct answer: ABCD

CORRECT RESPONSES

Month 2, Week 1

The project quality control schedule calls for internal reviews to be conducted after 80% complete in each design phase.

Month 3, Week 3

The project quality control schedule calls for internal reviews to be conducted after 80% complete in each design phase.

Month 6, Week 3

The project quality control schedule states that construction documents will have an internal review at 50%.

Month 8, Week 1

The project quality control schedule calls for internal reviews to be conducted after 80% complete in each design phase.

Section: Project Quality Control

Question 33

Project Phase	Budget / Invoiced	Spent at Fully-Burdened Rates
Programming	\$14,000 / 100%	\$12,840
Schematic Design	\$18,000 / 100%	\$17,200
Design Development	\$24,000 / 100%	\$22,800
Construction Documents	\$76,000 / 50%	\$39,200
Construction Administration	\$28,000 / 0%	\$0

Refer to the exhibit.

An architect determines that construction documents are now 50% complete. The total amount invoiced to the owner up to this point is \$94,000.

How much profit has the firm currently earned from this project?

- A. \$760
- B. \$1,960
- C. \$3,160
- D. \$39,960

Correct answer: B

CORRECT RESPONSE

\$1,960

CALCULATIONS

1. Total spent: \$12,840 + \$17,200 + \$22,800 + \$39,200 = \$92,040
2. Total invoiced: \$14,000 + \$18,000 + \$24,000 + (0.5 × \$76,000) = \$94,000
3. Variance: \$94,000 - \$92,040 = \$1,960 profit

Section: Resource Management

Question 34

During the schematic design phase of a traditional design-bid-build project, the architect provides a preliminary set of drawings to the owner that include the following:

- Floor plans that show the approximate size and locations of all egress stairs and ramps.
- Exterior elevations that show exterior egress stairs and ramps.
- Wall sections at exterior walls adjacent to egress stairs.

The architect needs to mitigate risk during and after construction.

What should the architect do prior to completing the construction documents phase?

- A. Conduct a constructability review with the general contractor.

- B. Develop a code compliance checklist as part of the firm's quality control process.
- C. Solicit a third-party peer review by a construction manager.

Correct answer: B

CORRECT RESPONSE

Develop a code compliance checklist as part of the firm's quality control process.

Preparing a code compliance checklist helps to ensure both quality and risk mitigation by verifying that key code requirements are met prior to the building being constructed or bid.

Section: Project Quality Control

Question 35

An architect is working on a large project with a construction manager (CM) as-contractor. All designers and engineers have been retained and the design is approximately 50% complete. Due to the size of the project, the CM is unable to secure a bond for the entire contracted project. Smaller construction contracts will be necessary. The owner and architect want all design and construction team members to continue in their current roles.

Which delivery method should the architect recommend to the owner?

- A. Design-build
- B. CM as-advisor
- C. Multiple prime
- D. Design-bid-build

Correct answer: B

CORRECT RESPONSE

CM as-advisor

Using a CM as-advisor delivery method will allow the CM as-contractor and the design team to continue in their current roles with their current responsibilities. It will also allow for the writing of smaller construction contracts once design is complete.

Section: Contracts

Question 36

What does a constructability review determine during the design phase?

- A. If design decisions are practical and can be economically built.
- B. If the project can feasibly be completed on time and within budget.
- C. The maximum area and height allowed to be constructed for each occupancy type.
- D. If the selected contractor has the required experience and available means to complete the project.

Correct answer: A

CORRECT RESPONSE

If design decisions are practical and can be economically built.

Constructability reviews identify design issues early, ensuring the project can be built efficiently, safely, and within the desired budget.

Section: Project Quality Control

Question 37

A contractor submits a punch list to an architect ten days before substantial completion of a gymnasium project. Days later, a subcontractor leaves a skylight open overnight, and rain floods the gymnasium floor, necessitating replacement of the flooring. The lead time for new flooring is twelve weeks.

If the architect's agreement with the owner is written to expire 30 days after substantial completion, which of the following documents must the architect prepare immediately? **Check the two that apply.**

- A. A revised schedule for owner approval.
- B. A request for liquidated damages for contractor review.
- C. An invoice for additional services for owner payment.
- D. A punch list for areas not damaged for contractor approval.
- E. A notice to the contractor for withholding final payment.

F. A change order to purchase new flooring.

Correct answer: CE

CORRECT RESPONSES

An invoice for additional services for owner payment.

According to AIA B101 Article 4.2.3, construction phase services exceeding those outlined by the agreement (here it is 30 days after the substantial completion), shall be compensated for additional services due to additional costs incurred by the architect.

A notice to the contractor for withholding final payment.

The AIA General Conditions prohibits final payment to the contractor until the project closeout documents have been submitted to the architect.

Section: Project Execution

Question 38

A university hires an architect to design a renovation and addition to a performing arts center. The university wants to use an integrated project delivery method and contract with a series of consultants who will each coordinate their scope of work with the architect. The work is to be executed in multiple phases and includes the following:

- Restore the original facade of the existing facility built in 1905.
- Convert the existing sloped concrete floor performance hall into a new flat floor performance space.
- Renovate existing classrooms to provide new advanced audio and video laboratories.
- Design a performance hall addition connected to the existing facility by an elevated walkway.
- Identify and address any AHJ or accessibility issues in the existing facility.

Who should the architect recommend the university hire before the schematic design phase? **Check the four that apply.**

- A. General contractor
- B. Lighting designer
- C. Geotechnical engineer
- D. Commissioning agent
- E. Historical preservationist
- F. Construction manager

Correct answer: ACEF

CORRECT RESPONSES

General contractor

As part of an IPD project, a general contractor will contract with the owner and should be involved in the predesign phase.

Geotechnical engineer

A geotechnical engineer will be a third-party consultant to the owner and should be involved in the predesign phase.

Historical preservationist

The owner should contract with an historic preservationist due to the facade restoration and should be involved in the predesign phase.

Construction manager

As part of an IPD project, a construction manager will contract with the owner and should be involved in the predesign phase.

Section: Resource Management

Question 39

An architect and a structural engineer are contracted under an AIA C401 agreement. The client revises the program, expanding the structural engineer's scope of services. The structural engineer is now preparing an additional fee request.

How should the structural engineer submit the additional fee request?

- A. Submit to the owner and wait for authorization to proceed.
- B. Submit to the owner and proceed with additional services.
- C. Submit to the architect and proceed with additional services.
- D. Submit to the architect and wait for authorization to proceed.

Correct answer: D

CORRECT RESPONSE

Submit to the architect and wait for authorization to proceed.

AIA Document C401 is the Standard Form of Agreement Between Architect and Consultant. Since the engineer is a consultant of the architect, the engineer must submit requests to the architect and should await authorization before proceeding with any additional services.

Section: Contracts

Question 40

An owner places a project on hold after receiving completed construction documents from the architect. After six months, the owner requests that the project continue into the bidding phase.

According to AIA B101, how should the architect proceed?

- A. Adjust the cost of work to reflect changes in the construction market.
- B. Prepare a change order and submit it to the owner for approval.
- C. Revise billable rates for architectural staff and consultants.

Correct answer: A

CORRECT RESPONSE

Adjust the cost of work to reflect changes in the construction market.

The B101 agreement stipulates that if the bidding phase doesn't start within 90 days after the architect submits construction documents, the owner's budget is to be adjusted to reflect changes in costs for construction. (Section 6.4)

Section: Contracts

Question 41

An architect working on a project delivered through the design-build method conducts a site visit. The architect observes unsafe working conditions, noting that several construction workers are without hard hats.

How should the architect respond?

- A. Immediately instruct the construction workers on the safety precautions that need to be taken.
- B. Document the unsafe working conditions in a memo to the contractor that is also copied to the owner.
- C. Document the unsafe working conditions in a memo to the owner that is also copied to the contractor.
- D. Ask the contractor to review the safety precautions that need to be taken with the construction workers.

Correct answer: B

CORRECT RESPONSE

Document the unsafe working conditions in a memo to the contractor that is also copied to the owner.

The architect is only responsible for informing the contractor of any observed unsafe construction site conditions.

Section: Project Work Planning

Question 42

An architect is designing an addition to a hospital on a relatively flat site that is susceptible to flash flooding. To save on costs, the client asks the architect to design the stormwater management plan instead of hiring a consulting engineer.

Which response should the architect provide to the client?

- A. Accept the request to design the stormwater management plan and request an additional fee.
- B. Recommend that the contractor coordinate the design of the stormwater management plans during construction.
- C. Decline the request and inform the client that they are not professionally qualified to design the stormwater management plan.

Correct answer: C

CORRECT RESPONSE

Decline the request and inform the client that they are not professionally qualified to design the stormwater management plan.

The architect should decline this request and consult with a civil engineer who is qualified to design storm water management systems.

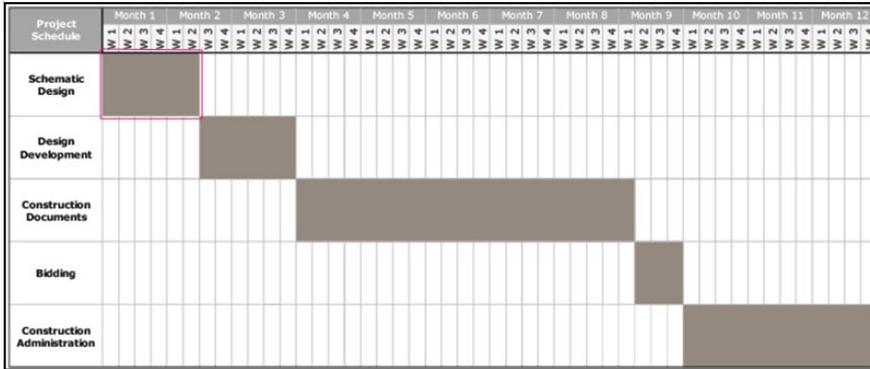
Section: Contracts

Question 43

Using an AIA C401, an architect contracts with a subconsultant to help build the strategic plan and vision for a new airport project. The subconsultant is another architect who has airport and aviation industry expertise.

Click in the shaded area on the project schedule to indicate when the subconsultant will receive their first payment.

Correct answer:



CORRECT RESPONSE

Schematic Design

The subconsultant will receive their first payment during the schematic design phase because the subconsultant's role relates to the overall strategic vision for the project, meaning that they will be providing their services early in the project.

Section: Contracts

Question 44

An owner asks the architect to reduce the production portion of each project phase with a client review and approval activity by one week. In addition, the owner requests the client review and approval time at each phase be extended by three weeks. Project phases follow:

- Programming: 8 weeks
- Schematic Design: 8 weeks
- Design Development: 12 weeks
- Construction Documents: 16 weeks
- Bidding/Negotiation: 6 weeks
- Construction Contract Administration: 56 weeks

By how many weeks should the architect extend the overall schedule?

- A. 3 weeks
- B. 6 weeks
- C. 8 weeks
- D. 12 weeks

Correct answer: B

CORRECT RESPONSE

6 weeks

Only Schematic Design, Design Development, and Construction Documents phases have a client review and approval activity. For each of these phases, the architect must decrease the production portion of their work by one week and provide the client an additional three weeks to complete review and approval.

CALCULATIONS

1. 3 phases x -1 week of production time = 3 weeks less to the overall schedule
2. 3 client review and approvals x 3 weeks of more time = 9 weeks more to the overall schedule
3. -3 + 9 = 6 weeks of schedule extension

Section: Project Work Planning

Question 45

An architect at a firm with in-house MEP design services pursues an RFP for a design-build refrigerated warehouse project with an aggressive schedule.

Which of the following consultants or partners will need to be contracted by the architect's firm? **Check the three that apply.**

- A. General contractor
- B. Food service consultant
- C. Refrigeration consultant
- D. Electrical engineer
- E. Structural engineer
- F. Construction manager

Correct answer: ACE

CORRECT RESPONSES

General contractor

A general contractor will be necessary in a design-build team.

Refrigeration consultant

A cold-storage warehouse will require the additional expertise of a refrigeration consultant, which is above what a general practice multidisciplinary firm can provide.

Structural engineer

The design-build team will require a structural engineer for ground-up construction.

Section: Resource Management

Question 46

Project Design Checklist

Agreement Type : AIA B101
Project Type : Education - High School
Delivery Method : Design-Bid-Build



1 PREDESIGN

- Establish a representative of the owner
- Request a geotechnical report from the owner
- Prepare and distribute project schedule

2 SCHEMATIC DESIGN

- Review applicable laws, codes, and regulations
- Determine and review construction alternatives
- Consider sustainable design alternates

3 DESIGN DEVELOPMENT

- Obtain written approval of SD documents
- Create diagrammatic layouts of building systems
- Advise the owner of adjustments to the cost of the work

4 CONSTRUCTION DOCUMENTS

- Complete detailed plans, sections, and elevations
- Prepare specifications for materials and systems
- Request approval of the CDs from the owner

Refer to the exhibit.

An architect is using a series of standard project design checklist forms as part of their firm's quality control program. Each form contains tasks to be completed chronologically by phase before starting construction administration.

Which of the following tasks must be completed in the predesign phase, identified by the shaded area in the Project Design Checklist?

- A. Develop typical construction details.
- B. Incorporate design requirements of the AHJ.
- C. Obtain a written program from the owner.
- D. Prepare a preliminary budget.

Correct answer: C

CORRECT RESPONSE

Obtain a written program from the owner.

This occurs in the predesign phase before proceeding to the SD phase.

Section: Contracts

Question 47

An owner wants to build a warehouse and has hired the architect to develop a building program and document the owner's requirements. The programming documents have just been completed.

Which delivery method should the architect suggest to minimize the need for owner involvement in finishing the project?

- A. Design-bid-build
- B. Design-build
- C. CM at-risk
- D. Integrated project delivery

Correct answer: B

CORRECT RESPONSE

Design-build

Design-build delivery provides a single point of accountability for the owner; this requires minimal involvement from the owner beyond the programming document.

Section: Resource Management

Question 48

An owner purchases a 45,000-square-foot, three-story hotel with the intention of converting it into an office building. The project will be complex and the owner's schedule is tight. The owner asks the architect for advice on project delivery.

Which delivery method should the architect recommend to the client?

- A. Design-bid-build
- B. Construction manager
- C. Design-build

Correct answer: B

CORRECT RESPONSE

Construction manager

Based on the complexity and tight schedule that characterize this project, hiring a construction manager will best serve the owner.

Section: Project Work Planning

Question 49

Milestone Schedule	Date
Project Kickoff, Field Work	31-Jan
Conceptual Design Phase	7-Feb
Owner Preliminary Concept Approval	28-Feb
City Preliminary Development Plan Submission*	7-Mar
City Comments Due	14-Mar
Owner Final Concept Approval	21-Mar
City Final Development Plan Submission**	1-Apr
SD Phase	11-Apr
DD Phase	16-May
CD Phase	4-Jul
Issue for Permit	24-Aug

* City accepts submissions 1st business day each week

** City accepts submissions 1st business day each month

Refer to the exhibit.

During Owner Final Concept Approval, it is discovered that part of the program has 200% more square feet than needed, causing massing changes for the building shell concept. This creates a two-week design delay, but all

milestone durations are to be maintained.

By how many weeks will the City Final Development Plan Submission be delayed?

- A. 2 weeks
- B. 3 weeks
- C. 4 weeks

Correct answer: C

CORRECT RESPONSE

4 weeks

The city only accepts final development plan submissions on the first business day of each month. The two week design delay pushes the City Final Development Plan Submission past April 1. The project will now have to wait until the beginning of the next month, May 1, to submit for the City Final Development Plan Submission.

Section: Project Work Planning

Question 50

An architect issues completed design development documents to prospective contractors for bidding. While interviewing contractors, the owner expresses concerns about schedule and budget changes. The owner also wants to know the cost of the project in order to apply for a community grant.

What type of price should the architect advise the owner to request from the contractors?

- A. Stipulated lump sum
- B. Guaranteed maximum price
- C. Cost plus material

Correct answer: B

CORRECT RESPONSE

Guaranteed maximum price

A guaranteed maximum price allows the contractor to give the owner a price early on in the process using design development drawings that are not at the level of completed construction drawings. This process requires additional cost risks since the contractor uses incomplete drawings to set the price, but GMP does address the owner's desire to move forward with a schedule and have a price for grant applications.

Section: Project Execution

Question 51

STAFF	MONTH 1	MONTH 2	MONTH 3	MONTH 4	MONTH 5
Architect	120	120	120	120	120
Designer 1	120	120	120	95	120
Designer 2	120	80	120	120	120

Refer to the exhibit.

An architect is scheduling workloads for Months 1 through 3. An ongoing project requires 300 hours per month until construction documents are completed at the end of Month 3. A new project will require 40 hours in Month 2 and 120 hours in Month 3.

If the schedule is fixed, how many additional staff hours are necessary to perform the expected work in Months 1 through 3?

- A. 20 hours
- B. 60 hours
- C. 80 hours
- D. 140 hours

Correct answer: C

CORRECT RESPONSE

80 hours

The architect must add the expected workload each month, deducting each team member's availability for each month, and combine the total additional staff hours from all months.

CALCULATIONS

- 1a. Month 1 requires 300 hours for the ongoing project.
- 1b. Additional staff hours required for Month 1: 360 hours are available - 300 hours required = 60 hours; because there are 60 unutilized hours, no additional staff hours will be required for Month 1.
- 2a. Month 2 requires 300 hours for the ongoing project + 40 hours for the new project = 340 hours total
- 2b. Additional staff hours required for Month 2: 320 hours available - 340 hours required = - 20 hours; this means that 20 additional staff hours will be required.
- 3a. Month 3 requires 300 hours for the ongoing project + 120 hours for the new project = 420 hours
- 3b. Additional staff hours required for Month 3: 360 hours available - 420 hours required = - 60 hours; this means that 60 additional staff hours will be required.
- 4. 20 hours (Month 2) + 60 (Month 3) = 80 additional staff hours.

Section: Project Work Planning

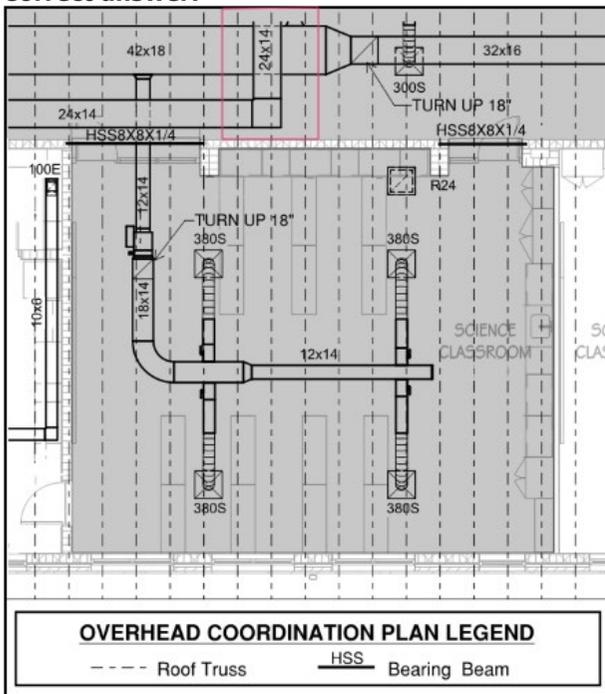
Question 52

An architect conducts a ceiling coordination review by overlaying the consultant's drawings. Design details follow:

- All ceilings: 12'-4" minimum
- Bottom of roof trusses: 14'-10"
- Top of bearing beams: 14'-10"
- All HVAC ducts: located below the roof structure

Click on the location in the shaded area of the RCP to indicate the issue that will require modification.

Correct answer:



CORRECT RESPONSE

Location where a 24" x 14" duct is routed above a 42" x 18" duct

Ductwork at this location would be below the minimum ceiling elevation, putting the bottom of the 42" x 18" duct at 12'-2", which is below the minimum ceiling height of 12'-4".

Section: Project Quality Control

Question 53

An architect is working on a renovation project under an AIA B101 agreement. The architect's compensation is to be calculated as 5% of the cost of the work. The cost of the work is initially determined to be \$12,800,000. Compensation for the architect's basic services follows:

- Schematic Design: 12%
- Design Development: 23%
- Construction Documentation: 40%

- Construction Administration: 25%

At the beginning of construction, the underground foundation is uncovered and is found to require extra structural support, increasing the the total cost of work by 2%.

How much should the architect bill the owner for construction administration services when this phase is 25% complete?

- A. \$40,000
- B. \$40,800
- C. \$50,400
- D. \$64,000

Correct answer: B

CORRECT RESPONSE

\$40,800

According to AIA-B101 Article 11.6, a percentage basis fee for compensation is not adjusted for previous progress payment.

CALCULATIONS

1. Calculate the increased cost of work: $\$12,800,000 + (\$12,800,000 \times 2\%) = \$13,056,000$
2. Determine the architect's compensation: $\$13,056,000 \times 5\% = \$652,800$
3. Calculate architect's fee for the construction administration phase: $\$652,800 \times 25\% = \$163,200$
4. Evaluate billing amount when constructions reaches 25%: $\$163,200 \times 25\% = \$40,800$

Section: Contracts

Question 54

An architect is working on a large office building of Type V construction. A week before the 100% schematic design (SD) deliverable is due to the client, the architect conducts an internal review of the documents to confirm that the deliverable aligns with SD standards.

Which of the following review items should be included in the SD quality review checklist?

- A. Complete procurement documents associated with allowances and unit prices.
- B. Review private office count and square footage needs with current architectural plan.
- C. Confirm structural engineer's documentation of final details to relocate existing columns.
- D. Coordinate plumbing engineer's details with civil engineer's plan for fire protection service.

Correct answer: B

CORRECT RESPONSE

Review private office count and square footage needs with current architectural plan.

Review of programming needs with the current plan is appropriate for an SD quality review process.

Section: Project Quality Control

Question 55

Early in the construction document phase of a building renovation project, a mechanical engineer alerts the project manager that the architect has improperly classified the use of the space. The architect will need to revise the use of the space so that the mechanical engineer can correctly size a large portion of the HVAC system and revise the distribution duct layout.

What should the architect do first to address the improper classification?

- A. Submit a request for additional services.
- B. Take corrective actions to modify the project work plan.
- C. Identify the impact on the previous construction cost estimate.
- D. Advise the owner of the design conditions and their impact on the schedule.

Correct answer: B

CORRECT RESPONSE

Take corrective actions to modify the project work plan.

Taking corrective action if a project is not performing according to the project work plan is the first step the architect should take. The architect should identify the root cause for the error and define a path forward to resolving it prior to discussion with the owner.

Section: Project Work Planning

Question 56

An architect is responding to an RFP for a ground-up research laboratory located on a wetland site. The site includes new road access and must be designed to meet local codes and ordinances.

Which of the following subconsultants should the architect include on their project team? **Check the four that apply.**

- A. Environmental engineer
- B. MEP engineer
- C. Construction manager
- D. Civil engineer
- E. Landscape architect
- F. Site surveyor

Correct answer: ABDE

CORRECT RESPONSES

Environmental engineer

Because the project will be located in a wetland and will require expertise in evaluating and designing for this type of environment.

MEP engineer

Because a laboratory building will require specialty expertise in mechanical, electrical, and plumbing.

Civil engineer

Because the project is located in a wetland and will require expertise in how to bring road and infrastructure to the site.

Landscape architect

Because the site around the building must be landscaped to meet local codes and ordinances.

Section: Resource Management

Question 57

An owner hires a civil engineer to complete site design and an architect to complete building design. The architect hires a mechanical engineer to design the plumbing for the building. During design review, the architect notices that the site's storm drain system is incorrectly tied in to the sanitary sewer at the street.

Who is responsible for correcting this error?

- A. Owner
- B. Architect
- C. Mechanical engineer

Correct answer: A

CORRECT RESPONSE

Owner

The error is due to work performed by the civil engineer. The owner hired the civil engineer and is responsible for the coordination of their work with the architect.

Section: Contracts

Question 58

A developer hires an architect to design a prototype for a series of five-story waterfront hotels. The purchase agreements have been finalized for the first four sites just as the DD phase is complete. The architect finds that the AHJ for one of the sites requires a building setback from a right-of-way that is slightly larger than anticipated. The developer is concerned this will negatively impact the waterfront amenities provided to the guests and has asked the architect to contact the AHJ.

What action should the architect immediately take to address the developer's concerns?

- A. Request a waterfront master plan hearing review.
- B. Appeal to the zoning authority for a variance.

C. Petition for a right-of-way use permit.

Correct answer: B

CORRECT RESPONSE

Appeal to the zoning authority for a variance.

If a project concept does not conform to the site's permitted use, an organization must appeal to the zoning AHJ for a zoning variance. Since the permitted and conditional use could not be fully evaluated until after the site was purchased, the architect should take immediate action to request the variance since this can be a lengthy process.

Section: Project Execution

Question 59

An architect is working under AIA B101 for a project. The terms of the agreement state that compensation is to be calculated as 6% of the owner's \$17,500,000 budget for the cost of the work. The compensation for the architect's basic services are as follows:

- Schematic Design: 10%
- Design Development: 20%
- Construction Documents: 30%
- Procurement: 10%
- Construction: 30%

Prior to completing construction documents, the owner requests changes that increase the cost of work by 2%.

How much compensation will the architect receive for the construction documents phase?

- A. \$315,000
- B. \$321,300
- C. \$630,000
- D. \$636,300

Correct answer: B

CORRECT RESPONSE

\$321,300

Since the cost of work increased by 2% during the CD phase, the architects fee for this phase of work is based on the increased cost of work. See calculations for compensation for the construction documents phase.

CALCULATIONS

1. Calculate new total cost of work: $\$17,500,000 + 2\% (\$17,500,000) = \$17,850,000$
2. Calculate the total architect compensation following the increase: $\$17,850,000 \times 6\% = \$1,071,000$
3. Calculate architect compensation per basic services for construction documents phase: $\$1,071,000 \times 30\% = \$321,300$

Section: Resource Management

Question 60

Project Stakeholder Engagement	Schematic Design		Design Dev.		Construction Documents								Bidding		Construction										
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	
A	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
B	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
C	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
D	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W

Refer to the exhibit.

In order to ensure design objectives are continually monitored and met across all phases of a project, an architect is mapping out the following communication plan for project stakeholders:

- The owner's project team will meet biweekly throughout the project.
- The owner's executive team will approve all deliverables before the end of each phase.
- The owner's stakeholder team will be interviewed early and receive updates at the beginning of each phase.
- The architect will meet biweekly with the internal design team.

Which row of the Project Stakeholder Engagement schedule indicates the frequency with which the owner's stakeholder team will engage?

- A. A
- B. B
- C. C
- D. D

Correct answer: D

CORRECT RESPONSE

D

This owner's stakeholder team goes in row D of the Project Stakeholder Engagement schedule because the row shows several meetings at the beginning of the project and then at the beginning of each phase. According to the communication plan, the owner's stakeholder team will be interviewed early and will receive updates at the beginning of each phase.

Section: Project Quality Control

Question 61

An architect has designed a project that the owner needs to be operational before the end of the year. As the bid package is being put together, the owner asks the architect for the most appropriate method of ensuring that the selected contractor meets the deadline. The owner is committed to not changing the design during construction.

Which one of the following should the architect recommend?

- A. Provide a contract provision for consequential damages to complete unfinished work.
- B. Provide a budget contingency for unforeseen schedule impacts.
- C. Provide a contract provision for liquidated damages.

Correct answer: C

CORRECT RESPONSE

Provide a contract provision for liquidated damages.

A liquidated damage provision, based on the financial loss expected to be incurred by the contractor if there is a delay in construction, can be included in the contract to motivate the contractor to meet the deadline.

Section: Contracts

Question 62

The architect is calculating the impact of a client-directed program changes on the work plan. The project manager estimates that 15% more hours will be needed in the DD and CD phases to complete the client's program changes. The average fee rate is \$120 per hour.

What is the additional total contract fee?

- A. \$27,000
- B. \$27,846
- C. \$25,704

Correct answer: A

CORRECT RESPONSE

\$27,000

CALCULATIONS

1. Calculate the hours spent to date for DD and CD: 700 hours (for design development) + 800 hours (for construction documents) = 1,500 hours
2. Calculate the increase in hours: 1,500 hours x 15% (number of extra hours needed to complete the modified program) = 225 hours
3. Calculate the additional contract fee: 225 hours x \$120/hr = \$27,000

CASE STUDY RESOURCES USED

Scenario

Cost and Budget

Section: Project Work Planning

Question 63

Eliminating the spa from the program will reduce the amount of HVAC, electrical, and plumbing work needed for the project. However, it will increase the amount of hotel room Furnishing, Fixtures & Equipment (FFE). The FFE cost for the original spa design was being covered by the spa operator and was not included in the architect's estimate. The reduced construction cost for the MEP changes is estimated to be \$65,400.

How much project cost should be allocated to the FFE budget to maintain the total opinion of probable cost from the Design Development phase? Round to the nearest hundred.

- A. \$65,400
- B. \$70,000
- C. \$210,000
- D. \$196,200

Correct answer: B

CORRECT RESPONSE

\$70,000

Per the Cost and Budget, FFE is not subject to the 7% construction contingency. This must be considered when moving the HVAC savings amount to the FFE budget.

CALCULATIONS

1. \$2,735,000 (subtotal direct costs) - \$65,400 (MEP savings) = \$2,669,600 (new subtotal direct costs)
2. \$2,669,600 (new subtotal direct costs) x 7% (construction contingency) = \$186,872
3. \$2,669,600 (new subtotal direct costs) + \$186,872 (construction contingency) = \$2,856,472 (total construction)
4. \$3,406,500 (total opinion of probable cost) - \$480,000 (current FFE) - \$2,856,472 (total construction) = \$70,028 (rounded to \$70,000)

CASE STUDY RESOURCES USED

Scenario

Cost and Budget

Section: Project Execution

Question 64

In response to the owner's decision to change the program, the project team holds a design review and assigns action items to members of the project team.

What element should the HVAC and structural engineers be instructed to coordinate?

- A. The floor opening size and locations for water lines.
- B. The revised heating and cooling loads for the new program.
- C. The location and supports for a rooftop air handling unit.

Correct answer: C

CORRECT RESPONSE

The location and supports for a rooftop air handling unit.

The structural engineer coordinates the loads of the rooftop unit that is designed by the HVAC engineer.

CASE STUDY RESOURCES USED

Scenario

Section: Project Work Planning

Question 65

Which element of the probable cost estimate should be reduced due to the client's change to the program?

- A. Vertical Transportation
- B. Plumbing
- C. Structural Modifications

Correct answer: B

CORRECT RESPONSE

Plumbing

The probable cost for plumbing should be reduced because converting existing hotel rooms to spa spaces will require more plumbing modifications than combining individual hotel rooms into suites. The new requested program would be able to reuse more of the existing plumbing of the original hotel rooms since the function is similar.

CASE STUDY RESOURCES USED

Scenario
Cost and Budget

Section: Project Execution

Question 66

An architect is reviewing the ice cream store elevations as part of a quality control review and finds that a cupola was added during the final stages of design. The cupola is 40% taller than zoning allows, and the architect questions if the AHJ will allow this architectural feature.

What should the architect do to obtain AHJ approval for this design?

- A. Request a special permit from the Zoning Board of Appeals.
- B. Request approval from the City Environmental Review Board.
- C. Provide elevations that show that the cupola height is 40% taller than the allowable height.
- D. Provide elevations that show the average height across the entire facade meets the allowable height.

Correct answer: C

CORRECT RESPONSE

Provide elevations that show that the cupola height is 40% taller than the allowable height.

According to Zoning Ordinance 1260.15, cupolas and other appurtenances are allowed to be up to 50% taller than the allowable height.

CASE STUDY RESOURCES USED

Scenario
Zoning Ordinance Excerpts

Section: Project Quality Control

Question 67

The ice cream chain directs franchisees to add ice cream trucks to their business plan. With a large area of the site available for construction, the owner directs the architect to provide a fee for the design of the largest storage and maintenance garage that can be accommodated on the site. The architecture firm calculates their standard fee for a garage at \$5.00 per square foot.

What is the firm's total fee for the garage?

- A. \$19,500
- B. \$22,750
- C. \$42,250
- D. \$65,000

Correct answer: B

CORRECT RESPONSE

\$22,750

CALCULATIONS

1. For the maximum square footage of the garage: 13,000 sf (square footage of the principal structure) x .35 (percentage for accessory structures) = 4,550 sf
2. For the firm's fee for the garage: 4,550 sf (allowable square footage of the garage) x \$5.00 (firm's fee per square foot) = \$22,750

CASE STUDY RESOURCES USED

Scenario
Zoning Ordinance Excerpts

Section: Project Execution

Question 68

The ice cream chain has selected a site for the proposed development, and due to site constraints, the civil engineer decides to place the building six feet from the side yard property line. After reading the requirements in chapter 1260 of the zoning ordinance, the architect is reevaluating this decision.

Why should the architect inform the civil engineer to reevaluate placing the building in that location?

- A. The exterior wall must have a fire rating.
- B. The building must have parking on all sides.

- C. The side yard must allow rear yard access to the fire department.
- D. The side yard must be large enough for a mechanical enclosure.

Correct answer: C

CORRECT RESPONSE

The side yard must allow rear yard access to the fire department.

Section 1260.05 stipulates that the side yard for any property in a commercial district must maintain eight feet to allow fire-fighting equipment to reach the rear yard.

CASE STUDY RESOURCES USED

Scenario

Zoning Ordinance Excerpts

Section: Project Execution

Question 69

Due to site limitations, the architect has decided to separate the retail space and creamery programs into separate buildings. The 9,000-square-foot retail space will contain the majority of the program, including a sales floor, drive-through, restrooms, office space, and mechanical space. The prototype design requires the creamery element of the program to include a cupola. The creamery will showcase the ice cream-making equipment and be accessed from the property's rear alley.

Which section from the Zoning Ordinance Excerpts will have the most direct impact on the size of the creamery?

- A. 1260.05
- B. 1260.11
- C. 1260.15

Correct answer: B

CORRECT RESPONSE

1260.11

The creamery is an accessory structure. Of the sections provided, 1260.11 will directly impact the overall size of the creamery because it regulates the area and height of accessory structures.

CASE STUDY RESOURCES USED

Scenario

Zoning Ordinance Excerpts

Section: Project Quality Control

Question 70

The agreement between the architect and the owner was originally drafted based on a proposed project budget of \$36,000,000. The architectural fees were set at 5% of the construction budget.

After reviewing the cost estimate, what action should the architect take?

- A. Request \$350,000 in additional fees from the owner based on the current project budget.
- B. Request revised fee proposals from MEP and structural consultants based on the current project budget.
- C. Work with the contractor to revise the pricing estimate and look for potential savings to reduce the budget.

Correct answer: C

CORRECT RESPONSE

Work with the contractor to revise the pricing estimate and look for potential savings to reduce the budget.

At the design development phase, cost estimates are not final and changes can still be made to bring the project within the client's budget. The architect's role is to monitor project costs throughout the design phases and make recommendations to keep the project within budget.

CASE STUDY RESOURCES USED

Scenario

Cost Estimate

Section: Contracts

Question 71

The project cost estimate exceeds the owner's total project funds, and they ask the architect to reduce the scope of architecture and engineering services. The architect suggests reducing the scope by removing a consultant from the

project.

Which consultant should they remove from the scope of the project?

- A. Accessibility Consultant
- B. Acoustic Consultant
- C. Elevator Consultant
- D. Historic Building Consultant

Correct answer: A

CORRECT RESPONSE

Accessibility Consultant

While accessibility is necessary for any project, it is a scope that the architect is most qualified to address without a consultant since it is a fundamental principle of health, safety, and welfare within architectural design.

CASE STUDY RESOURCES USED

Scenario

Cost Estimate

Section: Project Execution

Question 72

The architect is reviewing the estimate to calculate the additional cost to the project for the contractor's general conditions, profit, and overhead markups. The general contractor's combined rate for general conditions, profit, and overhead is 15%.

What will be the additional cost to the project for these markups?

- A. \$5,057,370
- B. \$5,182,620
- C. \$5,722,620
- D. \$5,872,620

Correct answer: A

CORRECT RESPONSE

\$5,057,370

Direct construction costs are used when calculating the total dollar amount for the general contractor's general conditions, profit, and overhead.

CALCULATION

1. $\$33,715,800$ (direct construction costs) \times 15% (general contractor's combined rate) = $\$5,057,370$

CASE STUDY RESOURCES USED

Scenario

Cost Estimate

Section: Project Execution

Question 73

The contractor has completed preliminary pricing based on the architect's design development drawings. The owner has reviewed the pricing and informed the architect that their budget is \$40,000,000.

The owner requests that the architect and contractor review the budget and make recommendations for cuts that will have a minimal impact to the schedule and quality of the project.

What should the architect recommend? **Check the two that apply.**

- A. Eliminate the interior sprinkler upgrades for savings of \$1,100,000.
- B. Propose leaving tenant spaces as empty shells without improvements for savings of \$800,000 per tenant space.
- C. Renovate the interior of the serviceable elevator cabs instead of replacing them for savings of \$760,000.
- D. Terminate the contract with the Sustainability Consultant after design development phase for savings of \$240,000.
- E. Eliminate exterior window replacement for savings of \$1,500,000.
- F. Terminate the contract with the Historic Building Consultant after design development for savings of \$75,000.

Correct answer: BC

CORRECT RESPONSE

Propose leaving tenant spaces as empty shells without improvements for savings of \$800,000 per tenant space.

Removing improvements to the tenant spaces and leaving them as empty shells will save \$2,400,000 (\$800,000 x 3 spaces) and has no impact on the overall structure. Improvements to these spaces can be negotiated later with the prospective tenants.

Renovate the interior of the serviceable elevator cabs instead of replacing them for savings of \$660,000.

Renovating the interior of serviceable elevators is an effective way to save money while maintaining the quality of the project. It would have minimal impact on the schedule and may save time over a full replacement.

CALCULATION

1. \$2,400,000 (removing improvements to the tenant spaces) + \$760,000 (renovating the interior of the serviceable elevators) = \$3,160,000

CASE STUDY RESOURCES USED

Scenario

Cost Estimate

Section: Project Execution

Question 74

During the project kickoff, the owner informs the architect that there is an abandoned and flooded mine shaft on the site. The architect notes that this will require additional geotechnical surveying and soil borings.

Which tasks from the fee proposal will need to be revised based on this information? **Check the two that apply.**

- A. 2.1
- B. 2.2
- C. 2.4
- D. 2.5
- E. 4.2
- F. AS2.9

Correct answer: BF

CORRECT RESPONSES

2.2

The geotechnical engineer will need to revise the fee to account for additional borings.

AS2.9

The geotechnical engineer will need to revise the fee to account for additional borings.

CASE STUDY RESOURCES USED

Scenario

Fee Proposal

Section: Project Execution

Question 75

The owner has asked the architect to resubmit the fee proposal with internal document coordination review periods called out in the pricing.

Coordination review periods should be included after which tasks listed in the fee proposal? **Check the three that apply.**

- A. 1.3
- B. 2.4
- C. 3.2
- D. 3.3
- E. 6.1
- F. AS2.5

Correct answer: CDF

CORRECT RESPONSES

3.2

A coordination review should be completed after design development since it is a primary design deliverable.

3.3

A coordination review should be completed after construction documents since it is a primary design deliverable.

AS2.5

A coordination review should be completed after the wastewater design development and construction documents are complete since they would also be primary design deliverables.

CASE STUDY RESOURCES USED**Scenario****Fee Proposal**

Section: Project Quality Control

Testing Resources

For more information on test preparation references and resources, as well as testing policies and procedures, please refer to the ARE 5.0 Guidelines, available on ncarb.org.