NCARB

PRACTICE EXAM

ARCHITECT REGISTRATION EXAMINATION® 5.0

Project Development and Documentation

ARE® 5.0

For use by supervisors and mentors.

Licensure candidates should access the free practice exams through their NCARB Record.

ARE® LICENSE

The Architect Registration Examination (ARE) 5.0 Practice Exams ("Materials") are made available by the National Council of Architectural Registration Boards ("NCARB") in accordance with the following terms and conditions ("Agreement").

1. **LICENSE GRANT.** Conditioned on continued compliance with this Agreement, NCARB provides each individual person (identified herein as "you" or with "your), and whether an individual person or an individual person using pursuant to a license to an individual entity, with a revocable, personal, limited, non-exclusive, non-transferable, and non-sublicensable license to use the Materials solely for educational purposes in connection with (assisted) study and preparation for the Architect Registration Examination® ("ARE®"). This license permits you to create printouts or output from the Materials and discuss these works in public or private settings but only in accordance with this Agreement.

2. **LICENSE GRANT RESTRICTIONS.** The Materials are not intended to contain any questions currently in use in the ARE®. Consequently, no rights are granted under this Agreement to any questions or materials currently in use in the ARE®. All use is limited to the Materials (in the form and format) as made available by NCARB. Except as provided above, you may not modify, alter, recompile, reassemble, translate, create derivative work(s) of, distribute, publish, license, sub-license, transfer, sell, rent, timeshare, outsource, provide on a service bureau basis, lease, grant a security interest in, assign or transfer any right(s) in, or otherwise use in any manner not expressly permitted herein the Materials or any part thereof. In addition, you may not remove or alter any proprietary notice on the Materials or use any portion of the Materials independently from the Materials as a whole or for purposes other than as expressly permitted herein. All rights not expressly granted to you herein are hereby reserved to NCARB.

3. **USER OBLIGATIONS.** You represent that you are of the legal age to create a binding agreement with NCARB and agree to abide by all applicable local, state, national, and international laws and regulations with respect to your use of the Materials. You also agree to assume all responsibility concerning your use of the Materials.

4. **PROPRIETARY RIGHTS.** Any rights granted hereby are licensed and not sold or otherwise transferred or assigned to you or any third party. NCARB shall retain all ownership right, title, and interest in and to the Materials. Unless otherwise noted, the Materials are Copyright © 2024 The National Council of Architectural Registration Boards. All rights reserved. NCARB, ARE®, ARCHITECT REGISTRATION EXAMINATION, and all other names, logos, and icons identifying NCARB and its programs, products, and services are proprietary trademarks of NCARB, and any use of such marks, including, without limitation, as domain names, without the express written permission of NCARB is strictly prohibited. Unauthorized use of the Materials may violate intellectual property or other proprietary rights laws as well as other domestic and international laws.

5. **FEEDBACK.** NCARB welcomes your feedback and suggestions about how to improve the Materials. You agree that NCARB shall have the perpetual, royalty-free, and irrevocable right to use such feedback and suggestions in any manner it deems desirable without providing any consideration, attribution, or payment to you. You also represent and warrant that such feedback does not infringe or violate the intellectual property or proprietary rights of any third party (including, without limitation, patents, copyrights, or trademark rights) and that you have all rights necessary to convey to NCARB and enable NCARB to use such feedback.

6. **WARRANTY DISCLAIMER.** Use of the Materials is solely of your own volition and at your own risk. NCARB does not guarantee a passing score on the ARE® or similar standardized tests. NCARB ALSO MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT THE SUITABILITY, COMPLETENESS, TIMELINESS, RELIABILITY, LEGALITY, OR ACCURACY OF THE MATERIALS FOR ANY PURPOSE. THE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, INCLUDING, WITHOUT LIMITATION, ALL IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, AND NON-INFRINGEMENT AS WELL AS ANY WARRANTY RELATED TO THE USE, OR THE RESULTS OF THE USE, OF THE MATERIALS OR ANY DOCUMENTATION ASSOCIATED

THEREWITH. NCARB may make modifications and/or changes to the materials at any time and for any reason.

7. **LIMITATION OF LIABILITY.** YOU AGREE THAT IN NO EVENT SHALL NCARB BE LIABLE FOR ANY INDIRECT, PUNITIVE, INCIDENTAL, SPECIAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE USE OF THE MATERIALS BY YOU OR ANYONE ELSE, WHETHER BASED IN CONTRACT, TORT, STRICT LIABILITY, OR OTHERWISE, EVEN IF YOU HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. WITHOUT LIMITATION OF THE FOREGOING, THE TOTAL LIABILITY OF NCARB FOR ANY REASON WHATSOEVER RELATED TO USE OF THE MATERIALS, INCLUDING FOR ANY CLAIMS RELATING TO THIS AGREEMENT, SHALL NOT EXCEED $100 (USD).

8. **INDEMNITY.** You agree to defend, indemnify, and hold harmless NCARB and its affiliates, employees, licensors, agents, directors, officers, partners, representatives, shareholders, attorneys, predecessors, successors, and assigns from and against any and all claims, proceedings, damages, injuries, liabilities, losses, costs, and expenses (including reasonable attorneys' fees and litigation expenses) relating to or arising from your use of the Materials and any breach by you of this Agreement.

9. **GOVERNING LAW.** This Agreement has been made in and will be construed and enforced solely in accordance with the laws of the District of Columbia as applied to agreements entered into and completely performed in the District of Columbia. Any action to enforce this Agreement will be brought solely in the federal or local courts in the District of Columbia, U.S.A., and you and NCARB expressly agree to be subject to the jurisdiction of such courts. You also agree that because there is no adequate remedy at law, NCARB shall be entitled to equitable relief in the courts of the District of Columbia, including injunctive relief, in the event of any breach or threatened breach of the provisions of this Agreement, and you shall not oppose the granting of such relief. Entitlement to equitable relief shall not be the exclusive remedy but shall be in addition to damages and all other remedies available to NCARB. If NCARB takes legal action to enforce this Agreement and is granted any material relief because of your breach, NCARB shall be entitled to reasonable attorneys' fees, expenses, and costs of litigation.

10. **TERM AND TERMINATION.** This Agreement and your right to use the Materials will take effect at the moment you install, download, access, or use the Materials, whichever occurs first, and is effective until terminated as set forth below. This Agreement will terminate automatically if you fail to comply with any of the terms and conditions described herein, including by exceeding the scope of the license. Termination or expiration of this Agreement will be effective without notice. You may also terminate at any time by ceasing to use the Materials, but all applicable provisions of this Agreement will survive termination, as outlined below. Upon termination or expiration, any right to use the Materials will immediately cease and you must return, destroy, or delete from your system all copies of the Materials (and any associated materials) in your possession. The provisions concerning NCARB's proprietary rights, indemnity, disclaimers of warranty and liability, termination, and governing law, however, will survive the termination or expiration of this Agreement for any reason.

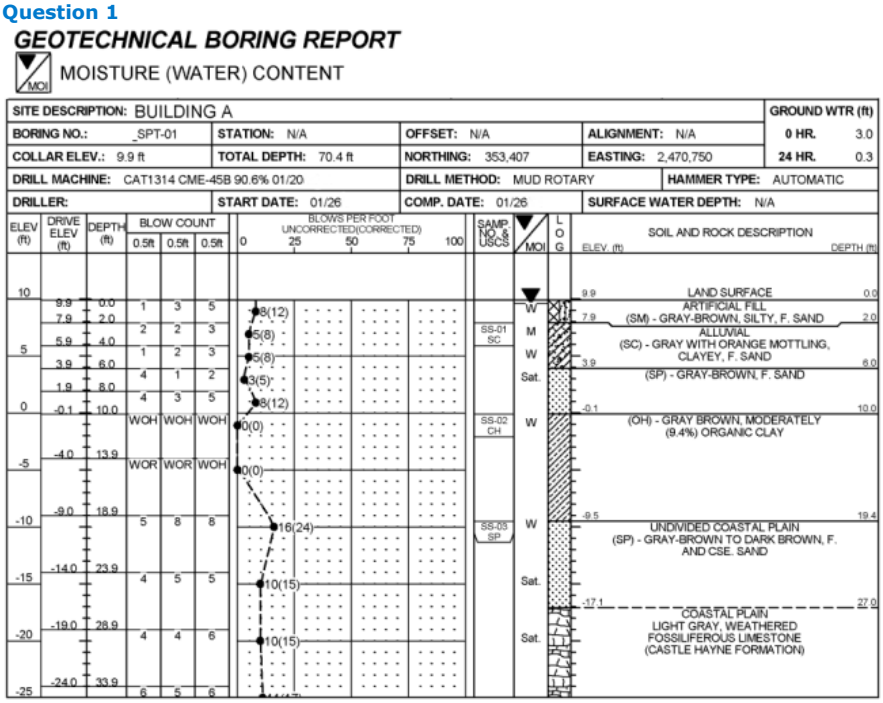
11. **MISCELLANEOUS.** Failure to insist on strict performance of any of the terms and conditions of this Agreement will not operate as a waiver of that or any subsequent default or failure of performance. A printed version of this Agreement and of any related notice given in electronic form shall be admissible in judicial or administrative proceedings based upon or relating to this Agreement to the same extent and subject to the same conditions as other business documents and records originally generated and maintained in printed form. No joint venture, partnership, employment, alliance, or agency relationship exists between you and NCARB as result of this Agreement or your utilization of the Materials. Moreover, you may not bind NCARB in any way or otherwise make any representations or statements for or on behalf of NCARB without NCARB's separate, express, and written permission. This Agreement represents the entire agreement between you and NCARB with respect to use of the Materials, and it supersedes all prior or contemporaneous communications and proposals, whether electronic, oral, or written, between you and NCARB with respect to the Materials. This Agreement may not be assigned or transferred by you without the prior express written consent of NCARB.

NCARB released this PDF version of the ARE Project Development and Documentation division practice exam to help supervisors and mentors understand the content that exists across this division. If you are a supervisor or mentor, please use this to guide your engagements with the licensure candidates you are helping.

If you are a licensure candidate, please access the free practice exam through your NCARB Record rather than referring to this PDF version.

Note: for case study questions in this practice exam, the case study resources are not reproduced as part of this PDF for copyright and other reasons. Each case study question does identify which case study resources should be used to properly answer the question. Any licensure candidate can access the practice exam at no cost through their NCARB Record and show their supervisor/mentor the available case study resources.

Question 1



Refer to the exhibit.

An architect is designing a new office building.

How should the architect detail the exterior of the foundation stem wall?

A. Apply dampproofing
B. Leave the concrete exposed
C. Apply waterproofing

Correct answer: C

CORRECT RESPONSE
Apply waterproofing
Water is located just below the land surface, and waterproofing is recommended to be applied in this condition where a high water table or severe soil-water conditions, as noted on the geotechnical report, are evident.

Section: Integration of Building Materials & Systems

Question 2
A project team is completing the design for a fast-track renovation project while demolition is underway. The new design calls for non-insulated metal stud furring along the perimeter of the existing insulated masonry wall. During demolition, though, the construction manager discovers that the walls are missing the insulation indicated in the documents for the existing building.

The architect and construction manager determine that foamed-in insulation to the full depth of the stud cavity will provide the desired R-value for the exterior wall system.

Which bid packages should be released in conjunction with the insulation bid package?

A. 07 62 00 - Sheet Metal Flashing and Trim & 07 92 00 - Joint Sealants
B. 20 07 19 - Piping Insulation & 23 07 13 - Duct Insulation
C. 09 21 16 - Gypsum Board Assemblies & 09 91 23 - Interior Painting
D. 26 05 34 - Conduit for Electrical Systems & 26 05 37 - Electrical Boxes

Correct answer: D

CORRECT RESPONSE
26 05 34 - Conduit for Electrical Systems & 26 05 37 - Electrical Boxes

Conduit and electrical boxes will be run in the framed walls and should be installed prior to the insulation so that insulation will not need to be cut out and replaced for electrical rough-in.

Section: Construction Documentation

Question 3
An architect is designing a single expansion joint for a 200-foot-long building. The movement will be primarily controlled by the steel roof deck, which will experience a 120º F temperature differential.

What will the size of the expansion joint be?

Reference Formulas:
change in length = coefficient of expansion x original length x change in temperature
coefficient of expansion = .0000065 / º F

A. 0.156 inches
B. 0.936 inches
C. 1.872 inches

Correct answer: C

CORRECT RESPONSE
1.872 inches

CALCULATIONS
1. 0.0000065 x 200-foot-long building x 120º F = .156 feet
2. 0.156 feet x 12 inches / 1 foot = 1.872 inches

Section: Integration of Building Materials & Systems

Question 4

Wall Type	Framing	Wall Cavity U-Value
A	Wood	.06
B	Wood	.07
C	Wood	.10
D	Wood	.11

Refer to the exhibit.

An architect needs to select a wall type with a wall cavity R-value of 16 or greater for the design of a wood-framed, low-rise building.

Which wall type should the architect select?

A. Wall Type A
B. Wall Type B
C. Wall Type C
D. Wall Type D

Correct answer: A

CORRECT RESPONSE
Wall Type A
R-value of 16.67

CALCULATIONS
1. Calculate R-value by converting U to R: 1 / .06 = 16.67

Section: Codes & Regulations

Question 5
An architect is designing a new office building in a marine environment that will receive regular ocean spray. The structural frame of the building will be made of carbon steel anchored to a concrete pile foundation. The skin of the building will consist of a brushed finished, aluminum framed, glass curtain wall.

What should the architect take into account when detailing the structural connections?

A. Selection and placement of materials and coatings to resist galvanic corrosion.
B. Determination of the use of sulfate-resistant cement in the pile foundation.
C. Choice of low iron glass for the ocean-facing side.

Correct answer: A

CORRECT RESPONSE
Selection and placement of proper materials and coatings to resist galvanic corrosion.
Ocean spray acts as an electrolyte. Untreated carbon steel acts as a cathode. Mechanically finished aluminum acts as an anode. Together, they act as a galvanic cell, which causes galvanic corrosion.

Section: Integration of Building Materials & Systems

Question 6
An architect is working on a small warehouse project. The client's program calls for a single-story, steel-frame, clear span structure housing a 4,500-square-foot open space that will be used for the storage of packaged plastic products. The architect is beginning a preliminary IBC code review.

Which of the following IBC tables should the architect review? **Check the three that apply.**

A. Table 504.3 Allowable Building Height in Feet Above Grade Plane
B. Table 508.4 Required Separation of Occupancies
C. Table 601 Fire-Resistance Rating Requirements for Building Elements
D. Table 706.4 Fire Wall Fire-Resistance Ratings
E. Table 722.2.4 Minimum Dimension of Concrete Columns
F. Table 1004.5 Maximum Floor Area Allowances per Occupant

Correct answer: ACF

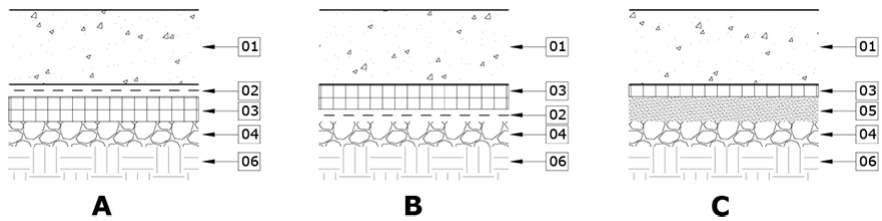
CORRECT RESPONSES
Table 504.3 Allowable Building Height in Feet Above Grade Plane
All projects typically utilize Table 504.3 in order to determine the maximum building height by building type.

Table 601 Fire-Resistance Rating Requirements for Building Elements
Meeting fire-resistance ratings is required for buildings.

Table 1004.5 Maximum Floor Area Allowances per Occupant
All buildings, regardless of use, must establish an occupant load.

Section: Codes & Regulations

Question 7



KEYNOTE:
01 STRUCTURAL CONCRETE SLAB
02 CAPILLARY BREAK
03 RIGID INSULATION
04 CRUSHED STONE BASE
05 SAND BASE
06 COMPACTED SUBGRADE

Refer to the exhibit.

An architect is designing the slab-on-grade assembly for a courthouse in a cold climate with frequent rainfall. The following will be required of the assembly:

- A high insulation R-value
- A thermal break
- Capillary movement should be reduced

Which floor assembly should the architect use?

A. A
B. B
C. C

Correct answer: A

CORRECT RESPONSE
A
This assembly positions the capillary break membrane to prevent rain water from being trapped between the insulation and the slab during construction. The assembly addresses the requirement of creating a thermal break as required.

Section: Integration of Building Materials & Systems

Question 8

	Nonresidential		*Residential*		*Semiheated*	
Opaque Elements	Assembly Maximum	Insulation Min. *R-Value*	Assembly Maximum	Insulation Min. *R-Value*	Assembly Maximum	Insulation Min. *R-Value*
Roofs						
Insulation entirely above deck	U-0.039	R-25 c.i	U-0.039	R-25 c.i	U-0.119	R-7.6 c.i.
*Metal Building**	U-0.041	R-10 + R-19 FC	U-0.041	R-10 + R-19 FC	U-0.096	R-16
Attic and other	U-0.027	R-38	U-0.027	R-38	U-0.053	R-19
Walls, above Grade						
Mass	U-0.123	R-7.6 c.i.	U-0.104	R-9.5 c.i.	U-0.580	NR
*Metal Building**	U-0.094	R-0 + R-9.8 c.i.	U-0.072	R-0 + R-13 c.i.	U-0.162	R-13
Steel-framed	U-0.077	R-13 + R-5 c.i.	U-0.064	R-13 + R-7.5 c.i.	U-0.124	R-13
Wood-framed and other	U-0.089	R-13	U-0.064	R-13 + R-3.8 c.i. or R-20	U-0.089	R-13
Walls, below Grade						
Below-grade wall	C-1.140	NR	C-1.140	NR	C-1.140	NR
Floors						
Mass	U-0.074	R-10 c.i.	U-0.074	R-10 c.i.	U-0.137	R-4.2 c.i.
Steel joist	U-0.038	R-30	U-0.038	R-30	U-0.052	R-19
Wood-framed and other	U-0.033	R-30	U-0.033	R-30	U-0.051	R-19

*Metal Building refer to a PEMB (pre-engineered metal building) consisting of rigid frames, cold-formed secondary structural members, building bracing members and typically metal panels on both the roof and exterior walls. All building components are manufactured offsite in a controlled environment and then shipped to the buidling site to be erected.
c.i. = continuous insulation

Refer to the exhibit.

An architect is reviewing insulation values for a new two-story office building. The building is designed with an aluminum standing seam roof with insulation entirely above the structural roof deck, an exterior brick veneer and metal stud back-up wall assembly, and concrete slab on grade with concrete foundations. Insulation values are as follows:

- Fiberglass batts: R3.5 per inch
- Rock-wool blankets: R3 per inch
- Polystyrene rigid: R4.5 per inch
- Polyisocyanurate rigid: R8 per inch

Which one of the following exterior assemblies complies with the requirements listed in the table above?

A. Standing seam metal roof with 4 inches of polyisocyanurate insulation, 1 inch of polystyrene rigid insulation in the brick veneer cavity, and 5 inches of fiberglass batts in the metal studs.
B. Standing seam metal roof with 3 inches of polyisocyanurate insulation, 2 inches of polystyrene rigid insulation in the brick veneer cavity, and 5 inches of fiberglass batts in the metal studs.
C. Standing seam metal roof with 4 inches of polyisocyanurate insulation, 1.5 inches of polystyrene rigid insulation in the brick veneer cavity, and 4.5 inches of rock-wool blankets in the metal studs.

Correct answer: C

CORRECT RESPONSE
Standing seam metal roof with 4 inches of polyisocyanurate insulation, 1.5 inches of polystyrene rigid insulation in the brick veneer cavity, and 4.5 inches of rock-wool blankets in the metal studs.
The insulation thicknesses at the roof and wall assemblies meet the minimum requirements in the table for nonresidential buildings with insulation entirely above the roof deck and steel-framed walls above grade.

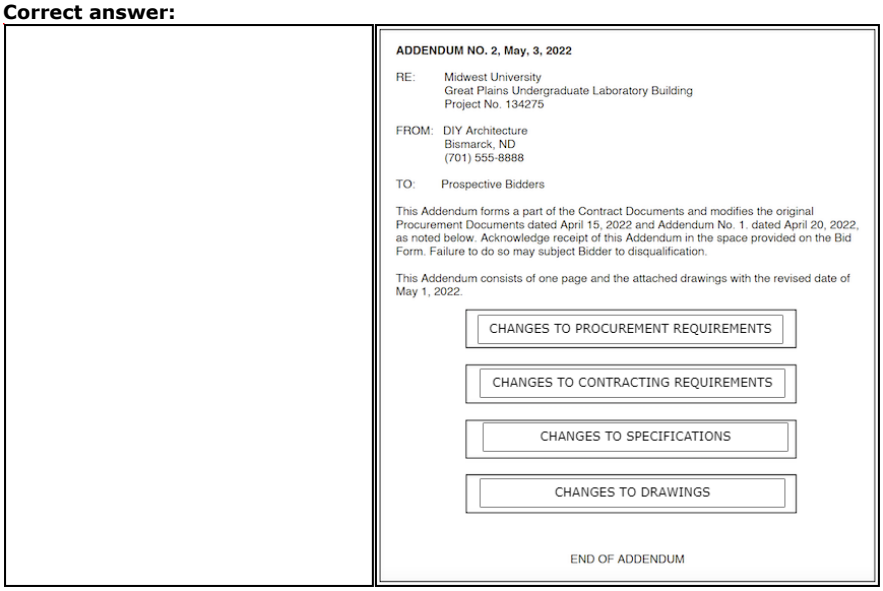
CALCULATIONS
1. Roof insulation: 4 inches of polyisocyanurate x R8 per inch = R32 (compliant)
2. Wall assembly - cavity continuous insulation: 1.5 inches of polystyrene x R4.5 per inch = R6.75 (compliant)
3. Wall assembly - metal stud insulation: 4.5 inches of rock-wool blankets x R3 per inch = R13.5 (compliant)

Section: Construction Documentation

Question 9
An architecture firm is designing a new university laboratory building. Though the project is currently in the bidding phase, the university board passes a campus-wide long-term sustainability goal that requires all new construction on campus to follow more stringent criteria. As a result, the architect issues an addendum about changes to the contract documents.

Drag the section titles into the boxes in the addendum to indicate the CSI recommended ordering of addendum sections.

Correct answer:



CORRECT RESPONSES
CHANGES TO PROCUREMENT REQUIREMENTS
CHANGES TO CONTRACTING REQUIREMENTS
CHANGES TO SPECIFICATIONS
CHANGES TO DRAWINGS
CSI recommends that addenda items be arranged in the same sequence as the project manual and the drawings.

Section: Project Manual & Specifications

Question 10
An architect is designing a strip mall with a canopy-covered walkway that runs along the storefronts. The client wants the fascia of the canopy-covered walkway to accommodate tenant signage. The turnover rate for smaller tenants will be 18 to 24 months. Tenant signs will range in size and are required to be direct mount channel signage for individual letters and logos.

Which materials and methods of construction should the architect recommend? **Check the three that apply.**

A. Plywood sheathing installed on the framing behind the weather barrier and finish material.
B. Soffit panels installed in canopy to access the back of the fascia wall.
C. Field-painted fiber cement rain screen panel system with aluminum clip system.
D. Field-painted fiber cement panels directly applied over the weather barrier and direct to sheathing.
E. Pre-finished corrugated metal wall panels directly applied over the weather barrier and direct to sheathing.
F. Gypsum sheathing installed on the framing behind the weather barrier and finish material.

Correct answer: ABD

CORRECT RESPONSES
Plywood sheathing installed on the framing behind the weather barrier and finish material.
Plywood sheathing installed behind the finish material, with a proper weather barrier, will allow different types of signs to be directly attached to the facade.

Soffit panels installed in canopy to access the back of the fascia wall.
Access to the back of the fascia allows for electrical access, which will be needed for sign change-over and maintenance.

Field-painted fiber cement panels directly applied over the weather barrier and direct to sheathing.
Fiber cement panels applied directly over the weather barrier allows for channel signage to be fastened directly through the panel into the sheathing behind. Field-painted panels can be repaired and repainted.

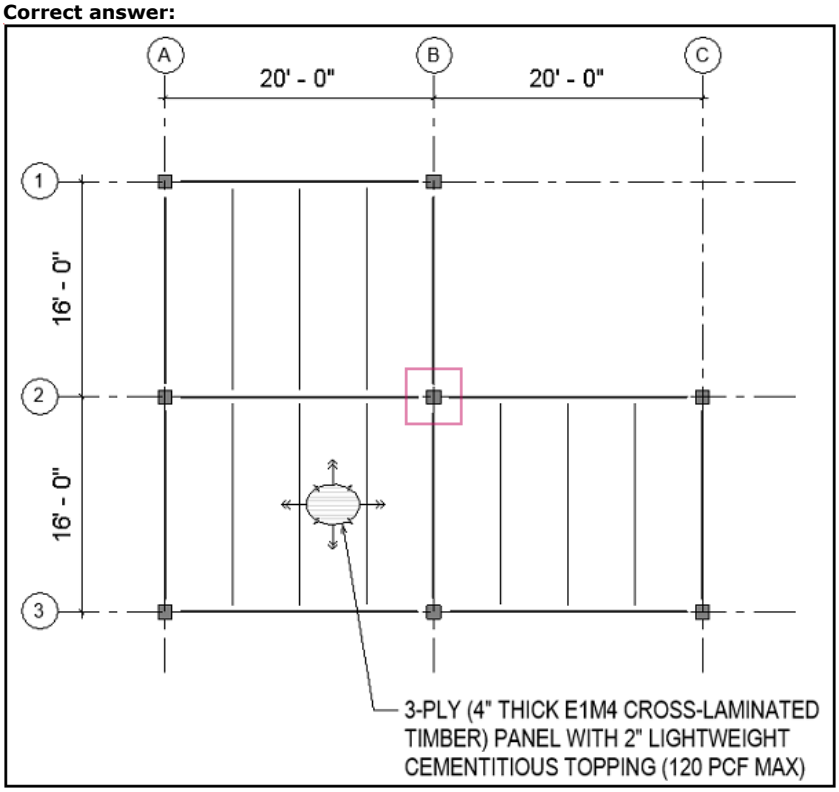
Section: Integration of Building Materials & Systems

Question 11

An architect is coordinating the support frame for an elevated deck with a structural engineer and would like to study the ability to reduce column sizes.

Click on the column in the framing layout that will bear the greatest load.

Correct answer:



CORRECT RESPONSE
The column at gridlines B and 2
This column will bear the the greatest load because because it supports the partial load area of three column bays. See calculations.

CALCULATIONS
1. Determine half of the length of one column bay: 20'-0" (length of column bay) / 2 = 10'-0"
2. Determine half of the depth of one column bay: 16'-0" (depth of column bay) / 2 = 8'-0"
3. Determine partial load area supported by one column: 10'-0" x 8'-0" = 80 sf
4. Calculate the load borne by the column on gridlines B and 2: 80 sf x 3 (number of column bays partially supported) = 240 sf

Section: Integration of Building Materials & Systems

Question 12

An architect notices a conflict between a two-inch sanitary line and a structural beam. The beam is a W24 steel wide flange with one end supported by a steel girder and the other end supported by a concrete wall. The architect wants to disturb the structural system as little as possible.

Where should the architect detail the beam penetration?

A. Web opening at the beam quarter span.
B. Web opening at the beam middle span.
C. Web opening at the end of the beam.

Correct answer: B

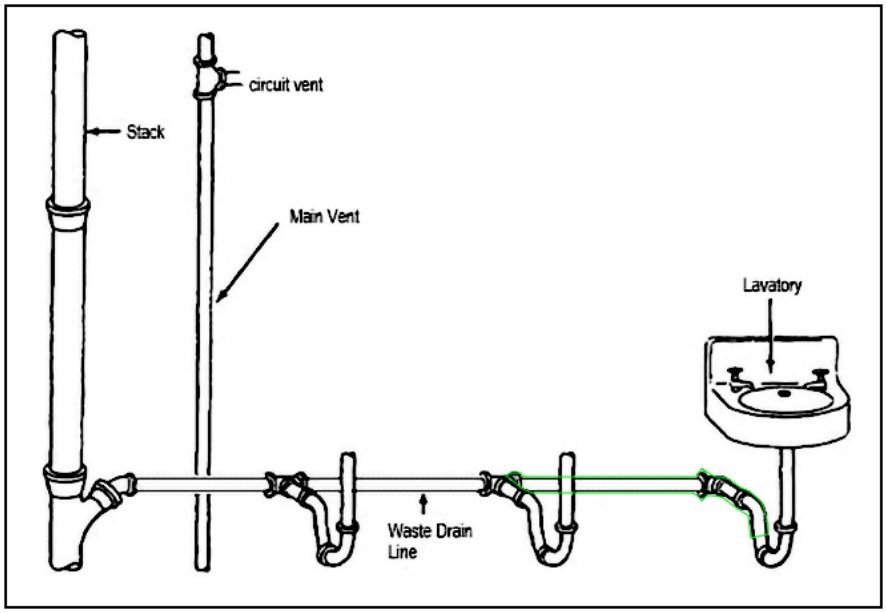
CORRECT RESPONSE
Web opening at the beam middle span.
This location is preferable as the shear force of a simply supported beam at middle span is zero.

Section: Integration of Building Materials & Systems

Question 13
An architect is designing a single-family home with multiple bathrooms. The bathrooms will be plumbed in sequence, and circuit vent branching will be used to connect several lavatories. The builder of the home has asked the architect where the circuit vent branching should be connected, and the architect provides the builder with an isometric diagram to show those points of connection.

Click on the area of the piping in the diagram to indicate where the circuit vent should connect.

Correct answer:



CORRECT RESPONSE
Between the last fixture in sequence and next downstream fixture
Only the length of the drainage pipe between the last fixture in the sequence and the next downstream fixture can function as a point of vent connection for all three sinks.

Section: Construction Documentation

Question 14
A developer hires an architect to provide bridging documents for a multistory office building. The developer asks the architect to make sure that the design concept and criteria package convey the owner's design goals without limiting bidding competition.

Which one of the following types of specifications should be included in the bridging package?

A. Proprietary
B. Performance
C. Reference

Correct answer: B

CORRECT RESPONSE
Performance
Performance specifications will allow for competitive bidding and still set a minimum standard for material used, workmanship, and aesthetics.

Section: Project Manual & Specifications

Question 15
During a review of the mechanical engineer's documents, an architect notes that the return ductwork in a corridor has increased to 40" x 24". The design of the corridor includes the following:

- Floor-to-floor height of 14'-0".
- 6" composite slab supported by W24x104 girders running perpendicular to corridor.
- Duct installed tight to the bottom of the girder.
- 2x2 acoustical tile with a standard recessed light fixture depth of 6".

What is the maximum ceiling height that the architect can designate?

A. 8'-6"
B. 9'-0"
C. 9'-6"

Correct answer: B

CORRECT RESPONSE
9'-0"

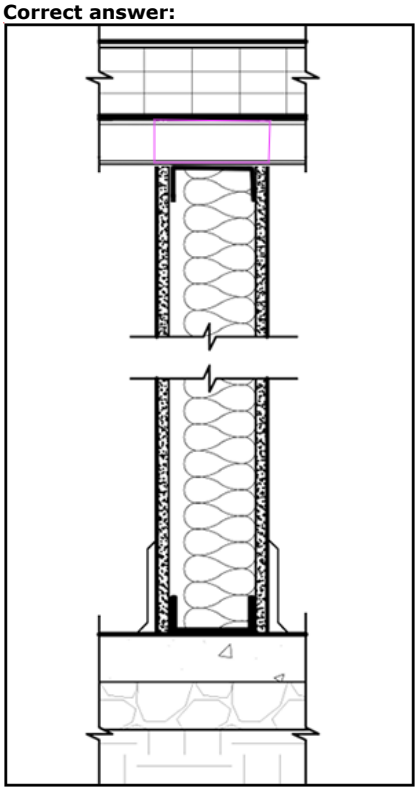
CALCULATIONS
1. Bottom of the new ductwork: 14'-0" (floor-to-floor height) - 6" (composite slab height) - 24" (girder height) - 24" (ductwork height) = 9'-6"
2. 9'-6" (bottom of new ductwork) - 6" (standard light fixture depth) = 9'-0" (maximum ceiling height)

Section: Construction Documentation

Question 16
An existing retail building is being converted into a series of educational spaces. The building is 10' from the finished floor to the underside of the metal roof deck. To provide acoustic separation between the classrooms, common walls must extend to the underside of the deck.

Click on the area of the common wall section that needs to be modified.

Correct answer:



CORRECT RESPONSE
Acoustic fill at metal deck flutes
The open gaps between metal deck flutes at the top of the partition need to be filled with an acoustic barrier to prevent the transmission of sound through the openings.

Section: Construction Documentation

Question 17
An architect is designing a facade replacement on a strip mall that is currently clad with EIFS. The existing drawings indicate plywood sheathing substrate. Water damage is apparent in a few locations, but the extent of the damage to the substrate has not been determined.

Which specification section should the architect include in the contract documents to control costs once demolition starts?

A. 01 23 00 - Alternates
B. 01 22 00 - Unit Prices
C. 00 50 00 - Contracting Forms and Supplements
D. 01 60 00 - Product Requirements

Correct answer: B

CORRECT RESPONSE
01 22 00 - Unit Prices
Unit Prices are used to bid a cost for product replacement when the extent of the replacement is unknown. It's also used for cost control, as the cost of the work is set during the bid and not during change order negotiation.

Section: Project Manual & Specifications

Question 18

TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (HOURS)[f]

OCCUPANCY	A, E		I-1[a], I-3, I-4		I-2		R[a]		F-2, S-2[b], U		B[e], F-1, M,S-1		H-1		H-2		H-3, H-4		H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A, E	N	N	1	2	2	NP	1	2	N	1	1	2	NP	NP	3	4	2	3	2	NP
I-1[a], I-3, I-4	1	2	N	N	2	NP	1	NP	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
I-2	2	NP	2	NP	N	N	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP
R[a]	1	2	1	NP	2	NP	N	N	1[c]	2[c]	1	2	NP	NP	3	NP	2	NP	2	NP
F-2, S-2[b], U	N	1	1	2	2	NP	1[c]	2[c]	N	N	1	2	NP	NP	3	4	2	3	2	NP
B[e], F-1, M, S-1	1	2	1	2	2	NP	1	2	1	2	N	N	NP	NP	2	3	1	2	1	NP
H-1	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	N	NP	NP	NP	NP	NP	NP	NP
H-2	3	4	3	NP	3	NP	3	NP	3	4	2	3	NP	NP	N	NP	1	NP	1	NP
H-3, H-4	2	3	2	NP	2	NP	2	NP	2	3	1	2	NP	NP	1	NP	1[d]	NP	1	NP
H-5	2	NP	2	NP	2	NP	2	NP	2	NP	1	NP	NP	NP	1	NP	1	NP	N	NP

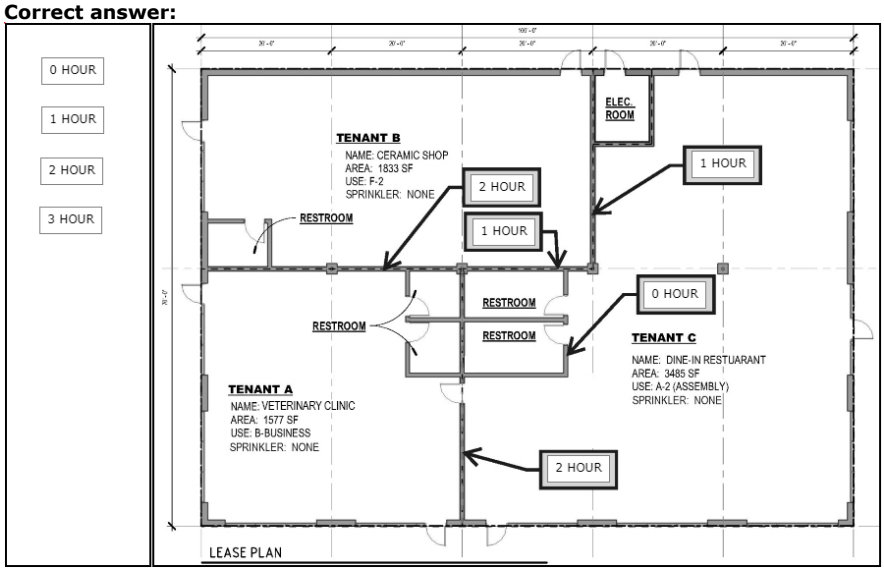
S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
N = No separation requirement.
NP = Not Permitted.
a. See Section 420.
b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but not to less than 1 hour.
c. See Sections 406.3.2 and 406.6.4.
d. Separation is not required between occupancies of the same classification.
e. See Section 422.2 for *ambulatory care facilities*.
f. Occupancy separations that serve to define fire area limits established in Chapter 9 for requiring fire protection systems shall also comply with Section 707.3.10 and Table 707.3.10 in accordance with Section 901.7.

Refer to the exhibit.

An architect is determining the demising walls for an existing building that is being separated into tenant spaces.

Drag the fire rating labels into the boxes on the floor plan to indicate the required fire ratings. Not all labels will be used.

Correct answer:



CORRECT RESPONSES
0 HOUR

Partition between Restroom and Dine-In Restaurant: No rating is required for Restroom partition.

1 HOUR
Partition between Ceramic Shop and Dine-In Restaurant/Restroom: 1-hour-rated partition is required between F-2 and A-2 occupancies if not sprinklered, even if the wall between occupancies is part of the Restroom.

2 HOUR
Partition between Ceramic Shop and Veterinary Clinic: 2-hour-rated partition is required between F-2 and B occupancies if not sprinklered.
Partition between Veterinary Clinic and Dine-In Restaurant: 2-hour-rated partition is required between B and A-2 occupancies if not sprinklered.

Section: Codes & Regulations

Question 19

WALL TYPE SCHEDULE

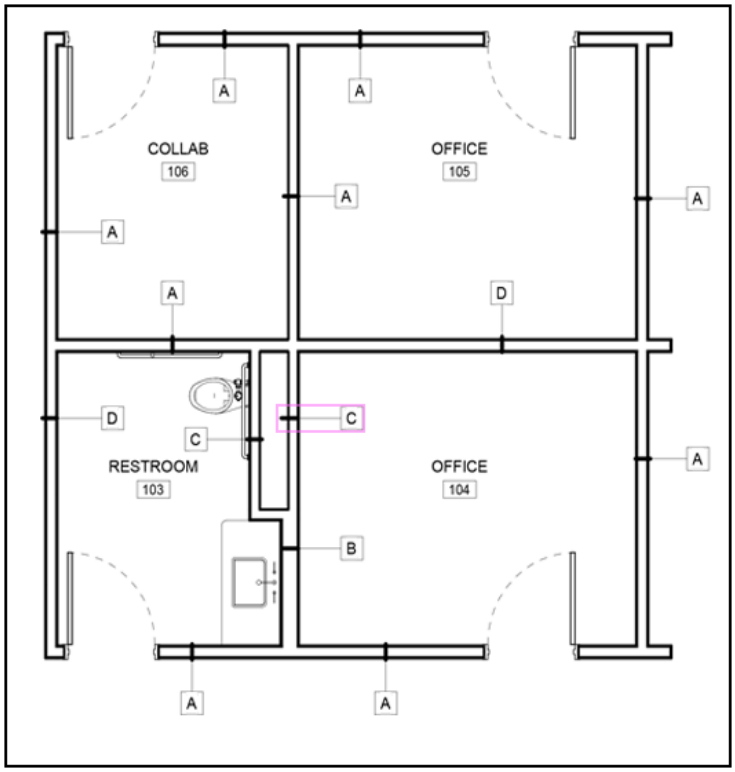
TYPE	STYLE	PLAN VIEW
A	5/8" TYPE 'X' GYPSUM BOARD 3 5/8" METAL STUDS @ 16" O.C. 3 1/2" ACOUSTIC INSULATION EXTEND WALL ASSEMBLY TO DECK	
B	5/8" TYPE 'X' GYPSUM BOARD 6" METAL STUDS @ 16" O.C. 3 1/2" ACOUSTIC INSULATION EXTEND WALL ASSEMBLY TO DECK	
C	5/8" TYPE 'X' GYPSUM BOARD 3 5/8" METAL STUDS @ 16" O.C. 3 1/2" ACOUSTIC INSULATION EXTEND WALL ASSEMBLY TO 4" ABOVE CEILING	
D	5/8" TYPE 'X' GYPSUM BOARD 3 5/8" METAL STUDS @ 16" O.C. 3 1/2" ACOUSTIC INSULATION EXTEND WALL ASSEMBLY TO 4" ABOVE CEILING	

Refer to the exhibit.

Office 104 and 105 are being renovated into a combined storage room with a code-required one-hour fire rating.

Click on the wall type tag in the plan to indicate the wall that will need to be revised to comply with code.

Correct answer:



CORRECT RESPONSE
Wall Type C between Office 104 and Restroom 103
Wall Type C, between Office 104 and Restroom 103, is noted as extending to only four inches above the ceiling. This would not provide a fire-rated wall assembly.

Section: Construction Documentation

Question 20
An architecture firm is designing and detailing the lobby area of an office tower. The firm will create mock-ups to help facilitate design and construction.

Drag the labels into the Mock-Up Type column in order to indicate the mock-up that is most appropriate for achieving each set of target goals. Not all labels will be used.

Correct answer:

Full Scale Performance Mock-Up Full Scale Pre-Tender Mock-Up

LOCATION	TARGET GOAL	MOCK-UP TYPE
Wood Wall and Ceiling	- Geometry and Joint Alignment Review - Material and Device Review - Installation by Multiple Trades	Full Scale Visual Mock-Up
Elevator Cab	- Lighting Design Options Review - Material and Device Review - Installation, Fit and Maintenance	Full Scale Visual Mock-Up
Doubly Curved Metal Panel Cladding	- Select Most Capable Contractor for Supply and Installation	Full Scale Pre-Tender Mock-Up
Glass Cable Wall	- Demonstration of Custom Cable Tension Measuring Device and Shroud Removal - Performance Testing	Full Scale Performance Mock-Up

CORRECT RESPONSES
Full Scale Visual Mock-Ups - Wood Wall and Ceiling and Elevator Cab
These are used for reviewing geometry, joint alignment, materials, and devices.

Full Scale Pre-Tender Mock-Ups - Doubly Curved Metal Panel Cladding
These are used to identify the most capable contractor for complex and challenging constructions.

Full Scale Performance Mock-Ups - Glass Cable Wall
These are used for performance testing, special installation methods, and very complex details.

Section: Integration of Building Materials & Systems

Question 21

ESTIMATED SEWAGE FLOW RATES		
Occupancy Type		**Unit Gallons per Day**
Schools - staff and office		20 per person
Elementary school students		15 per person
Intermediate and high school students		20 per student
	With gym and showers, add	5 per student
	With cafeteria, add	3 per student

Refer to the exhibit.

A client hires an architect for a high school project. The school will have a gym, shower rooms, and a cafeteria that need to support 400 students. There will be 24 staff members and office personnel.

What is the sewage flow rate for the school?

A. 10,000 gallons
B. 11,200 gallons
C. 11,680 gallons

Correct answer: C

CORRECT RESPONSE
11,680 gallons

CALCULATIONS
1. Calculate the total unit gallons of sewage per day per student: 20 gallons (per student) + 5 gallons (for gym and shower usage) + 3 gallons (for cafeteria usage) = 28 gallons
2. Calculate the unit gallons of sewage per day for all students: 400 (number of students at the school) x 28 = 11,200 gallons
3. Calculate the unit gallons of sewage per day for all staff and office: 24 (number of staff members and office personnel) x 20 gallons (per staff and office) = 480 gallons
4. Determine sewage flow rate: 11,200 gallons (for all students per day) + 480 gallons (for all personnel per day) = 11,680 gallons

Section: Integration of Building Materials & Systems

Question 22
An architect has been designing a three-story office building. The owner of the building has a deadline to vacate their present office space. At the beginning of the project, the owner and architect agreed to use a design-bid-build delivery method. During schematic design, though, they modify their contract to include a construction manager at-risk with an early site and structural package.

What is the benefit to the owner from this change?

A. It will minimize the number of drawings required in the bid set.
B. It will reduce the danger of conflicts in the bid documents.
C. It will shorten the construction schedule.

Correct answer: C

CORRECT RESPONSE
It will shorten the construction schedule.
A construction manager at-risk will expedite the construction process by issuing bid packages dependent on when they are required by the overall schedule.

Section: Construction Documentation

Question 23
At 85% construction documents for an elementary school, an architect is requesting a cost estimate update.

Which one of the following cost estimate methods should the architect request?

A. Historical Comparison

B. Square Footage
C. Labor and Materials

Correct answer: C

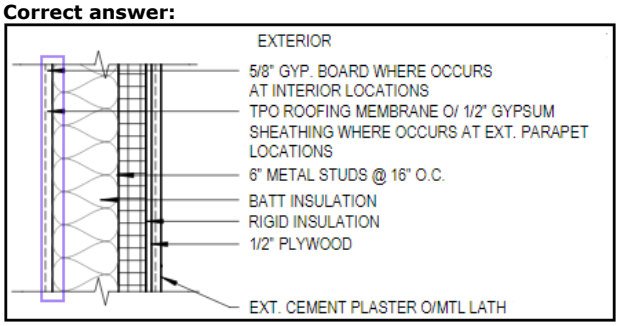
CORRECT RESPONSE
Labor and Materials
This type of cost estimate will provide the most accurate estimate of cost during the late stages of construction documents.

Section: Construction Cost Estimates

Question 24
An architect is designing a municipal services building in a location with very cold winters and mild summers (climate zone 6).

Click on the area in the exterior wall detail to indicate where the architect should locate the vapor retarder.

Correct answer:



CORRECT RESPONSE
Interior side of the insulation
In a location with cold winters, climate zone 6, the vapor retarder should be placed on the interior side of the building envelope insulation.

Section: Project Manual & Specifications

Question 25
An architect is designing an office building in a cold climate. As part of a value engineering exercise, the client requests that insulated glass unit (IGU) be replaced with single laminated glass.

For which of the following will initial and lifecycle costs increase as a result of the client's request? **Check the two that apply.**

A. Mechanical system
B. Fire protection system
C. Lighting system
D. Energy consumption
E. Building management system
F. Building facade

Correct answer: AD

CORRECT RESPONSES
Mechanical system
Insulation reduces the exchange of heat through a surface such as the building envelope. Reducing the insulation of the building skin increases mechanical system needs for heating and cooling machinery.

Energy consumption
Reducing the insulation of the building envelope allows more warm air to escape during the winter and more cool air to escape during the summer. Additional heating and cooling will be needed as a result, and this will lead to increased energy consumption.

Section: Construction Documentation

Question 26
An architect is coordinating the design of a building facade with the mechanical system. The facade of the building will feature both opaque and vision glass.

Which attributes of the facade will impact the design of the mechanical system? **Check the three that apply.**

A. Type of heat-treated glass
B. Thickness of the glass pane
C. Shading coefficient of the glass
D. Window-to-wall ratio of the facade
E. U-value performance of the facade
F. Color of the glazing framing material

Correct answer: CDE

CORRECT RESPONSES
Shading coefficient of the glass
Shading coefficient is the ratio of solar heat gain through the glass from radiation. When the shading coefficient number decreases, there will be a reduction in heat gain, which will have an impact on the design of the mechanical system.

Window-to-wall ratio of the facade
Through its potential to regulate heat gain and loss, the window-to-wall ratio (WWR) will have an impact on the design of the mechanical system.

U-value performance of the facade
Insulating glass increases a window's thermal performance. U-value measures the transmission of heat through the glazing material.

Section: Integration of Building Materials & Systems

Question 27

1010.1.2 Egress door types. Egress doors shall be of the side-hinged swinging door, pivoted door, or *balanced door* types.

Exceptions:

1. *Private garages*, office areas, factory and storage areas with an *occupant load* of 10 or less.
2. Group I-3 occupancies used as a place of detention.
3. Critical or intensive care patient rooms within suites of health care facilities.
4. Doors within or serving a single *dwelling unit* in Groups R-2 and R-3.
5. In other than Group H occupancies, revolving doors complying with Section 1010.3.1.
6. In other than Group H occupancies, special purpose horizontal sliding, accordion or folding door assemblies complying with Section 1010.3.3.
7. *Power-operated* doors in accordance with Section 1010.3.2.
8. Doors serving a bathroom within an individual *sleeping unit* in Group R-1.
9. In other than Group H occupancies, manually operated horizontal sliding doors are permitted in a *means of egress* from spaces with an *occupant load* of 10 or less.

Refer to the exhibit.

An architect has designed a 12'-0" x 12'-0" conference room with a three-foot-wide manual sliding door for a tenant office space. The owner later requests that the architect enlarge the space to a more flexible 20'-0" x 30'-0" multipurpose room. The occupant load factor for the room is 15 sf per person.

Which one of the following will be required to accommodate the owner's request?

A. A second sliding door
B. A pivoted swing door
C. A 36" clear width opening

Correct answer: B

CORRECT RESPONSE
A pivoted swing door
Per IBC 1010.1.2, egress doors shall be of the pivoted, side-hinged swinging or balanced type. Manually operated horizontal sliding doors are only permitted in spaces with an occupant load of 10 or less. The occupant load of the multipurpose room is 40, and, therefore, a

pivoted swing door will be required.

Section: Codes & Regulations

Question 28

When developing components of the Contract Documents, an architect should consider the relationship between construction drawings and specifications to be which one of the following?

A. Complementary
B. Independent
C. Statutory

Correct answer: A

CORRECT RESPONSE
Complementary
The specifications and construction drawings are both components of the Contract Documents and should be viewed as complementary for the proper execution and completion of the work.

Section: Project Manual & Specifications

Question 29

A truss manufacturer tells the general contractor of a residential project that the truss design should change in the following ways:

- Heel heights will need to increase from 8" to 12".
- Layout will change from 24" o.c. to 12" o.c.
- Bottom chords will increase from 2x4 to 2x6.
- Truss bearing elevation will not be affected.

The architect is updating the construction documents to show the truss changes. The roof framing plan and building sections have already been updated.

What additional drawing will need to be updated?

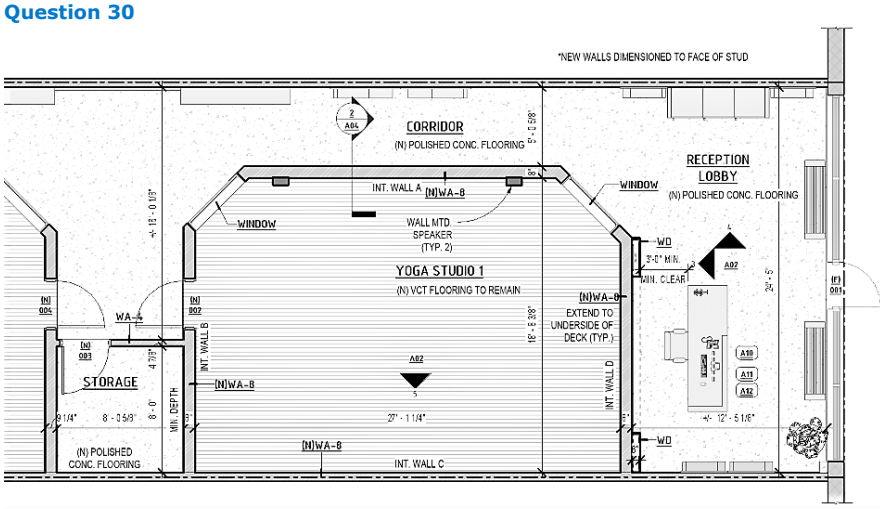
A. Reflected ceiling plan
B. Exterior elevations
C. Structural general notes

Correct answer: B

CORRECT RESPONSE
Exterior elevations
The exterior elevations will be affected by the truss changes, and the truss heel height will change the elevation of the roof.

Section: Construction Documentation

Question 30



Refer to the exhibit.

An architect is selecting finishes for Yoga Studio 1. The client has the following requirements:

- Mirrors should extend from floor to 7’ above finished floor.
- Mirrors should be located along three walls.
- Sound curtains should be installed along one wall.
- The ceiling should be a 2 x 2 lay-in ceiling.
- Reverberation of voice commands should be minimized.

Where should the architect place the sound curtains?

A. Int. Wall A
B. Int. Wall C
C. Int. Wall D

Correct answer: B

CORRECT RESPONSE
Int. Wall C
Sound reverberation is reduced most by placing sound absorbing materials on the ceiling and opposite of the sound source. Therefore, the curtains should be placed on Int. Wall C.

Section: Construction Documentation

Question 31
An architecture firm is designing a supermarket on a slightly sloping site in a dry, temperate region. A parking lot is required and storm drains are not part of the infrastructure of the surrounding neighborhood. A porous pavement solution is being considered for the stormwater management of the parking lot. The design team will need to evaluate the characteristics of the existing site to determine if porous pavement will provide adequate drainage.

Which site characteristics are most significant for determining if porous pavement is appropriate? **Check the three that apply.**

A. Percolation rates of underlying and surrounding soils.
B. Rate of rainfall in the design storm, per local code.
C. Capacity of detention/retention ponds on adjoining properties.
D. Availability of precast concrete catch basins and culverts.
E. Classification and grading of soils beneath and surrounding the site.
F. Depth of storage and reservoir capacity beneath the parking lot.

Correct answer: ABE

CORRECT RESPONSES
Percolation rates of underlying and surrounding soils.
A porous pavement system, by definition, depends on the capability of underlying and surrounding soils to accept rainwater runoff and to transmit it to locations beyond and below the site. Percolation rates of the soil will therefore be significant in determining whether porous pavement should be used.

Rate of rainfall in the design storm, per local code.
The rate at which water falls and collects on the site will drive the calculations that determine the adequacy of the surrounding soils and the extent to which they can transmit rainwater away from the parking lot. And because porous pavement depends on the percolation rates of the soil, the rate of rainfall that will eventually percolate through the soil will have a significant impact on whether porous pavement should be used.

Classification and grading of soils beneath and surrounding the site.
Learning the nature of soils on the site allows for the avoidance of clay soils that perform poorly in porous pavement systems, which depend on the ability of soils to transmit rainwater. Knowing whether there are poorly performing soils present will have a significant impact on any decision to use porous pavement.

Section: Construction Documentation

Question 32
An architect is designing a small single-family vacation home that will be vacant for extended periods. The home is located in a rural area with very cold winters and hot, humid summers. Electricity in the area is inexpensive and mainly generated from renewable sources. The owners desire a home that is low maintenance, economical to heat and cool, and has a low impact on the environment.

Which one of the following HVAC systems should the architect recommend?

A. Central oil furnace with through-the-wall direct expansion cooling units.
B. Thermostatically controlled wood stove with circulation fan and window air conditioners.

C. Separate natural gas furnace and ducted, direct expansion central air conditioning system.
D. Ductless, direct expansion heat pump system with backup electrical resistance baseboards.

Correct answer: D

CORRECT RESPONSE
Ductless, direct expansion heat pump system with backup electrical resistance baseboards.
Ducted systems crowd interior space. Ductless, direct expansion heat pumps provide both heating and cooling, utilizing most of the same equipment. Renewably generated electricity provides comfort control without local or global environmental degradation. The system can be fully automated to accommodate periods of vacancy.

Section: Integration of Building Materials & Systems

Question 33
An AE firm is designing an addition to an acute care hospital. When specifying the new door hardware, the owner informs the firm that all new cylinders must be keyed into the existing Sargent KESO security key system used throughout the existing facility.

Which type of specifications should be used for the door hardware?

A. Descriptive specifications
B. Performance specifications
C. Reference specifications
D. Proprietary specifications

Correct answer: D

CORRECT RESPONSE
Proprietary specifications
Proprietary specifying uses proprietary information from the manufacturer, guaranteeing that the project will be provided with the required item.

Section: Project Manual & Specifications

Question 34
A developer has hired an architect for an apartment building project. A swimming pool is to be built on the roof of the building, and the architect wants to confirm the minimum design load for the pool support framing. Assume the following:

- The weight of the pool structure is to be ignored.
- Water weight is 62.4 pounds per cubic foot.
- The pool has a uniform depth of eight feet.

What is the minimum design load for the pool support framing?

A. 7.8 lbs/sf
B. 499.2 lbs/sf
C. 529.2 lbs/sf
D. 561.6 lbs/sf

Correct answer: B

CORRECT RESPONSE
499.2 lbs/sf

CALCULATIONS
1. 62.4 lbs/cu ft (water weight) x 8 ft (pool depth) = 499.2 lbs/sf

Section: Integration of Building Materials & Systems

Question 35

715.4 Exterior curtain wall/fire-resistance-rated floor intersections. Voids created at the intersection of exterior curtain wall assemblies and fire-resistance-rated floor or floor/ceiling assemblies shall be protected with an *approved perimeter fire containment system* to prevent the interior spread of fire. Such systems shall provide an *F rating* for a time period not less than the *fire-resistance rating* of the floor or floor/ceiling assembly.

715.4.1 Fire test criteria. *Perimeter fire containment systems* shall be tested in accordance with the requirements of ASTM E2307.

Exception: Voids created at the intersection of the exterior curtain wall assemblies and floor assemblies where the vision glass extends to the finished floor level shall be permitted to be protected with an approved material to prevent the interior spread of fire. Such material shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (0.254 mm) of water column (2.5 Pa) for the time period not less than the fire-resistance rating of the floor assembly.

FIRE RESISTIVE ASSEMBLIES

BUILDING ELEMENT	FIRE RATING	UL LISTING
STRUCTURAL FRAME		
BEAMS AND COLUMNS	2	UL X701
TUBE STEEL	2	UL Y710
TUBE STEEL AT CURTAINWALL	2	UL X661
FLOOR CONSTRUCTION	2	UL D919
ROOF CONSTRUCTION	1	UL P733

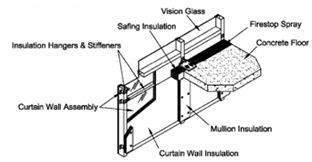


Figure 1 Perimeter Fire Containment System (ASTM E2307)

Refer to the exhibit.

An architect is detailing the exterior curtain wall system of a seven-story hotel. The main entrance includes a three-story curtain wall facade that intersects the second and third floors. The architect is finalizing the exterior curtain wall section at its intersection with the second floor.

Which of the following should be included on the detail? **Check the three that apply.**

A. Provide curtain wall with insulated glazing; 1-hour rated assembly.
B. Provide curtain wall with insulated glazing; 2-hour rated assembly.
C. Provide concrete slab; 1-hour rated assembly.
D. Provide concrete slab; 2-hour rated assembly.
E. Provide firestop spray and safing insulation at floor opening at curtain wall.
F. Provide fire-rated insulation system and hold-off curtain wall with insulation hangars.

Correct answer: DEF

CORRECT RESPONSES
Provide concrete slab; 2-hour rated assembly.
The fire-resistive assemblies table in the exhibit indicates a 2-hour rating for the floor construction.

Provide firestop spray and safing insulation at floor opening at curtain wall.
Under section 715.4, an approved fire containment system to prevent the interior spread of fire is required. The firestop spray and safing insulation are components of the approved assembly. The system is described in Figure 1 - Perimeter Fire Containment System (ASTM E2307).

Provide fire-rated insulation system and hold-off curtain wall with insulation hangars.
Under section 715.4, an approved fire containment system to prevent the interior spread of fire is required. The fire-rated insulation system is part of the approved assembly. The system is described in Figure 1 - Perimeter Fire Containment System (ASTM E2307).

Section: Construction Documentation

Question 36

An owner contracts with a signage company to fabricate the interior signage for a four-story medical office facility. The owner asks an architect to create graphics and provide digital drawings to the signage company for production. This request is not part of the architect's basic scope of services for the project.

Per AIA B101, which initial action should the architect take?

A. Issue an invoice to the signage company for the graphics and drawings.
B. Provide the graphics and drawings per the owner's request.
C. Alert the owner in writing that the scope has changed.

Correct answer: C

CORRECT RESPONSE
Alert the owner in writing that the scope has changed.
Since the owner's request is not part of the architect's basic services, the B101 stipulates that as soon as the architect is aware of the need to perform an additional service, "the Architect shall notify the Owner with reasonable promptness and explain the facts and circumstances

giving rise to the need." Also, the architect is not to "provide the...Additional Services until the Architect receives the Owner's written authorization."

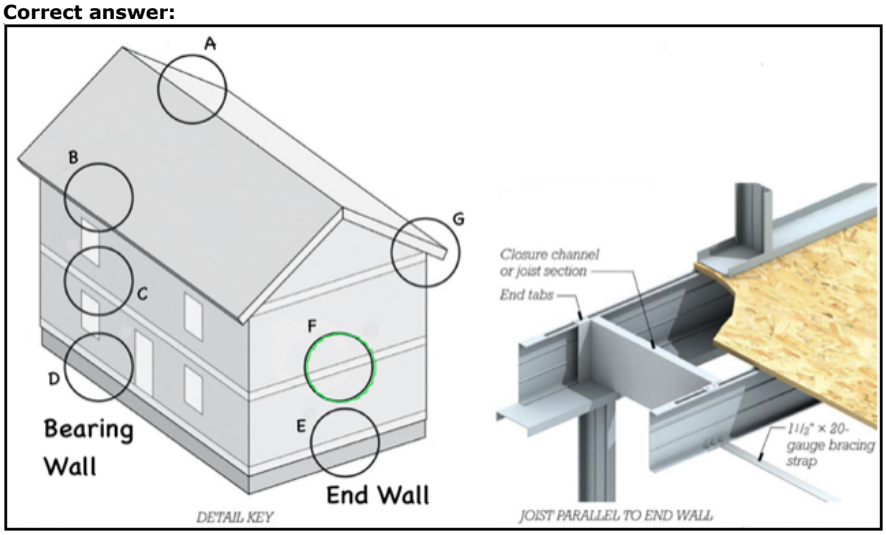
Section: Construction Documentation

Question 37

An architect is drawing the construction documents for a two-story office building. The building will be constructed using light gauge steel framing construction.

Click in the circle on the Detail Key to indicate where the condition depicted in the detail occurs.

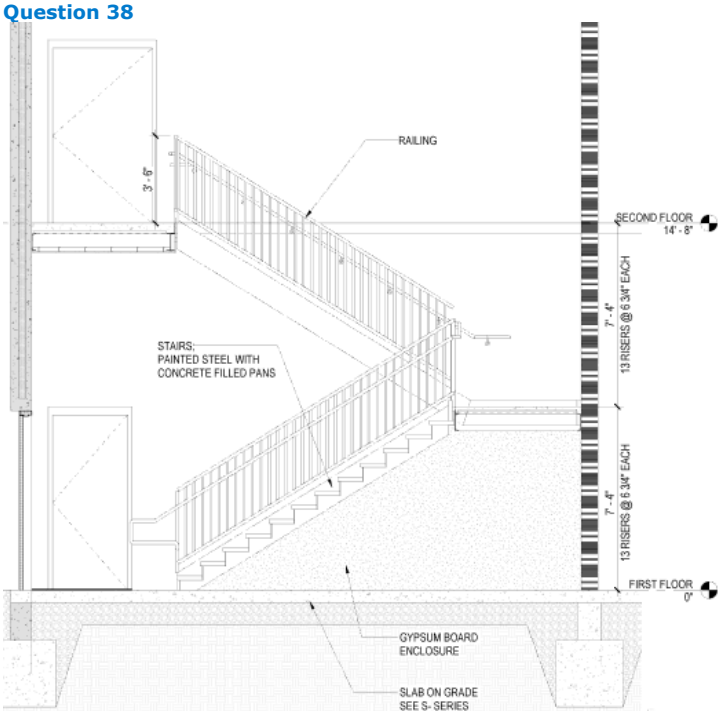
Correct answer:



CORRECT RESPONSE
Circle F
This area shows a floor joist detail with the joist parallel to the end wall and wall framing above and below.

Section: Construction Documentation

Question 38



Refer to the exhibit.

During a value engineering study, a contractor determines that removing the gypsum board wall enclosure under the stairs will provide access to the area below the stairs and save on costs. The architect reviews the request and

refers to the following requirements in the Architecture Barriers Act (ABA) Standards Section 307.2 Protrusion Limits:

- "Objects with leading edges more than 27 inches (685mm) and not more than 80 inches (2030 mm) above the finish floor or ground shall protrude 4 inches (100 mm) maximum horizontally into the circulation path."

What should the architect indicate on the drawings?

A. Gypsum board ceiling under the first-floor stairs.
B. A permanent cane detectable barrier below the stairs.
C. Floor markings and signage for emergency egress.

Correct answer: B

CORRECT RESPONSE
A permanent cane detectable barrier below the stairs.
Adding fixed barriers, such as a permanent cane, guardrail, or planter at an open stairway, will protect individuals with the visual impairments from the minimum height hazard.

Section: Codes & Regulations

Question 39

	U-Value	Glazing	Frames	Cost
Acme Windows	.32	Double	Wood	$39/sq. ft.
Western Windows	.30	Double	Vinyl	$42/sq. ft.
XYZ Windows	.31	Triple	Metal	$41/sq. ft.

Refer to the exhibit.

A general contractor has a window allowance of $4,100 for a 400-square-foot residential addition. The addition calls for 98 square feet of glazing. The owner wants the highest performing type of window that does not exceed the window allowance. The general contractor provides the architect with the following window options:

Which windows should the architect recommend to the owner?

A. Acme Windows
B. Western Windows
C. XYZ Windows

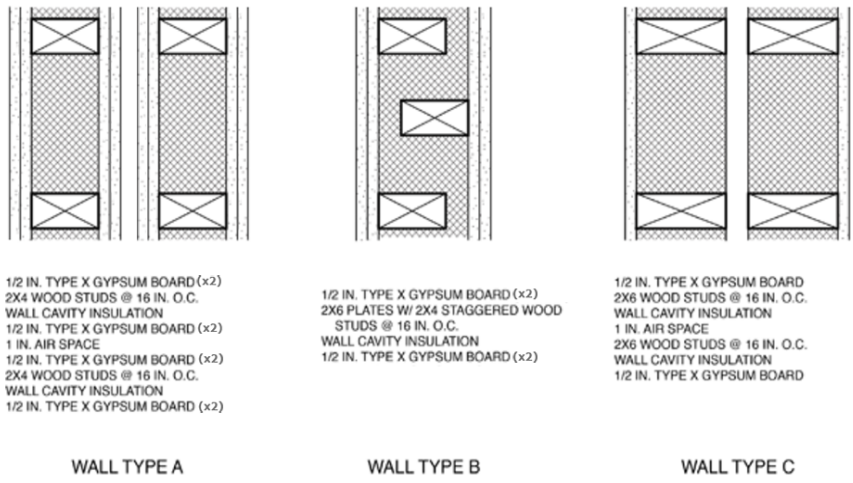
Correct answer: C

CORRECT RESPONSE
XYZ Windows
XYZ Windows are under the allowance and are the best performing windows with a .31 U-value.

CALCULATIONS
1. Acme Windows: $39/sf x 98 square feet = $3,822
2. Western Windows: $42/sf x 98 square feet = $4,116
3. XYZ Windows: $41/sf x 98 square feet = $4,018

Section: Construction Cost Estimates

Question 40



Refer to the exhibit.

An architect is working on a residential townhouse project with units that do not have fire suppression. The architect will need to specify a party wall assembly that divides the units. Local codes specify the following:

- The party walls must be independent 2-hour fire-rated assemblies.
- Each townhouse unit must be structurally independent.
- Each layer of 1/2" type X gypsum board provides a 1/2-hour rating.

Which wall type should the architect specify?

A. Wall Type A
B. Wall Type B
C. Wall Type C

Correct answer: A

CORRECT RESPONSE
Wall Type A
The party wall must be structurally independent for each unit, so an air space is required. Each independent wall must be 2-hour rated, requiring 2 layers of type X gypsum board per wall.

Section: Integration of Building Materials & Systems

Question 41
A school district is adding photovoltaic panels to a high school. The panels will connect to the existing electrical grid system and supplement the school's power. The electrical utility company has agreed to purchase any excess power generated by the panels through a buy-back program. However, the buy-back program will only purchase power generated during the winter.

The school district wants to earn as much revenue from this program as possible.

How should the panels be mounted?

A. Wall-mounted on the south elevation.
B. Wall-mounted on the west elevation.
C. Roof-mounted in parallel rows at a latitude of plus 15º.
D. Roof-mounted in parallel rows at a latitude of minus 15º.

Correct answer: C

CORRECT RESPONSES
Roof-mounted in parallel rows at a latitude of plus 15º.
Roof-mounted locations will function throughout daylight hours. Due to the emphasis on winter sales of excess power, the tilt of the panels should maximize winter power production.

Section: Integration of Building Materials & Systems

Question 42

An architect is adding a single door to an exit corridor in a clinic. The door swings in the direction of egress and the space it serves has an occupant load of 100. The door is tied to an access control system.

What hardware should be specified for the door? **Check the three that apply.**

A. Panic bar hardware on the egress side of the door with top and bottom rods.
B. Rim exit device with panic bar hardware on the egress side of the door.
C. Proximity card reader installed on the panic bar side of the door.
D. Proximity card reader installed on the lock side of the door.
E. Jamb mounted, surface mounted electric strike.
F. Jamb mounted, recessed electric strike.

Correct answer: BDE

CORRECT RESPONSES
Rim exit device with panic bar hardware on the egress side of the door.
Rim exit devices are used for a single door. The panic bar is required due to the number of occupants served.

Proximity card reader installed on the lock side of the door.
The card access system is mounted on the lock side or outside of the secured door.

Jamb mounted, surface mounted electric strike.
A surface mounted electric strike will work with the rim exit device that is required for proper latching.

Section: Construction Documentation

Question 43

TABLE 506.2
ALLOWABLE AREA FACTOR (A_t = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET[a, b]

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
R-2[h]	NS[d]	UL	UL	24,000	16,000	24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000
	S13R												
	S1	UL	UL	96,000	64,000	96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	184,500	123,000	76,875	61,500	36,000	21,000

UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S1 = Buildings a maximum of one story above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; SM = Buildings two or more stories above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

Refer to the exhibit.

A large residential development consists of a 300,000-square-foot, five-story, sprinklered (SM) residential building. The client asks an architect to prepare a low-carbon design with an exposed structure.

Which one of the following construction types should the architect use?

A. Type V
B. Type IV
C. Type I

Correct answer: B

CORRECT RESPONSE
Type IV
Per IBC Table 506.2, this construction type allows for the required building area. Heavy timber construction is Type IV HT, low carbon, and can be left exposed depending on the material depth.

Section: Codes & Regulations

Question 44
An architect is designing a single-family home in a location with cold winters and mild, dry summers. The homeowner is concerned about climate change and would like the home to have the lowest operating cost and the smallest carbon footprint possible. The local electrical grid is supplied with photovoltaic and nuclear power but not power from combustion sources.

Which one of the following systems is most appropriate?

A. Ground source heat pumps for space and water heating with reversing valve for summertime cooling.
B. Local, sustainably harvested wood pellet space and water heating furnace with heat pump cooling.

C. Direct-fired natural gas space and water heating with whole house heat exchanger forced air ventilation.
D. Electrical resistance space and water heating system coupled with heat pump for summer cooling.

Correct answer: A

CORRECT RESPONSE
Ground source heat pumps for space and water heating with reversing valve for summertime cooling.
While heat pumps require electricity to drive the refrigeration cycle, the electricity in this location is not generated by fossil fuel combustion, addressing the homeowner's concern about carbon footprint.

Section: Integration of Building Materials & Systems

Question 45
An A/E firm is designing an addition to a building. The addition features a masonry veneer exterior wall, and because of past experiences with such walls, the firm wants to take care to avoid an early onset of efflorescence. From exterior to interior, the wall assembly consists of the following:

- Nominal face brick
- 2" air cavity
- 8" CMU backup wall with insulating foam inserts in cores
- 2" rigid insulation between Z furring
- 1/2" gypsum wallboard

Which one of the following design choices should the A/E firm make during design documentation?

A. Limit vents at the top and bottom to reduce water infiltration.
B. Detail the wall assembly so that air cavity depth is reduced to less than one inch.
C. Specify masonry units and mortar that do not contain water-soluble salts or dirty ingredients.

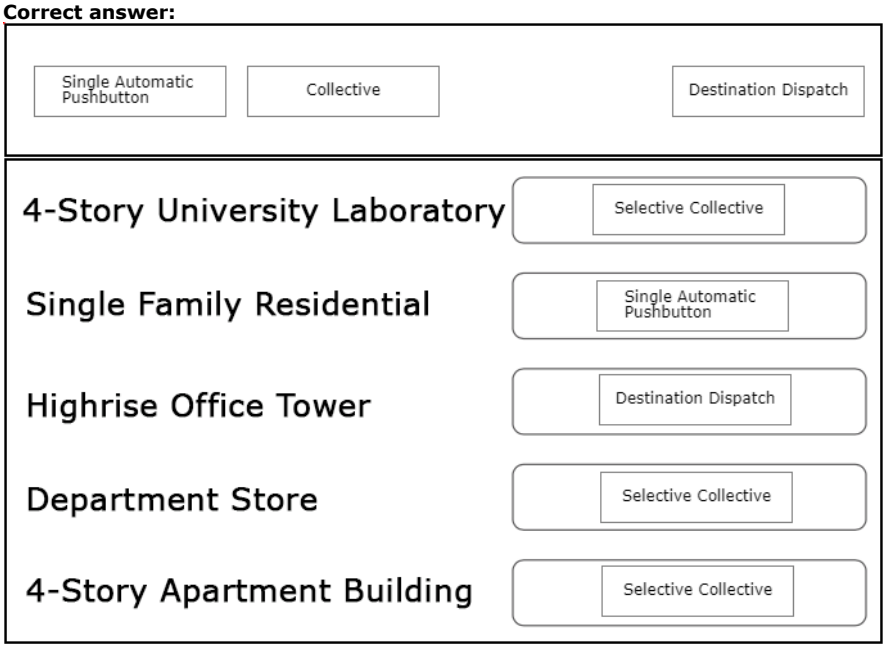
Correct answer: C

CORRECT RESPONSE
Specify masonry units and mortar that do not contain water-soluble salts or dirty ingredients.
Reducing the salts and other dirty ingredients in the masonry assembly will reduce the chances of efflorescence developing at any time within the building's life. Even if water does find its way into the cavity, the lack of contaminants for it to push to the surface of the assembly will minimize or nullify the formation of efflorescence.

Section: Integration of Building Materials & Systems

Question 46
Drag the system tags into the boxes in the project list to indicate the elevator control systems that are most appropriate for each project type. Not all system tags will be used.

Correct answer:



CORRECT RESPONSES
Single Automatic Pushbutton - Single Family Residential
This handles only one call at a time, providing an uninterrupted trip for each call. This type of control system is an appropriate choice for Single Family Residential.

Selective Collective - 4-Story University Laboratory, 4-Story Apartment Building, and Department Store
This stores all calls until they are answered and automatically reverses the direction of travel at the highest and lowest calls. This is the most common control type, and it is appropriate for the 4-Story University Laboratory, Department Store, and 4-Story Apartment Building.

Destination Dispatch - Highrise Office Tower
This is an optimization technique used for multi-elevator installations in which groups of passengers head to the same destinations using the same elevators, thereby reducing waiting and travel times. This type of system is especially useful in highrise buildings, making this type of control system appropriate for the Highrise Office Tower.

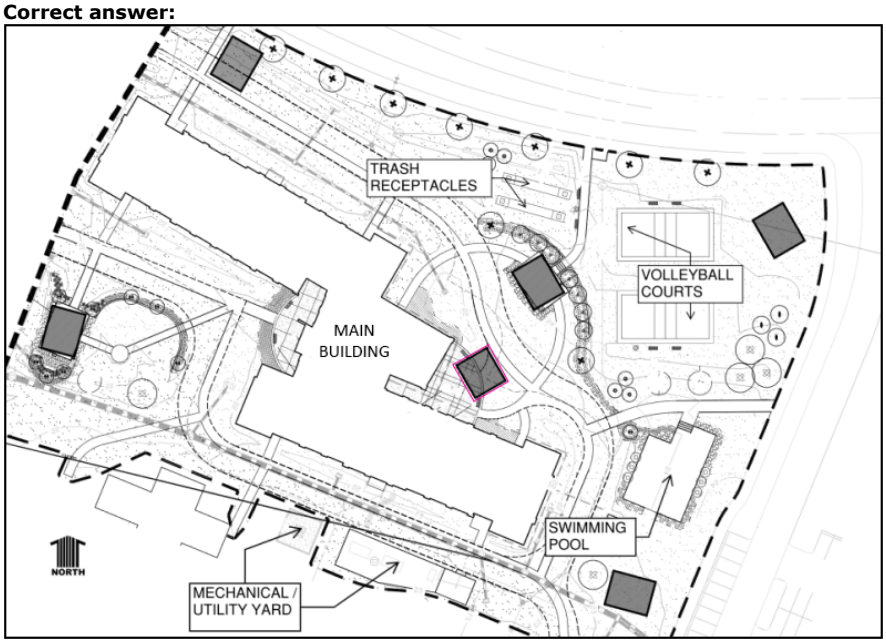
Section: Construction Documentation

Question 47
An architect is designing an Outdoor Pavilion. The owner has provided the following programmatic requirements for the Outdoor Pavilion:

- A view of the Volleyball Courts.
- Close proximity to the Main Building.
- Located on the north side of the Main Building to maximize shade.
- Located away from the Trash Receptacles and the Mechanical/Utility Yard.

Click in the shaded box on the site plan to indicate the location that the architect should recommend for the Outdoor Pavilion.

Correct answer:



CORRECT RESPONSE
Shaded box close to northern perimeter of Main Building with a view of the Volleyball Courts

Section: Construction Documentation

Question 48
An A/E firm is designing a four-story office building with concrete beams and a two-way slab system. During documentation, the structural engineer tells the architect that the slab thickness must increase from four inches to five inches due to the increased floor finish weight. However, the concrete beam depth can stay the same.

Which one of the following will need to be reviewed?

A. Fire sprinkler location
B. Mechanical duct routing
C. Concrete column dimension
D. Drop ceiling height

Correct answer: C

CORRECT RESPONSE
Concrete column dimension
The dimensions of the structural concrete columns may increase or need additional rebar due to the increased floor finish and concrete weight resulting from the thickened slabs.

Section: Integration of Building Materials & Systems

Question 49
An architect is working on a phased fast-track commercial project. While digging the foundation, the excavator finds evidence of high ground water that had not been revealed from test pits and the geotechnical report. The concrete subcontractor suggests changing the concrete stem wall and footing foundation to a concrete slab-on-grade foundation.

Which members of the project team will the architect need to consult?

A. Client, excavator, and landscape architect
B. Structural engineer, concrete subcontractor, and geotechnical engineer
C. Geotechnical engineer, client, and structural engineer

Correct answer: C

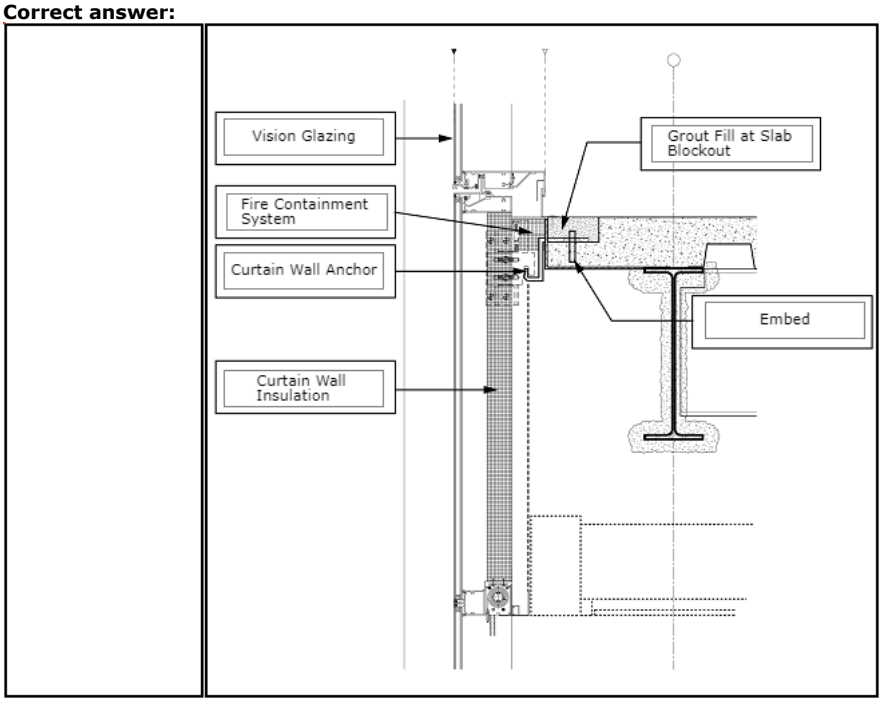
CORRECT RESPONSE
Geotechnical engineer, client, and structural engineer
The geotechnical engineer will be consulted over the high ground water issue and foundation recommendation. The client will need to be informed of the situation and approve the change. The structural engineer will need to oversee and detail the change in foundation.

Section: Construction Documentation

Question 50
An architect is completing the bidding documents for a new office building.

Drag the labels into the boxes on the slab section detail to identify the facade components.

Correct answer:



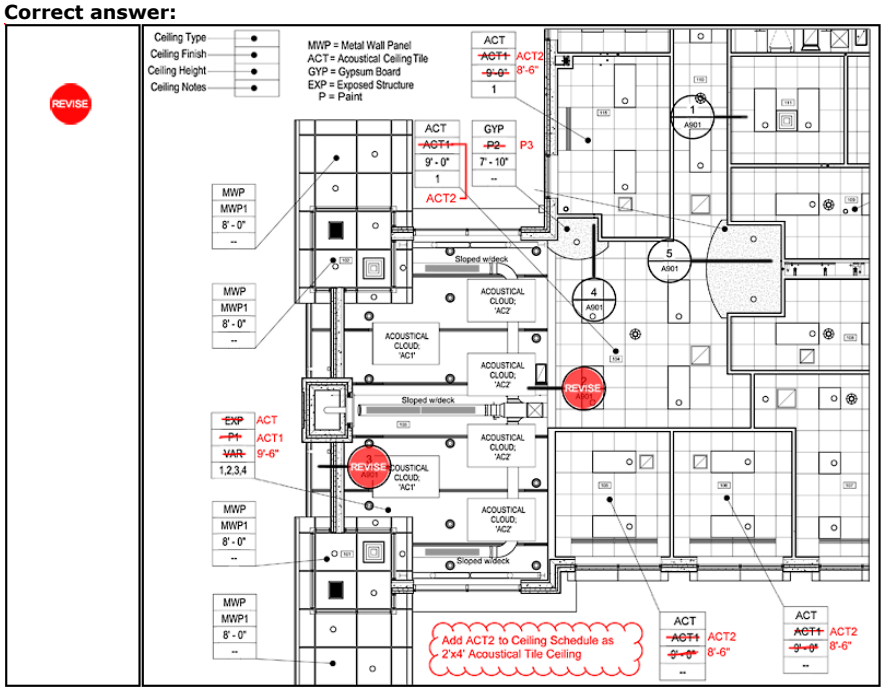
CORRECT RESPONSE
This section detail shows the components of an exterior curtain wall system attached to a steel-framed structural system with a concrete deck.

Section: Integration of Building Materials & Systems

Question 51
An architect is redlining a reflected ceiling plan in order to identify details that require significant changes.

Drag the revise symbols into the detail callout circles to indicate the details that will require significant changes. Not all revise symbols will be used.

Correct answer:



CORRECT RESPONSES
Detail callout 2
Detail callout 3
The revise symbols should be placed at callouts 2 and 3 because these details are affected by the change in ceiling material from exposed ceiling to an acoustical ceiling tile, which is noted at the bottom of the plan. The other details at the gypsum soffits/bulkheads are not affected by the change to a 2'x4' tile size.

Section: Construction Documentation

Question 52
An architect is designing an addition to an existing high school. The addition consists of two band practice rooms and four classrooms. Metal stud wall assemblies will be used to physically and acoustically separate the practice rooms from the classrooms.

How should the architect design the metal stud wall assemblies?

A. Maximize the wall assembly's mass.
B. Place all electrical devices back-to-back.
C. Firmly secure the gypsum wallboard to the framing.

Correct answer: A

CORRECT RESPONSE
Maximize the wall assembly's mass.
The ability of a wall assembly to transmit sound is inversely dependent on its mass.

Section: Integration of Building Materials & Systems

Question 53
An architect is designing a new one-story office building that will be constructed using a fast-track project delivery method. The client asks the architect to provide a fully proprietary set of drawings and specifications, even though the client has not yet decided on the materials for the building envelope.

The architect is now drawing the details for the building and the roof plan.

How should the architect keynote the roofing system?

A. Fully Adhered Single-Ply Roof Membrane

B. EPDM Roof Membrane
C. Roof Membrane

Correct answer: C

CORRECT RESPONSE
Roof Membrane
This note includes enough information to name the system and allows for the specification to detail the method of attachment, membrane thickness, membrane material, and installation method. Since final envelope materials have not been selected and potential last minute changes may occur, generic keynoting will allow for membrane materials to change in the specifications without modifications to the drawings.

Section: Project Manual & Specifications

Question 54
An architect is placing and detailing vertical expansion joints in a one-story, "L" shaped masonry elementary school. The exterior walls consist of 1'-4"-thick cavity wall construction with face brick and a 10" CMU backup. The CMU wall is structural.

What should the architect consider when locating and detailing the joints? **Check the three that apply.**

A. Depth of the brick shelf cast in the concrete foundation wall.
B. Changes in the moisture content over time in the brick and CMU.
C. Changes in the direction of the exterior cavity wall construction.
D. Quantity of rigid insulation in the exterior cavity wall construction.
E. Average overall height of the exterior cavity wall construction.
F. Location of the penetrations in the exterior cavity wall construction.

Correct answer: BCF

CORRECT RESPONSES
Changes in the moisture content over time in the brick and CMU.
Over time, brick absorbs moisture and therefore expands, while CMU continues to cure and shrink. While detailing the joints, these differentials need to be considered, especially when choosing a sealant.

Changes in the direction of the exterior cavity wall construction.
Expansion joints should be located at or near changes in wall direction as they are areas more likely to experience stress and therefore movement.

Location of the penetrations in the exterior cavity wall construction.
Expansion joints should be located at or near wall penetrations, such as doors or windows, and also at connections of the wall to other dissimilar materials, such as curtain walls.

Section: Construction Documentation

Question 55
During the contract document phase, the design team is informed that polyisocyanurate insulation (polyiso) is in short supply and will delay the proposed project construction schedule. The team needs to revise the roof insulation, which is currently specified as R-38 polyiso, to expanded polystyrene (EPS). R-value information follows:

- The required R-value of the roof insulation is R-38.
- Polyiso has an R-value of 5.7 per inch.
- EPS has an R-value of 3.85 per inch.

What is the net difference in thickness that needs to be accommodated with the EPS system to maintain the design R-value?

A. 3.2 inches
B. 5.7 inches
C. 6.7 inches
D. 9.9 inches

Correct answer: A

CORRECT RESPONSE
3.2 inches

CALCULATIONS
1. Current system (polyiso) at R-38: 38 / 5.7 = 6.67 inches
2. EPS system to achieve R-38: 38 / 3.85 = 9.87 inches
3. Net difference between the two systems: 9.87 - 6.67 = 3.2 inches

Section: Construction Documentation

Question 56
The owner provides the architect with specific requirements for performance and payment bonds for the project.

In which section should the architect place this performance and payment bond information?

A. 00 40 00 - Procurement Forms and Supplements
B. 00 72 00 - General Conditions
C. 00 73 00 - Supplementary Conditions
D. 00 50 00 - Contracting Forms and Supplements

Correct answer: C

CORRECT RESPONSE
00 73 00 - Supplementary Conditions
Supplementary Conditions is where owner-specific items are located in the specifications. The Supplementary Conditions section supplements (or changes) the general conditions of the contract. Any owner specific modifications to the general conditions, such as specific requirements for performance and payment bond information, would be located here.

Section: Project Manual & Specifications

Question 57
An architect is designing a university research lab. The university provides three manufacturers of a piece of specialty equipment to the architect, who will include them in a set of open proprietary specifications. The client also provides the following information:

- Manufacturer A is preferred to Manufacturers B or C.
- No products from other manufacturers will be accepted.

What should the architect include in the specifications?

A. Requested alternates
B. Proposed substitutions
C. Controlled substitutions

Correct answer: A

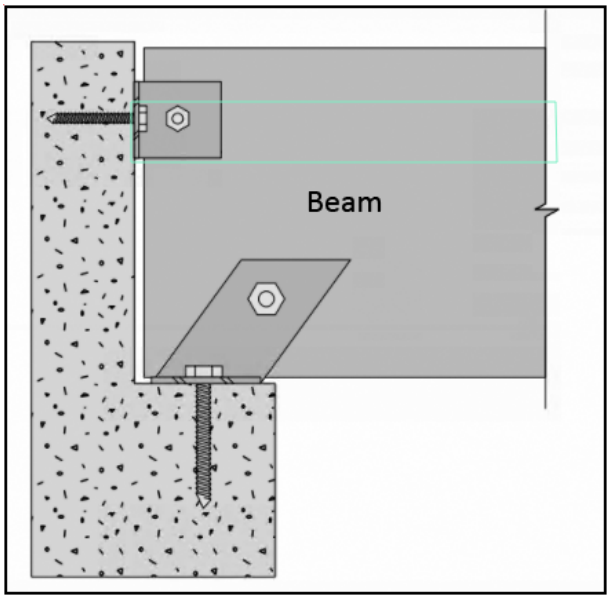
CORRECT RESPONSE
Requested alternates
In open proprietary specifications with requested alternates, the architect can list Manufacturer B and Manufacturer C as alternates. Bidders will include both base bids and prices for each alternate product. The architect can then decide if installing Manufacturer B's or Manufacturer C's product will result in significant savings. No other substitution is allowed.

Section: Project Manual & Specifications

Question 58
An architect is detailing a glulam roof rafter supported on top of a concrete shear wall. The beam is attached at the base and a lateral restraint clip attaches it at the top.

Click on the area of the beam in the section where a split will occur due to beam deflection under load.

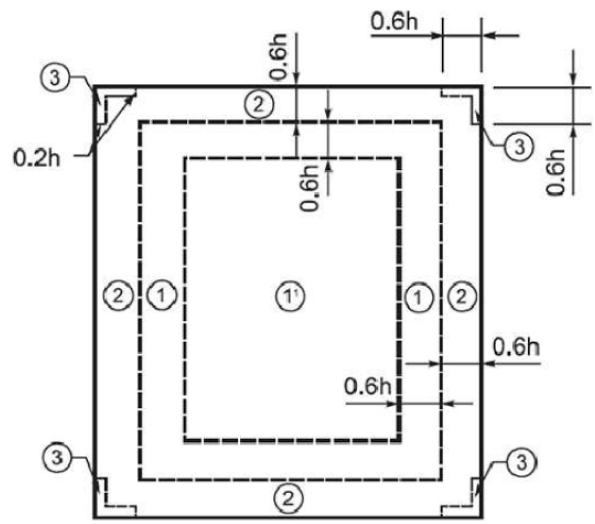
Correct answer:



CORRECT RESPONSE
Area at and around top bolt connection
Splitting at the top connection will occur because the bolt does not allow the beam end to rotate, causing tensile stress perpendicular to grain to occur as the beam deflects under load. The correct detail would have no bolt at the lateral restraint clip.

Section: Integration of Building Materials & Systems

Question 59



Refer to the exhibit.

For the design of a roof, an architect is using a ballast zone diagram to determine the ballast depth for corner zone 3. Assume the following:

- Existing grade elevation: 1,321.00'
- Roof height: 1,361.00'
- h = height above grade

What is the dimension along the fascia for the ballast of corner zone 3?

A. 8 feet
B. 24 feet
C. 272.2 feet
D. 816.6 feet

Correct answer: B

CORRECT RESPONSE
24 feet

CALCULATIONS
1. 1,361.00' (roof height) - 1,321.00' (grade elevation) = 40' (height above grade)
2. 0.6 x 40' = 24'

Section: Integration of Building Materials & Systems

Question 60

1003.4 Slip-resistant surface. Circulation paths of the *means of egress* shall have a slip-resistant surface and be securely attached.

1003.5 Elevation change. Where changes in elevation of less than 12 inches (305 mm) exist in the *means of egress*, sloped surfaces shall be used. Where the slope is greater than one unit vertical in 20 units horizontal (5-percent slope), *ramps* complying with Section 1012 shall be used. Where the difference in elevation is 6 inches (152 mm) or less, the *ramp* shall be equipped with either *handrails* or floor finish materials that contrast with adjacent floor finish materials.

Exceptions:

1. Steps at exterior doors complying with Section 1010.1.4.
2. A *stair* with a single riser or with two risers and a tread is permitted at locations not required to be *accessible* by Chapter 11 where the risers and treads comply with Section 1011.5, the minimum depth of the tread is 13 inches (330 mm) and not less than one *handrail* complying with Section 1014 is provided within 30 inches (762 mm) of the centerline of the normal path of egress travel on the *stair*.
3. A step is permitted in *aisles* serving seating that has a difference in elevation less than 12 inches (305 mm) at locations not required to be *accessible* by Chapter 11, provided that the risers and treads comply with Section 1030.14 and the *aisle* is provided with a *handrail* complying with Section 1030.16.

Throughout a *story* in a Group I-2 occupancy, any change in elevation in portions of the *means of egress* that serve nonambulatory persons shall be by means of a *ramp* or sloped walkway.

1003.6 Means of egress continuity. The path of egress travel along a *means of egress* shall not be interrupted by a building element other than a *means of egress* component as specified in this chapter. Obstructions shall not be placed in the minimum width or required capacity of a *means of egress* component except projections permitted by this chapter. The minimum width or required capacity of a *means of egress* system shall not be diminished along the path of egress travel.

1003.7 Elevators, escalators and moving walks. Elevators, escalators and moving walks shall not be used as a component of a required *means of egress* from any other part of the building.

Exception: Elevators used as an *accessible* means of egress in accordance with Section 1009.4.

Refer to the exhibit.

An architect is designing a multistory addition to an existing multistory apartment building. The addition will require an 11" offset in floor elevations between new and existing adjacent floors. New and existing construction must connect on all floor levels. The connection is required to be an accessible route.

How should the architect connect the new and existing floor levels?

A. Install a short stair with two 5-1/2" risers with handrails on both sides.
B. Install a continuous ramp 20'-long with no handrail.
C. Install a single step along the course of the means of egress with one handrail.
D. Install a continuous ramp 10'-long with a handrail on one side.

Correct answer: B

CORRECT RESPONSE
Install a continuous ramp 20'-long with no handrail.
The IBC requires that changes in elevation less than 12" in height must be accomplished with a ramp that has a maximum slope of 1 in 12. Ramps sloped less than 1 in 20 do not require handrails.

Section: Codes & Regulations

Question 61

Building Shell Package - Preliminary Estimate

Classroom Wing A Addition	SF	Cost/SF	Total
EPDM Roof System	11000	$ 15.00	$ 165,000.00
Aluminum Storefront	660	$ 55.00	$ 36,300.00
Architectural Precast System	7000	$ 42.00	$ 294,000.00
Metal Wall Panel System	9400	$ 35.00	$ 329,000.00

Classroom Wing B Addition	SF	Cost/SF	Total
EPDM Roof System	12500	$ 15.00	$ 187,500.00
Aluminum Storefront	740	$ 55.00	$ 40,700.00
Architectural Precast System	7600	$ 42.00	$ 319,200.00
Metal Wall Panel System	10000	$ 35.00	$ 350,000.00

Gymnasium Addition	SF	Cost/SF	Total
EPDM Roof System	14400	$ 15.00	$ 216,000.00
Aluminum Storefront	200	$ 55.00	$ 11,000.00
Architectural Precast System	15840	$ 42.00	$ 665,280.00
Metal Wall Panel System	1760	$ 35.00	$ 61,600.00

All Additions	SF	Cost/SF	Total
EPDM Roof System	37900	$ 15.00	$ 568,500.00
Aluminum Storefront	1600	$ 55.00	$ 88,000.00
Architectural Precast System	30440	$ 42.00	$ 1,278,480.00
Metal Wall Panel System	21160	$ 35.00	$ 740,600.00
Total			$ 2,675,580.00

Note 1: Costs per SF are for the total cost of installation.
Note 2: Metal Wall Panel System includes exterior wall framing and sheathing at $10/SF. Metal wall panels only are $25/SF.

Refer to the exhibit.

An architect is designing a new school. Following the development of the schematic design estimate, the construction manager tells the architect that the cost of metal wall panels has increased to $45 per square foot. To cut costs, the architect decides to replace the metal wall panel system at Classroom Wings A and B with an architectural precast wall panel system.

What are the net cost savings of using precast wall panels instead of metal wall panels?

A. $58,200
B. $194,000
C. $252,200
D. $446,200

Correct answer: C

CORRECT RESPONSE
$252,200

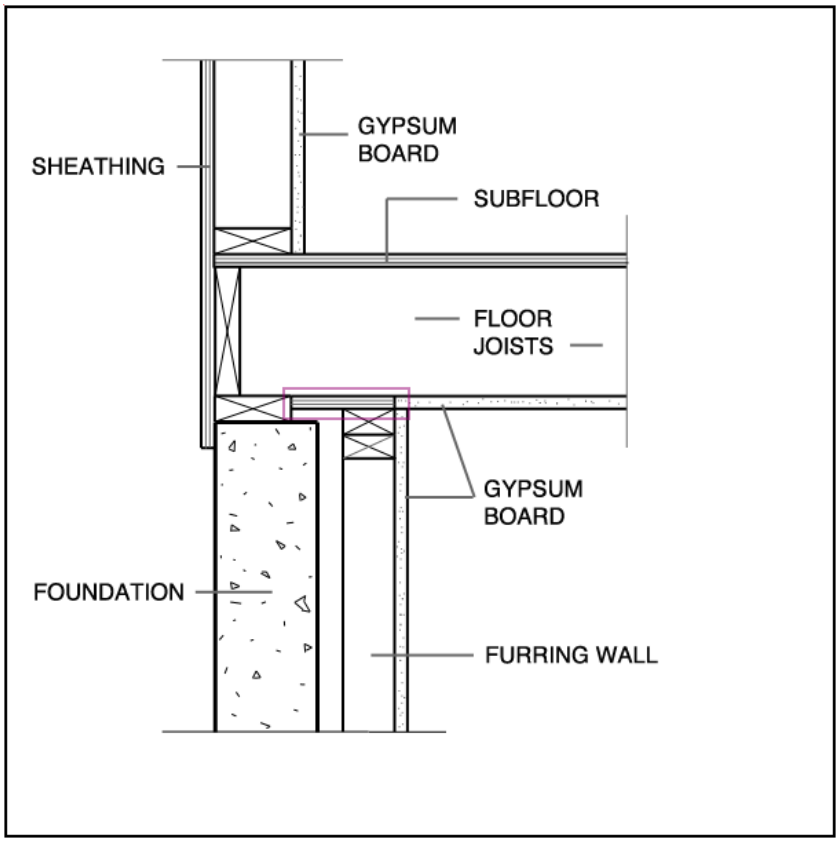
CALCULATIONS
1. The note at the bottom of the "Building Shell Package - Preliminary Estimate" lists the cost of metal wall panels only at $25 per square foot. The cost of the metal wall panels increases to $45 per square foot for a difference of $20 per square foot.
2. New cost of the metal wall panel system: $35 (original cost per square foot) + $20 (price increase) = $55 (new cost of metal wall panel system)
3. Total square footage of metal wall panel system on Classroom Wings A and B: 9,400 square feet (Classroom Wing A) + 10,000 square feet (Classroom Wing B) = 19,400 square feet
4. New total cost of the metal wall panel system: 19,400 square feet x $55 per square foot = $1,067,000
5. Total cost of the precast wall panel system: 19,400 square feet x $42 per square foot (cost of precast wall panel system) = $814,800
6. Cost savings: $1,067,000 - $814,800= $252,200 (total cost savings)

Section: Construction Cost Estimates

Question 62
An architect is working on a wood frame construction floor assembly detail for a residential project. The architect needs to include fire blocking to meet requirements for protecting concealed spaces.

Click on the component in the detail to indicate the location of the fire blocking.

Correct answer:



CORRECT RESPONSE
Cavity between the sill plate and top plates of the furring wall
Between the foundation wall and the furring wall there is a cavity with an opening at the top between the sill plate and the top plates of the furring wall. A plywood block is installed at the top opening to serve as a fire block to prevent the spread of fire from the floor joist/floor system.

Section: Integration of Building Materials & Systems

Question 63
A day before issuing construction documents (CDs) for bidding, an architect discovers a small discrepancy. The required special inspection items in the general notes on the consultant structural drawing set does not match the corresponding sections in the specifications.

How should the architect address the discrepancy?

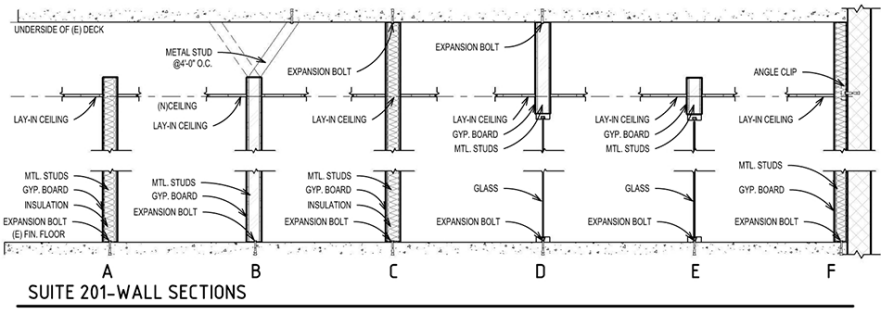
A. Modify the general notes to match the corresponding sections in the specifications before issuing CDs.
B. Modify the specifications to match the general notes in the structural drawing set before issuing CDs.
C. Issue the documents as-is and ask the structural engineer to clarify the discrepancy in an addendum.
D. Issue the documents as-is and send the structural engineer a RFI to clarify the discrepancy.

Correct answer: C

CORRECT RESPONSE
Issue the documents as-is and ask the structural engineer to clarify the discrepancy in an addendum.
The architect should ask the structural engineer consultant to modify and reissue documents with consistent information before bidding. In this scenario, since there is no time for the structural engineer to reissue consistent documents before bidding and the discrepancy is small, the documents can be issued as-is. During the bidding phase, the architect should provide clarifications to bidders in an addendum.

Section: Project Manual & Specifications

Question 64



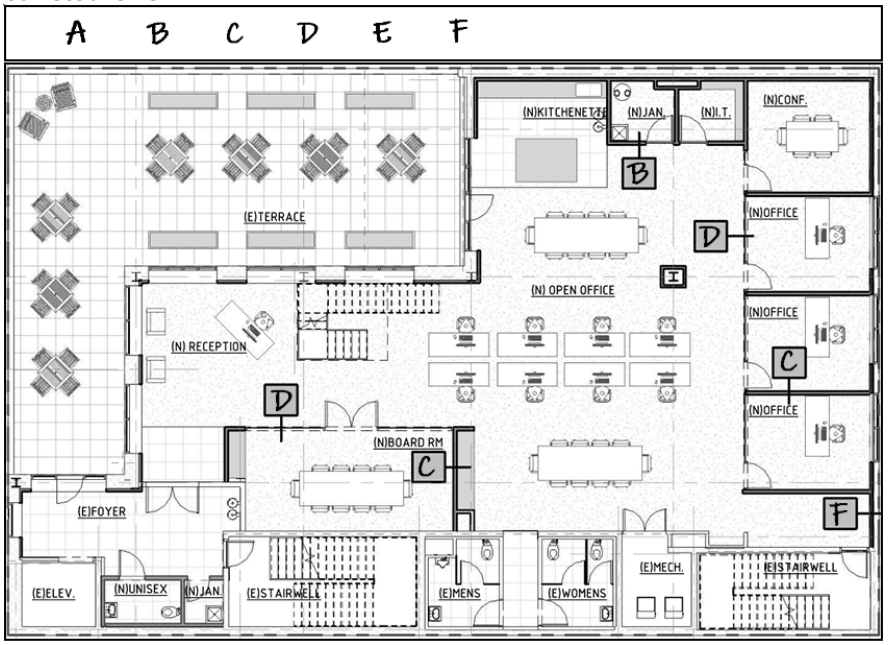
Refer to the exhibit.

An architect is selecting wall types for an office tenant space according to the following requirements:

- Walls between private offices and walls surrounding conference rooms must limit sound transmission.
- Walls between private and open offices, and between conference rooms and open offices, must include glass.
- Walls must be stabilized to prevent lateral movement.
- Walls will extend 6” above the ceiling unless otherwise required.
- The cost of metal framing must be minimized when possible.
- All ceilings are 2’x2’ lay-in.

Drag the wall type letter into the wall type boxes on the floor plan to indicate the wall types. Not all wall type letters will be used.

Correct answer:



CORRECT RESPONSES

Wall Type B
The wall between the Janitor Closet and Open Office does not require insulation. It extends 6" above ceiling and includes bracing for lateral support.

Wall Type C
The walls between adjacent Offices, and between the Board Room and the Open Office, extend up to the underside of the deck for lateral support and include insulation to reduce sound transmission.

Wall Type D
The walls between the private Office and Open Office, and between the Board Room and Open Office, include glass and extend up to the underside of the deck for lateral support.

Wall Type F
The exterior wall requires furring as in wall type F.

Section: Construction Documentation

Question 65
An architect is composing the project manual for a new restaurant project. The client-provided program for the project lists the following commercial kitchen appliances:

- (2) Acme Kitchen Pro stand mixers (Model #1234)
- (1) Pro-Cook gas range top (Model #PC002)
- (1) Industrial Kitchen Tech dishwasher (Model #IKT-99)

Which one of the following should the architect include in the project manual?

A. Proprietary specifications
B. Allowances
C. Procurement schedule

Correct answer: A

CORRECT RESPONSE
Proprietary specifications
Proprietary specifications are used to specify exact products and do not allow for equal or alternative products.

Section: Project Manual & Specifications

Question 66

TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (HOURS)[f]

OCCUPANCY	A, E		I-1[a], I-3, I-4		I-2		R[a]		F-2, S-2[b], U		B[e], F-1, M,S-1		H-1		H-2		H-3, H-4		H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A, E	N	N	1	2	2	NP	1	2	N	1	1	2	NP	NP	3	4	2	3	2	NP
I-1[a], I-3, I-4	1	2	N	N	2	NP	1	NP	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
I-2	2	NP	2	NP	N	N	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP
R[a]	1	2	1	NP	2	NP	N	N	1[c]	2[c]	1	2	NP	NP	3	NP	2	NP	2	NP
F-2, S-2[b], U	N	1	1	2	2	NP	1[c]	2[c]	N	N	1	2	NP	NP	3	4	2	3	2	NP
B[e], F-1, M, S-1	1	2	1	2	2	NP	1	2	1	2	N	N	NP	NP	2	3	1	2	1	NP
H-1	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	N	NP	NP	NP	NP	NP	NP	NP
H-2	3	4	3	NP	3	NP	3	NP	3	4	2	3	NP	NP	N	NP	1	NP	1	NP
H-3, H-4	2	3	2	NP	2	NP	2	NP	2	3	1	2	NP	NP	1	NP	1[d]	NP	1	NP
H-5	2	NP	2	NP	2	NP	2	NP	2	NP	1	NP	NP	NP	1	NP	1	NP	N	NP

S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
N = No separation requirement.
NP = Not Permitted.
a. See Section 420.
b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but not to less than 1 hour.
c. See Sections 406.3.2 and 406.6.4.
d. Separation is not required between occupancies of the same classification.
e. See Section 422.2 for *ambulatory care facilities*.
f. Occupancy separations that serve to define fire area limits established in Chapter 9 for requiring fire protection systems shall also comply with Section 707.3.10 and Table 707.3.10 in accordance with Section 901.7.

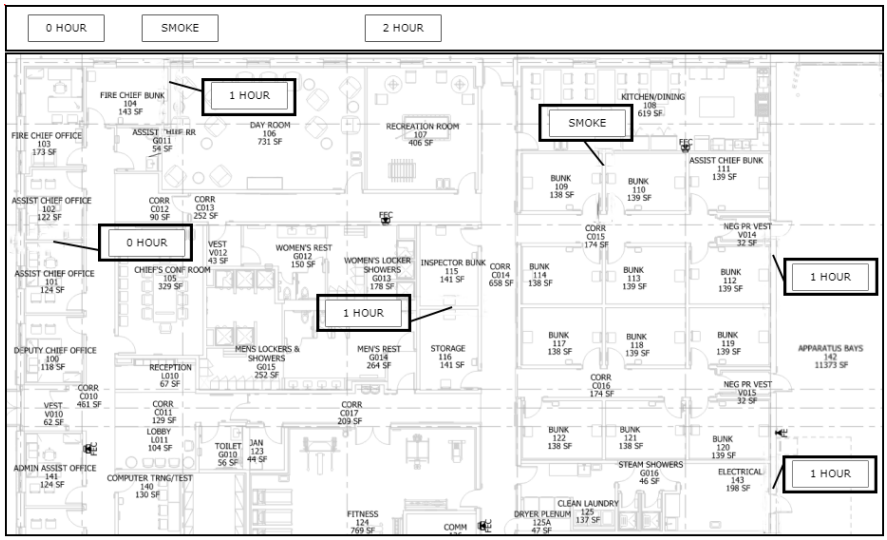
Refer to the exhibit.

An architect is adding fire-rating tags to the floor plan of a fully sprinklered fire station. The fire chief requests that the walls between bunk rooms receive a smoke partition. The remaining building occupancies include the following:

- Apparatus Bays: S-2
- Electrical, Maintenance, Tool and Storage Spaces: S-1
- Day Room, Recreation Room, Conference Rooms: A
- Offices: B
- Bunk Rooms: R

Drag the partition ratings into the boxes on the floor plan to indicate the wall ratings. Not all partition ratings will be used.

Correct answer:



CORRECT RESPONSES
0 HOUR
Required for the partition separating Business (B) and Business (B)

SMOKE
Required for the partitions separating Bunk rooms

1 HOUR
Required for the partition separating Fire Chief Bunk (residential R) and Day Room (assembly A)
Required for the partition separating Inspector Bunk (residential R) and Storage (S-1)
Required for the partition separating Bunk (residential R) and Apparatus Bays (S-2)
Required for the partition separating Electrical (S-1) and Apparatus Bays (S-2)

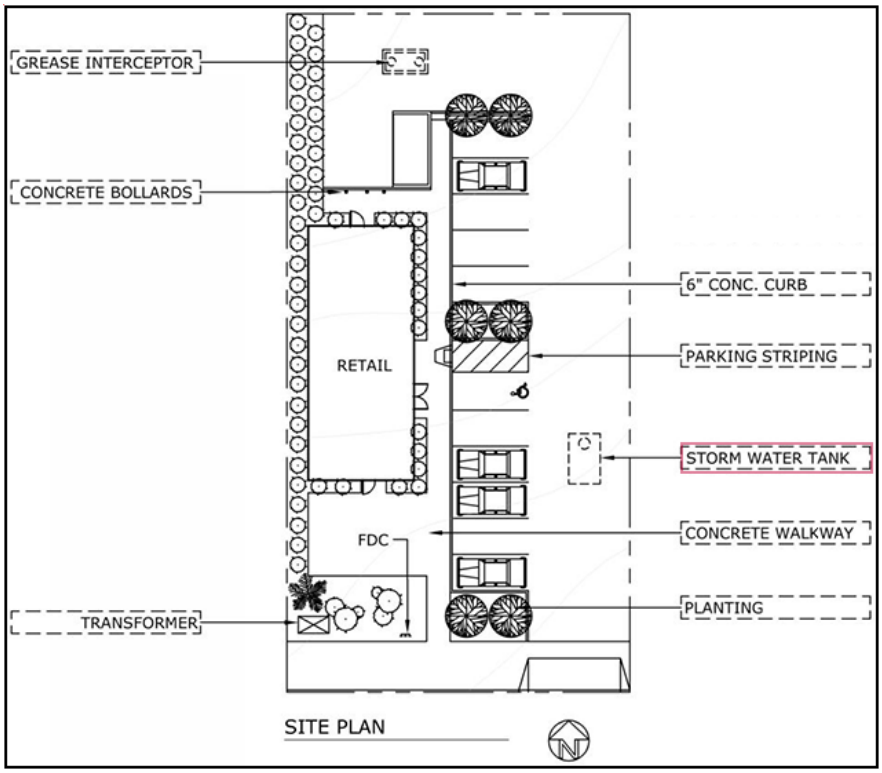
Section: Codes & Regulations

Question 67
An architect is reviewing a recently updated site plan and specifications that a civil engineer is preparing to issue for construction. The civil engineer has provided the following specifications:

03 30 53 - Miscellaneous Concrete	32 17 00 - Paving Specialties
03 48 13 - Precast Concrete Bollards	32 33 03 - Site Trash & Litter Receptacles
22 13 00 - Facility Sanitary Sewage	32 91 00 - Planting Preparation
32 00 00 - Exterior Improvements	33 71 00 - Electrical Utility Transmission & Distribution

Click on the site element tag on the site plan that is missing from the provided specifications.

Correct answer:



CORRECT RESPONSE
Storm Water Tank
The provided specifications address all the site elements except for the storm water tank.

Section: Construction Documentation

Question 68
An architect is designing a restaurant for a large hospitality project. The owner wants to hold events at the restaurant and requests the following changes during the construction document phase:

- Add a door from the adjacent service corridor through an STC-55 wall to the main dining area.
- Add a chandelier in the main dining area to improve the guest experience.
- Remove gypsum ceilings from the adjacent service corridors to balance the budget.

Which of the following will be needed to accommodate the owner's requests? **Check the four that apply.**

A. The structural engineer will need to revise the size of the columns.
B. The mechanical engineer will need to revise the specification for the supply air diffusers.
C. The plumbing engineer will need to revise the material of the sprinkler piping.
D. The electrical engineer will need to revise the schedule for light fixtures.
E. The acoustical consultant will need to revise the strategy for sound dampening.
F. The door hardware consultant will need to coordinate the door hardware for access controls.

Correct answer: BDEF

CORRECT RESPONSES
The mechanical engineer will need to revise the specification for the supply air diffusers.
The architect is required to coordinate supply air diffusers with the mechanical engineer. The mechanical engineer will need to provide the appropriate diffuser when the gypsum ceiling is removed.

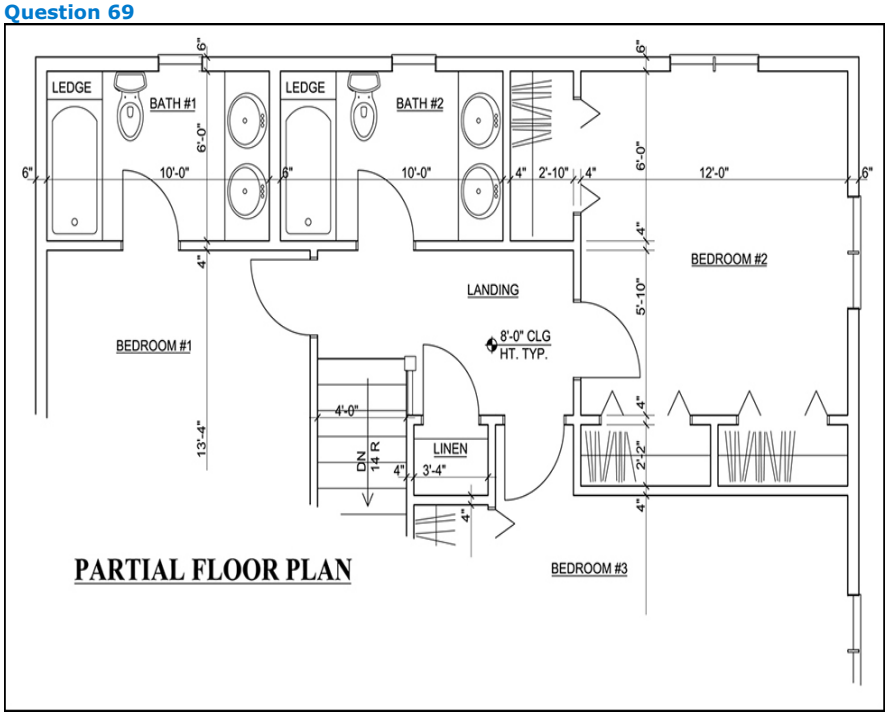
The electrical engineer will need to revise the schedule for light fixtures.
The architect is required to coordinate light fixtures with the electrical engineer. The electrical engineer will need to revise the schedule for any ceiling-mounted fixtures and will need to review light levels when the gypsum ceiling is removed. The electrical engineer will also need to coordinate power for the addition of the chandelier.

The acoustical consultant will need to revise the strategy for sound dampening.
The architect is required to coordinate room finishes with the acoustical consultant for sound control. Since the owner requested the addition of a door from the adjacent service corridor for the purpose of providing staff with discrete access to the main dining area, the architect can determine that the owner values privacy between the two spaces. The acoustical consultant will need to revise the strategy for sound dampening when the gypsum ceiling is removed.

The door hardware consultant will need to coordinate the door hardware for access controls.
The door hardware consultant will need to coordinate access controls due to the addition of the door between the service corridor and the main dining area.

Section: Construction Documentation

Question 69



Refer to the exhibit.

An architect is designing a wood frame single-family residence. In order to provide the recommended ventilation of eight air changes per hour, bath ventilator fans must be installed in each bathroom.

What size bath fans should the architect select?

A. 128 cfm
B. 64 cfm
C. 8 cfm

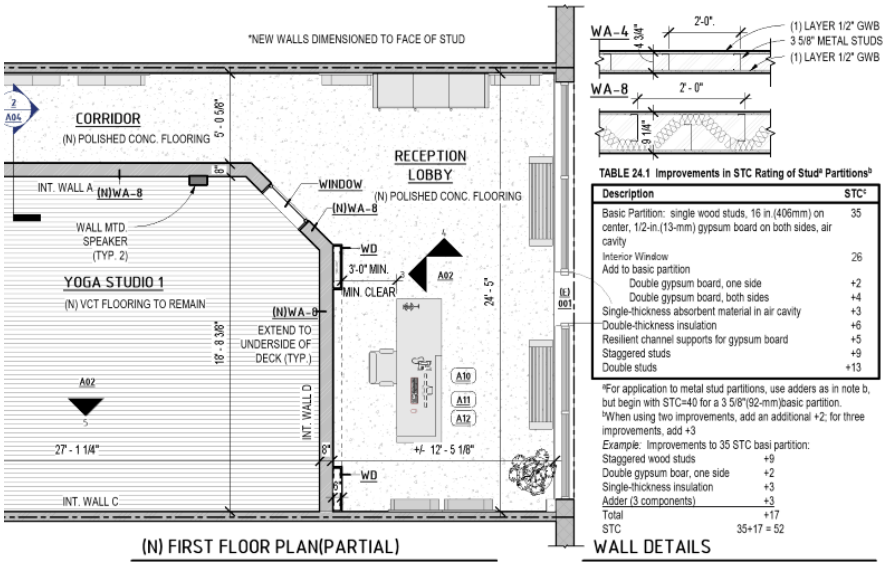
Correct answer: B

CORRECT RESPONSE
64 cfm

CALCULATIONS
1. For the volume of the room: 6' X 10' X 8' = 480 cubic feet
2. For cubic feet of air per hour: 480 cubic feet (room volume) * 8 (number of air changes needed per hour) = 3,840 cubic feet per hour
3. For the bath fan size in cfm: 3,840 cubic feet per hour / 60 (number of minutes per hour) = 64 cfm

Section: Integration of Building Materials & Systems

Question 70



Refer to the exhibit.

A client wants to control sound transmission from Yoga Studio 1 to the Reception Lobby. Relevant project details follow:

- The roof will be made of open-web steel joists with a metal deck.
- The windows will have 1/2" thermal insulated glass.
- The ceilings will be an exposed structure.
- The interior walls of the studio will be mirrors.
- The interior walls will be insulated.

How should the architect design wall WA-8 to minimize sound transmission? **Check the three that apply.**

A. Seal the wall to the underside of deck.
B. Remove the interior window.
C. Increase metal studs from 3 5/8” to 6”.
D. Decrease stud spacing to 16” o.c.
E. Add a layer of gypsum wallboard to each side of the wall.
F. Use wood studs instead of metal studs.

Correct answer: ABE

CORRECT RESPONSES
Seal the wall to the underside of deck.
Sealing the wall to the deck will prevent the transmission of sound through the space between the wall and the deck.

Remove the interior window.
A wall will only control sound to the same extent as its penetrations. Because the window in Yoga 1 has a lower STC rating (26) than the wall, the removal of the window will increase the STC rating of the wall.

Add a layer of gypsum wallboard to each side of the wall.
Extra weight increases STC, and so the addition of a layer of gypsum wallboard will increase the STC rating by 2.

Section: Construction Documentation

Question 71

INSULATING MATERIAL USED	MINIMUM THICKNESS OF INSULATING MATERIAL FOR THE FOLLOWING FIRE-RESISTANCE PERIODS (inches)			
	4 hours	3 hours	2 hours	1 hour
Carbonate, lightweight and sand-lightweight aggregate concrete, members 12" × 12" or greater (not including sandstone, granite and siliceous gravel).[a]	1 1/2	1	1	1
Cement plaster over metal lath wire tied to 3/4" cold-rolled vertical channels with 0.049" (No. 18 B.W. gage) wire ties spaced 3" to 6" on center. Plaster mixed 1:2 1/2 by volume, cement to sand.	—	—	2 1/2[b]	7/8
Perlite or vermiculite gypsum plaster over self-furring metal lath wrapped directly around column, lapped 1" and tied at 6" intervals with 0.049" (No. 18 B.W. gage) wire.	1 3/4	1 3/8	1	—

Refer to the exhibit.

An architect must determine the most appropriate insulating material for the steel columns used in a type I-A office tower. The columns must provide a fire-resistance rating of 2 hours, maximize usable floor area, and assist with carrying the structural load.

Which insulating material should the architect use?

A. 7/8" cement plaster
B. 1" gypsum plaster
C. 1" carbonate concrete

Correct answer: C

CORRECT RESPONSE
1" carbonate concrete
1" carbonate concrete will provide a fire-resistance rating of 2 hours and assist with carrying the structural load. It also requires the least thickness of the insulating material options and will maximize the usable floor area.

Section: Integration of Building Materials & Systems

Question 72
An architect is designing a new restaurant located at street level. The restaurant has an occupant load of 200 persons and requires a total exit width of 60”.

Which one of the following fulfills the minimum exit requirements?

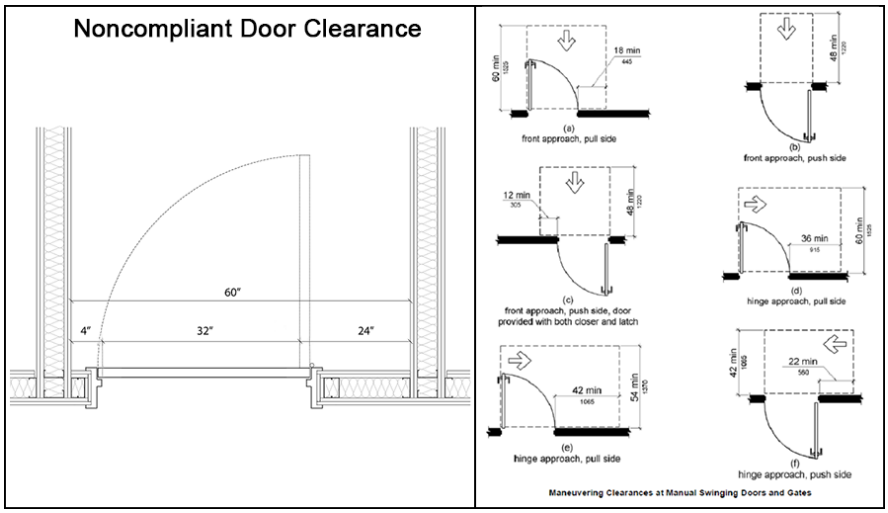
A. One pair of exit doors, swinging out.
B. One pair of exit doors, swinging in.
C. Two separate exit doors, swinging out.
D. Two separate exit doors, swinging in.

Correct answer: C

CORRECT RESPONSE
Two separate exit doors, swinging out.
Providing two exit doors, swinging out, complies with code.

Section: Codes & Regulations

Question 73



Refer to the exhibit.

During a construction document review, an architect discovers a door clearance that does not comply with ADA requirements. The door is 1-1/2" thick.

How should the architect bring the door clearance into ADA compliance?

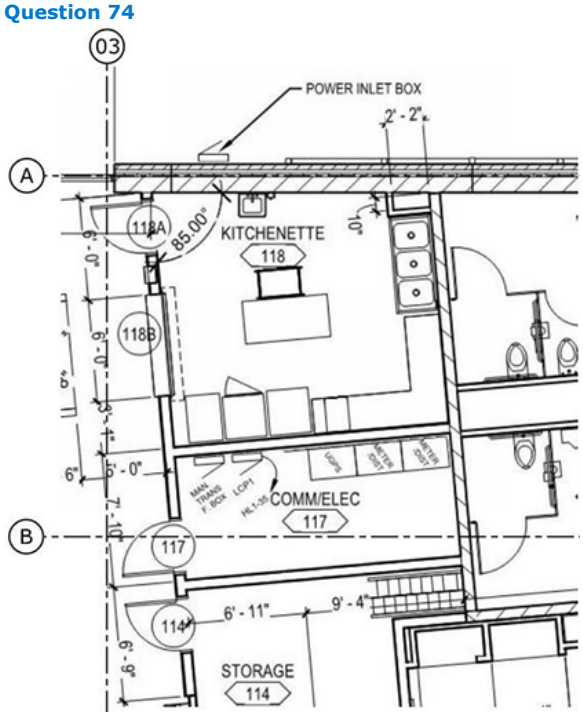
A. Move the door to the right by 8 inches.
B. Move the door to the right by 14 inches.
C. Enlarge the door to 36 inches.
D. Enlarge the door to 40 inches.

Correct answer: B

CORRECT RESPONSE
Move the door to the right by 14 inches.
Clearances comply with ADA. (Chapter 4 Accessible Routes, Maneuvering Clearances at Manual Swinging Doors and Gates) ADA requires a minimum of 18 inches clearance on the knob side for a front approach, pull side door.

Section: Codes & Regulations

Question 74

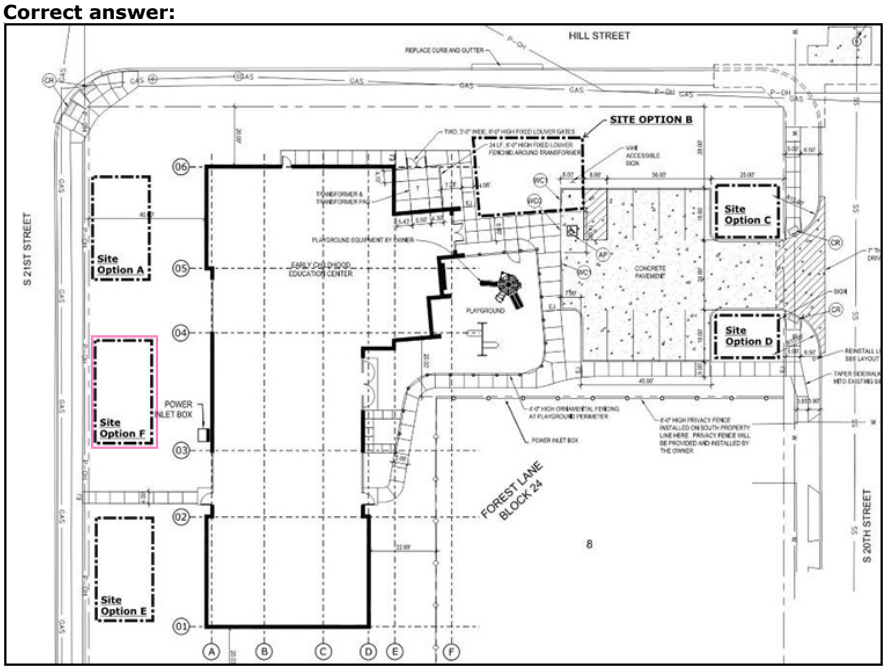


Refer to the exhibit.

After discussions with the AHJ, the owner of a community center has agreed to include the infrastructure necessary for providing temporary power during power outages. The architect is reviewing the latest electrical room equipment layout to determine the location for a temporary generator pad. Costs must be minimized and the generator pad must be accessible to maintenance trucks.

Click in the site option box on the plan to indicate the most appropriate site for a temporary generator pad.

Correct answer:



CORRECT RESPONSE
Site Option F
This is correct because of its proximity to the public right of way and the electrical room, making it ideal for accessibility and short temporary cabling runs.

Section: Integration of Building Materials & Systems

Question 75
An architect discovers that several specified interior finishes have an excessive lead time. The documents must be revised to avoid extending the construction schedule.

Which one of the following will require revisions to the project manual?

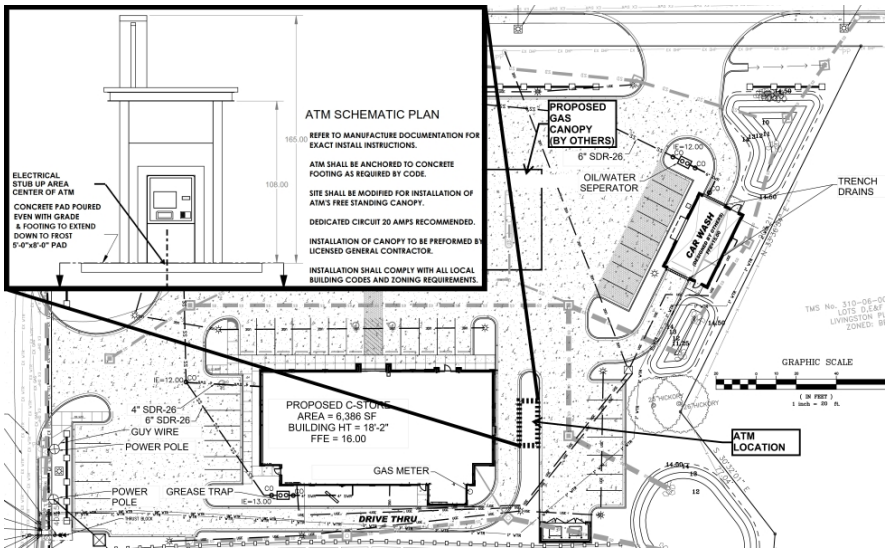
A. Replacing interior stone veneer product with solid surface.
B. Reducing the quantity of tile patterns on finish plans.
C. Clarifying an acceptable alternate paver product in an RFI.

Correct answer: A

CORRECT RESPONSE
Replacing interior stone veneer product with solid surface.
Finish products are communicated as specifications, which are a component of the project manual.

Section: Project Manual & Specifications

Question 76



Refer to the exhibit.

An architect is implementing client-requested modifications to the approved site plan.

With which consultants should the architect coordinate?

A. Surveyor, civil engineer, landscape architect
B. Civil engineer, electrical engineer, structural engineer
C. Electrical engineer, structural engineer, mechanical engineer

Correct answer: B

CORRECT RESPONSE
Civil engineer, electrical engineer, structural engineer
A civil engineer will need to to modify their plans; an electrical Engineer will need to update their plans to provide circuiting; and a structural engineer will be needed for footing design, as noted on the schematic site plan.

Section: Construction Documentation

Question 77
The owner of a restaurant notices a significant increase in the waiting line for the restrooms and decides to hire an architect for a restroom expansion. The owner wants a full interior renovation that includes the following:

- Wainscoting
- Easily maintained finishes
- Three new toilets
- New restroom vestibule walls
- Use of existing ceiling
- Use of existing exhaust fans

Which specification section notes should the architect add to the interior elevation drawings? **Check the three that apply.**

A. 05 40 00 – Cold-Formed Metal Framing
B. 09 30 00 – Tiling
C. 09 66 00 – Terrazzo Flooring
D. 10 21 00 – Compartments and Cubicles
E. 22 42 00 – Commercial Plumbing Fixtures
F. 23 38 00 – Ventilation Hoods

Correct answer: BDE

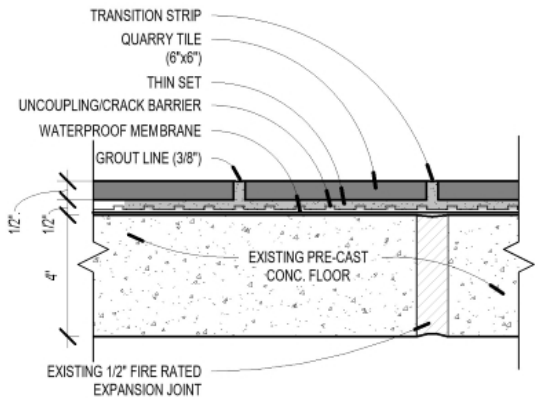
CORRECT RESPONSES
09 30 00 – Tiling
Tile is appropriate to specify for the renovation of a restroom and the use of tile improves cleanability and maintenance. It is appropriate to note wall tile on an interior elevation drawing.

10 21 00 – Compartments and Cubicles
Toilet compartments are appropriate to specify for the renovation of a restroom and their addition to the restrooms improve cleanability and maintenance. It is appropriate to note toilet compartments on an interior elevation drawing.

22 42 00 – Commercial Plumbing Fixtures
Commercial plumbing fixtures are appropriate to specify for the renovation of a restroom in a restaurant. It is appropriate to note plumbing fixtures, such as water closets, urinals, and lavatories, on an interior elevation drawing.

Section: Project Manual & Specifications

Question 78



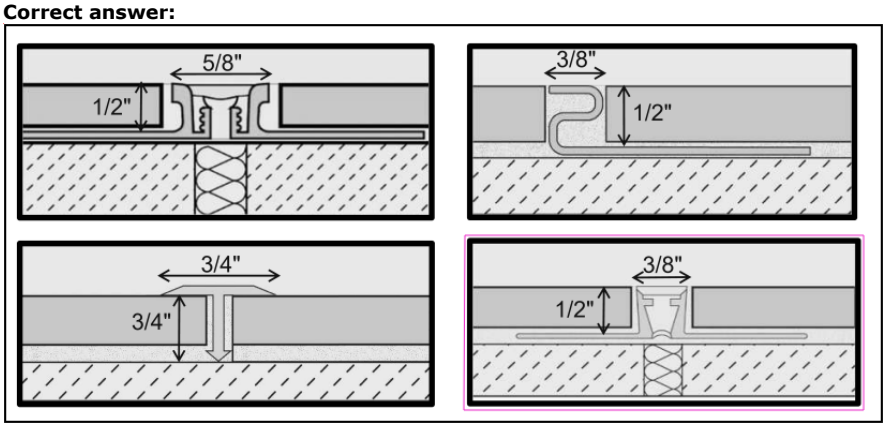
Refer to the exhibit.

An architect is selecting a tile transition strip for the kitchen floor of a restaurant. Floor requirements follow:

- Transition should create a smooth, cleanable surface and should match with grout lines.
- Prevent water leaking to basement below the cracking of tile.
- Transition cannot allow water to accumulate.
- Transition must meet ADA requirements.

Click on the profile in the array to indicate the transition strip the architect should select.

Correct answer:



CORRECT RESPONSE
Bottom right profile
This profile fits the grout line and is expandable to accommodate changes in the existing expansion joint.

Section: Construction Documentation

Question 79
An architect wants to reduce low-frequency sound transmission through a single-wythe CMU wall.

Which of the following options will be most effective?

A. Providing applied acoustical panels on the noise-producing side of the wall.
B. Providing lateral bracing of the wall at closer intervals.
C. Filling the cells of the masonry units with loose granular insulation.

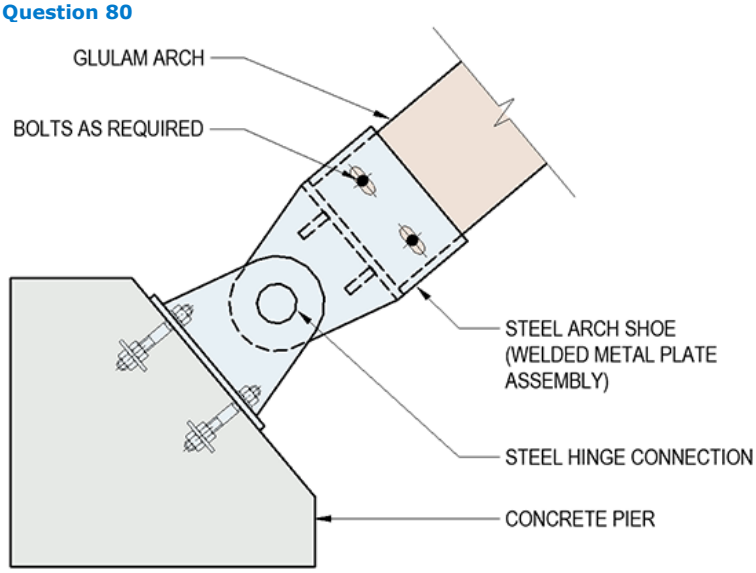
D. Filling the cells of the masonry units with sand.

Correct answer: D

CORRECT RESPONSE
Filling the cells of the masonry units with sand.
Low frequency sound does not transfer well through sand as it increases the mass.

Section: Integration of Building Materials & Systems

Question 80



Refer to the exhibit.

An architect is designing a luxury hotel in a tropical climate. A structural engineer provides an initial sketch for a steel arch shoe detail to an exterior glulam timber canopy at the hotel entrance.

Which one of the following long-term issues should the architect expect to result from the detail?

A. Glulam decay due to end grain being in direct contact with steel.
B. Glulam decay due to moisture build-up inside the arch shoe.
C. Glulam split due to material expansion perpendicular to grain.
D. Glulam split due to tension parallel to grain.

Correct answer: B

CORRECT RESPONSE
Glulam decay due to moisture build-up inside the arch shoe.
A steel arch shoe must be provided with a drain slot in order to minimize moisture buildup inside the steel arch shoe.

Section: Integration of Building Materials & Systems

Question 81

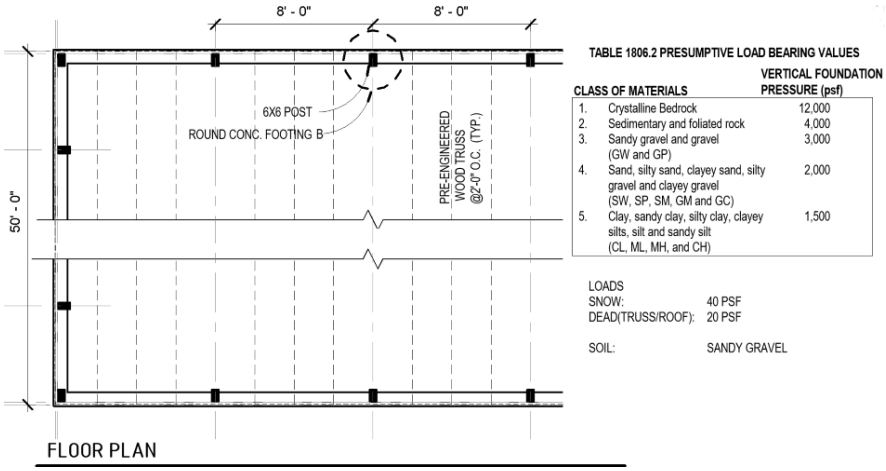


TABLE 1806.2 PRESUMPTIVE LOAD BEARING VALUES

CLASS OF MATERIALS		VERTICAL FOUNDATION PRESSURE (psf)
1.	Crystalline Bedrock	12,000
2.	Sedimentary and foliated rock	4,000
3.	Sandy gravel and gravel (GW and GP)	3,000
4.	Sand, silty sand, clayey sand, silty gravel and clayey gravel (SW, SP, SM, GM and GC)	2,000
5.	Clay, sandy clay, silty clay, clayey silts, silt and sandy silt (CL, ML, MH, and CH)	1,500

LOADS
SNOW: 40 PSF
DEAD(TRUSS/ROOF): 20 PSF

SOIL: SANDY GRAVEL

Refer to the exhibit.

An architect is verifying the size of "Round Conc. Footing B" for a pole barn.

What is the required surface area of this footing?

Reference Formula:
Surface area of footing (SF) = total load on footing (pounds) / soil capacity (PSF)

A. 4 square feet
B. 6 square feet
C. 32 square feet
D. 48 square feet

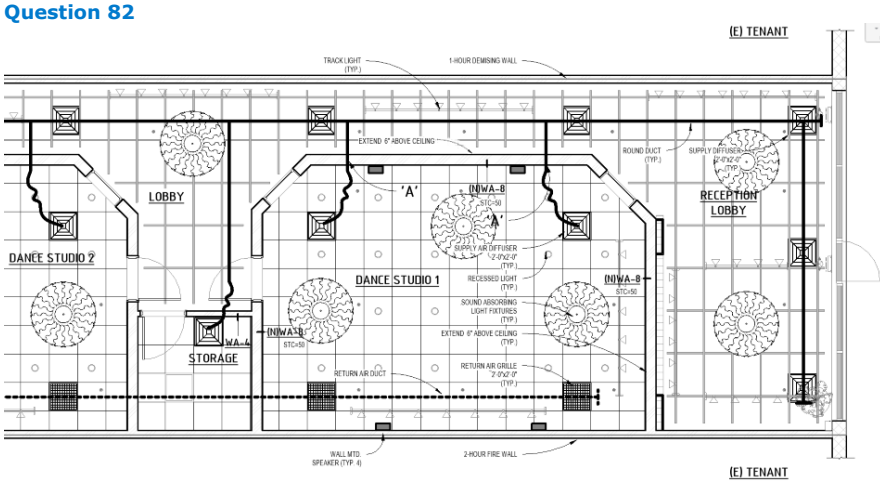
Correct answer: A

CORRECT RESPONSE
4 square feet

CALCULATIONS
1. Footing load dimension one: 50 feet (building width) / 2 = 25 feet
2. Footing load dimension two: 8 feet (column spacing) / 2 + 8 feet (column spacing) / 2 = 8 feet
3. 8 feet x 25 feet = 200 square feet of building load to footing B
4. 40 PSF (snow load) + 20 PSF (dead load) = 60 PSF
5. 60 PSF x 200 square feet = 12,000 lbs.
6. 12,000 lbs. / 3,000 PSF (sandy gravel load bearing value) = 4 square feet

Section: Integration of Building Materials & Systems

Question 82



Refer to the exhibit.

An architect is coordinating the mechanical plan with the ceiling plan.

What should the architect specify for Note 'A'?

A. Duct attenuator
B. Fire damper
C. Transfer grille

Correct answer: A

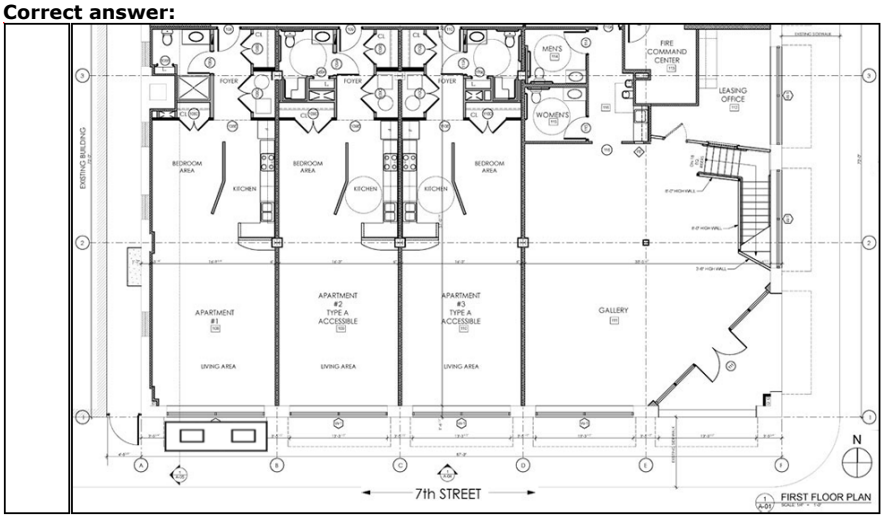
CORRECT RESPONSE
Duct attenuator
The wall has sound-absorbing fixtures, and the duct requires sound control between spaces. A duct attenuator reduces sound transmission through the ducts.

Section: Integration of Building Materials & Systems

Question 83
The local power utility decides to locate their new transformers for the building in a vault beneath the sidewalk. The currently designated Transformer Room will instead be used for the building's switchgear and meters. The new vault must be located in close proximity to the internal switchgear and meter room.

Drag the utility vault onto the First Floor Plan to indicate where the vault should be located.

Correct answer:



CORRECT RESPONSE
Horizontally oriented to the south of Apartment #1
The correct location for the vault is on the sidewalk on 7th Street as the meter and switchgear room are located in the southwest corner of the basement. The vault must be located between gridlines A and B. It must not move to the west of A, as it would interfere with the egress from the alley on the west side of the building.

CASE STUDY RESOURCES USED
Scenario
Construction Document Drawings

Section: Construction Documentation

Question 84
The client wants to control and monitor access to the second through fifth floors of the building.

What should the architect specify?

A. Video surveillance system located at Doors 100, 107, and 104.
B. Card control access system at Doors 100, 101, 107, and 104.
C. Card control access system at Doors 100, 107, 110, and 104.
D. Video and voice intercom system located near Door 100.

Correct answer: B

CORRECT RESPONSE

Card control access system at Doors 100, 101, 107, and 104.
A card control access system at these doors will prevent access from the first floor, both at the interior and exterior, to the second floor of the building and beyond.

CASE STUDY RESOURCES
Scenario
Construction Document Drawings

Section: Integration of Building Materials & Systems

Question 85
The client anticipates that Gallery events with loud music and conversation will extend into the late evening hours. The client wants to reduce the noise transfer between the Gallery and Apartment #3.

Which solution should the architect suggest?

A. A sound masking system in the gallery.
B. An acoustical ceiling tile system with a high NRC rating.
C. A different wall construction system with a higher IIC value along gridline D.
D. A different wall construction system with a higher STC value along gridline D.

Correct answer: D

CORRECT RESPONSE
A different wall construction system with a higher STC value along gridline D.
STC (sound transmission class) is a measurement that indicates how much airborne or voice command noise is stopped or absorbed by the wall or floor ceiling assembly. A system with a higher STC value is most appropriate for decreasing the transmission of sound. The wall with the higher STC value would need to be installed along gridline D, which marks the partition between the Gallery and Apartment #3.

CASE STUDY RESOURCES USED
Scenario
Construction Document Drawings

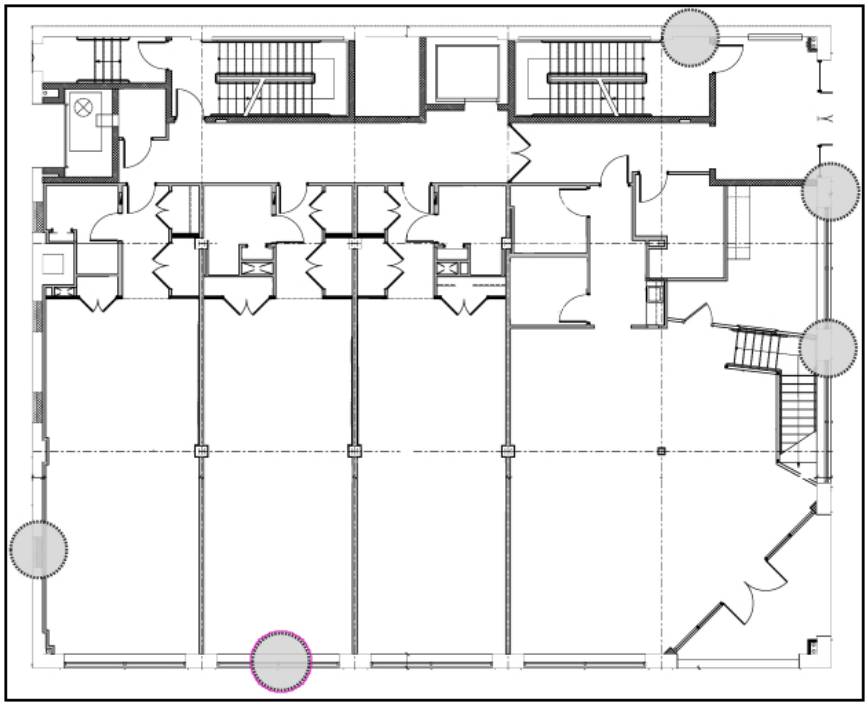
Section: Integration of Building Materials & Systems

Question 86
During a coordination meeting, the fire marshal asks the architect to locate the fire department connection (FDC). The FDC must be located as close as possible to the Fire Pump Room and adhere to the following additional installation requirements:

- Must be mounted through a solid wall and not more than 12” above grade.
- Must have a 3’x3’ clear access space on interior side of wall for fire department access.
- Must allow for access to the FDC inlet from the street or alley without any obstructions.

Click in the shaded circle on the floor plan to indicate the most appropriate location for the FDC.

Correct answer:

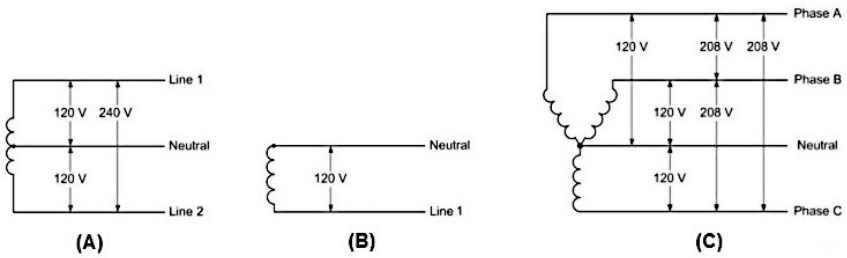


CORRECT RESPONSE
Shaded circle at the bottom of the floor plan
This location is near the Fire Pump Room. The area is unobstructed from the street and the room is accessible from the interior. A solid wall is available below the window.

CASE STUDY RESOURCES USED
Scenario
Construction Document Drawings

Section: Integration of Building Materials & Systems

Question 87



Refer to the exhibit.

Which electrical service and supply voltage arrangement is most appropriate for the project?

A. A
B. B
C. C

Correct answer: C

CORRECT RESPONSE
C
A 120/208 V, 3-phase, 4-wire arrangement is appropriate for the historic five-story building. It is not appropriate for very large commercial and industrial buildings.

CASE STUDY RESOURCES USED
Scenario

Section: Integration of Building Materials & Systems

Question 88
The National Park Service and an architectural conservator inform the architect that the brickwork of the historic building should be cleaned in the "gentlest means possible." An investigation of the brickwork reveals that the mortar joints are sound.

Which one of the following is most appropriate for cleaning the existing brickwork?

A. Low-pressure water washing starting at the bottom of the building and working up to the top, followed by a light application of muriatic acid and a clean water rinse.
B. Low-pressure water washing starting at the top of the building and working down to the bottom, followed by a clean water rinse and an application of water-repellent coating.
C. Low-pressure water washing starting at the bottom of the building and working up to the top, followed by a clean water rinse.

Correct answer: C

CORRECT RESPONSE
Low-pressure water washing starting at the bottom of the building and working up to the top, followed by a clean water rinse.
The Preservation Brief indicates that the building should be treated with low-pressure water washing from the bottom to the top of the building, followed by a clean water rinse.

CASE STUDY RESOURCES USED
Scenario
Preservation Brief

Section: Project Manual & Specifications

Question 89

UL U419

Interior Partitions - Steel Stud (Non-Load-Bearing)

Fire Rating	System Thickness	STC
1 hours	5 3/8 in.	50

ASSEMBLY DETAILS

Gypsum Board: 5/8" Thick Gypsum Board (UL Type ULIX™)

Resilient Channel: 1/2" 25ga. Resilient Channel Spaced 24" O.C. (Sound Tested with RC Deluxe®)

Steel Studs: 3-5/8" Steel Studs, EQ20 (0.020"), Spaced 16" O.C.

Insulation: 3-1/2" Thick Glass Fiber Batt Insulation

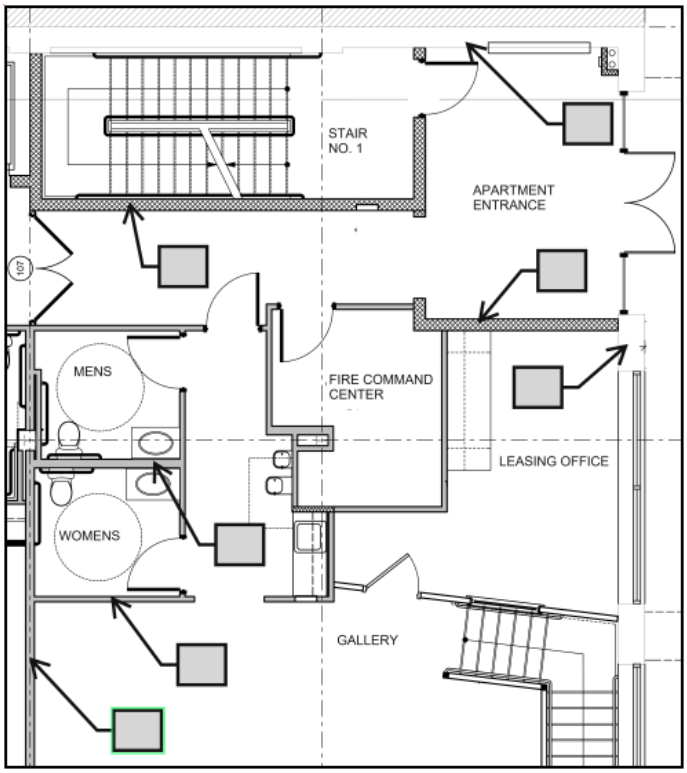
Gypsum Board: 5/8" Thick Gypsum Board (UL Type ULIX™)

Refer to the exhibit.

The architect has selected a wall specification to incorporate into the construction documents. The building is equipped with an automatic sprinkler system.

Click on the shaded box in the partial floor plan to indicate the wall that should be specified as UL U419.

Correct answer:



CORRECT RESPONSE
Shaded box that indicates the west wall of the Gallery
The wall specification that the architect wants to incorporate into the construction documents is a 1-hour-rated wall with a high STC rating. The wall between the Gallery and Apartment requires both of these.

CASE STUDY RESOURCES USED
Scenario
Construction Document Drawings
IBC Excerpts

Section: Project Manual & Specifications

Question 90
In order to increase property revenues, the client decides to rent the Gallery at the corner of the ground floor to an accounting firm. The Programmable Space in the basement will be used as storage. The architect will need to accommodate the change in occupancy for the former Gallery space by making sure its fire separation ratings meet the minimum code requirements. The building contains a sprinkler system.

What should the architect specify for the former Gallery space?

A. 1-hour-rated walls only
B. 2-hour-rated walls only
C. 1-hour-rated walls, ceiling, and floor
D. 2-hour-rated walls, ceiling, and floor

Correct answer: C

CORRECT RESPONSE
1-hour-rated walls, ceiling, and floor
Since the former Gallery space will now be occupied by an accounting firm, it will be classified as a business occupancy. The former Programmable Space will now be used for storage, so it will be classified as a storage occupancy. Per IBC Table 508.4 Required Separation of Occupancies, 1-hour fire separation is required between residential and business occupancies and between business and storage occupancies.

CASE STUDY RESOURCES USED
Scenario
Construction Document Drawings
ICC Excerpts

Section: Codes & Regulations

Question 91

The project team is currently focused on the cleaning and preservation of the existing window sills.

Which one of the following cleaning methods should the architect specify?

A. Acidic chemical cleaning
B. Alkaline chemical cleaning
C. Organic solvent cleaning

Correct answer: A

CORRECT RESPONSE
Acidic chemical cleaning
Acidic chemical cleaning is appropriate for cast stone according to the Preservation Brief resource.

CASE STUDY RESOURCES USED
Scenario
Preservation Brief
Elevations

Section: Codes & Regulations

Question 92
While reviewing the 35% construction document set, the architect realizes that the set does not specifically call out the tread depths for the egress stairs. The architect will need to add a string of dimensions to clarify the tread depths.

What are the tread depths for Stair 1 at the Basement level?

A. 11 inches
B. 11.6 inches
C. 12 inches
D. 12.6 inches

Correct answer: A

CORRECT RESPONSE
11 inches

CALCULATIONS
1. 10'-1" (riser to riser dimension of Stair No. 1 at the basement level) / 11 treads = 11" per tread
2. 4'-7" (riser to riser dimension of Stair No. 1 at the basement level) / 5 treads = 11" per tread

CASE STUDY RESOURCES USED
Scenario
Construction Document Drawings

Section: Construction Documentation

Question 93
The client decides not to expose any of the mechanical ductwork in the Community Center.

How should the architect revise the construction documents?

A. Revise the building sections
B. Specify spiral ductwork in these areas
C. Eliminate all return air ductwork and specify a plenum return

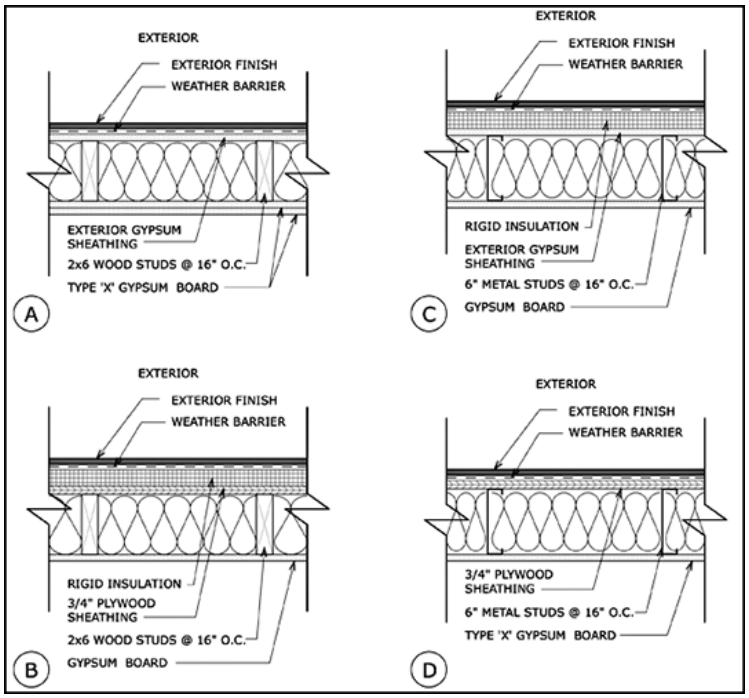
Correct answer: A

CORRECT RESPONSE
Revise the building sections
The building sections will need to be updated to reflect the addition of a ceiling and the removal of exposed ductwork within the impacted spaces.

CASE STUDY RESOURCES USED
Scenario
Plans

Section: Construction Documentation

Question 94



Refer to the exhibit.

During the construction document phase, the nonprofit organization directs the architect to change to Type II-B construction as a cost-saving measure. The exterior walls must still function as bearing walls and have the same exterior finishes.

Which exterior wall assembly meets the minimum requirements?

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

Correct answer: C

CORRECT RESPONSE
C
This wall assembly is the only one that is constructed with noncombustible material, which is necessary for Type II-B construction. It has continuous rigid insulation, which is required for metal studs, per the IBC. Also, IBC Table 601 indicates that Type II-B construction does not require exterior bearing walls that are fire-rated.

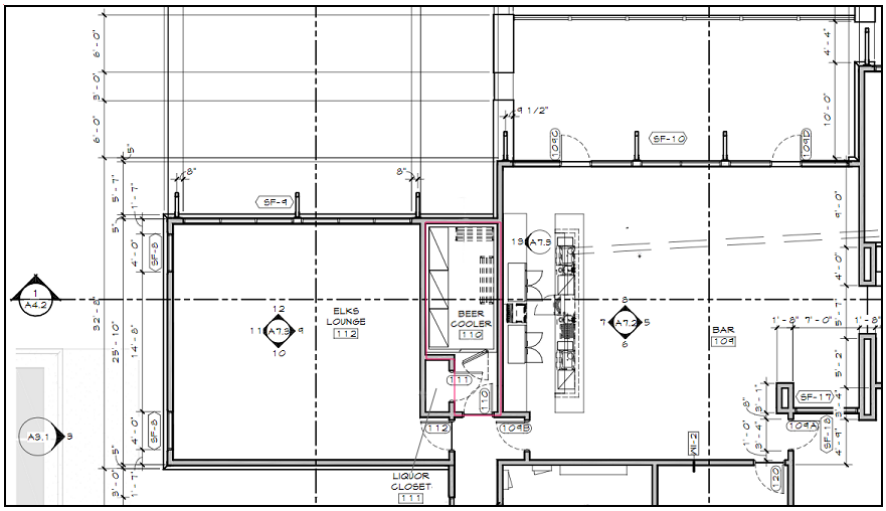
CASE STUDY RESOURCES USED
Scenario
IBC Excerpts

Section: Construction Documentation

Question 95
After receiving bid estimates for the community center project, the nonprofit organization learns they can reduce costs and expedite the schedule if subgrade preparation is omitted from the proposed floor assemblies.

Click in the room on the partial floor plan that would be affected by the change.

Correct answer:



CORRECT RESPONSE
Beer Cooler (110)
The Beer Cooler (110) will be affected by any change that would omit subgrade preparation. The Beer Cooler uses floor assembly FT-2. The Floor Assembly Legend on Building Section Sheet A4.1 notes that "subgrade preparation per geotechnical report" will be necessary for FT-2.

CASE STUDY RESOURCES USED
Scenario
Plans
Building Sections

Section: Construction Documentation

Question 96

	Glazing Type	U Factor	SHGC
A	Single pane window	1.09	0.81
B	Suspended coated film with argon gas	0.19	0.27
C	Double pane window	0.48	0.70
D	Double pane low-e glass	0.33	0.71

Refer to the exhibit.

The architect is reviewing the final selections for materials in the specifications and is considering several different types of glazing. The architect wants to choose the glazing type with a U factor and SHGC rating that is most appropriate for the project location.

Which glazing type should the architect choose?

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

Correct answer: B

CORRECT RESPONSE
B (Suspended coated film with argon gas; U factor = 0.19; SHGC = 0.27)
The location of the community center project has extreme temperature swings, making glazing that limits heat gain during the summer and heat loss during the winter desirable. A low U factor and low SHGC are beneficial in assisting in the reduction of demands on the HVAC system.

CASE STUDY RESOURCES USED
Scenario

Section: Project Manual & Specifications

Question 97
During pre-construction, the general contractor suggests several value engineering options to reduce labor and material costs for the proposed wall assemblies. All interior wall assemblies are non-load bearing.

Which option should the architect recommend to the nonprofit organization?

A. Remove sound batt from acoustical walls and specify an additional layer of GWB on each side.
B. Increase the spacing of interior light gauge metal studs from 16" O.C. to 24" O.C.
C. Specify type X GWB only where it is required by building code.

Correct answer: C

CORRECT RESPONSE
Specify type X GWB only where it is required by building code.
The architect has specified type X GWB at all wall assemblies. Type X GWB contains a core material reinforced with glass fibers necessary for fire-resistance-rated construction. Due to these special applications, type X GWB is more expensive and more labor intensive to install than standard gypsum walls. Specifying type X GWB only where fire-resistance-rated construction is required will be beneficial in reducing costs.

CASE STUDY RESOURCES USED
Scenario
Plans
IBC Excerpts

Section: Construction Cost Estimates

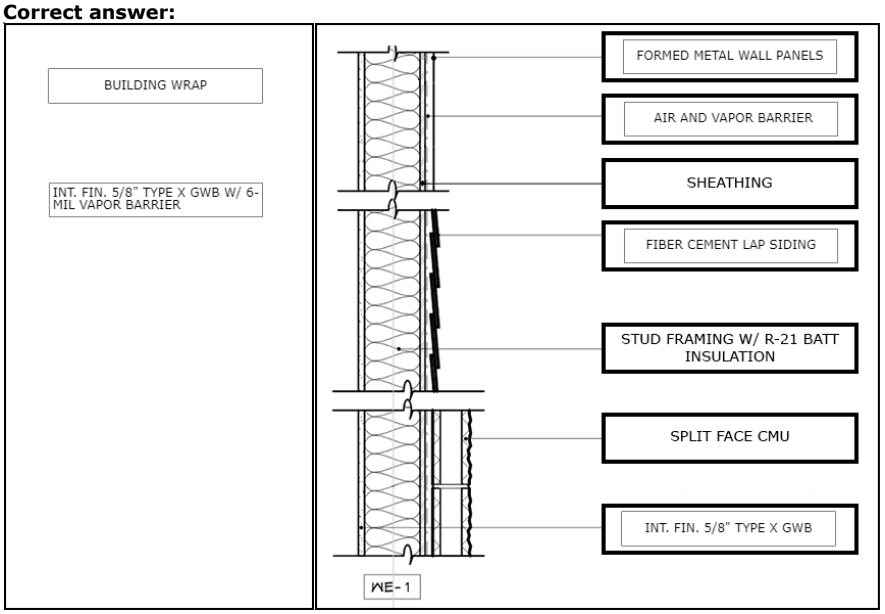
Question 98
The nonprofit organization hires the architecture firm to design a second community center in the southeastern United States. The nonprofit and the firm agree to the following:

- The drawings for the original community center will be used as a base drawing set.
- The new community center will retain the design of the original in size, scope, and aesthetics.
- The drawings will be modified only if needed to coordinate the design with local climate, site conditions, and zoning ordinances.

The architecture firm determines that the assembly of exterior wall type WE-1, as shown in the Wall Assembly Legend in the Plans, will need to be modified for the hot and humid southeastern climate.

Drag the wall assembly components into the boxes on the exterior wall type detail to indicate the assembly for the

Correct answer:



CORRECT RESPONSES
Formed Metal Wall Panels
No change from the base drawings is required. This material is appropriate in all climates.

Air and Vapor Barrier
Because of the change in climate, the vapor barrier needs to be on the exterior face of the wall assembly.

Fiber Cement Lap Siding
No change from the base drawings is required. This material is appropriate in all climates.

Int. Fin. 5/8" Type X GWB
Because of the change in climate, a vapor barrier should not be placed on the interior face of the wall assembly.

CASE STUDY RESOURCES USED
Scenario
Plans

Section: Construction Documentation

Question 99
While studying the runoff from properties adjacent to the bluff, the civil engineer finds increased levels of hydrostatic pressure on the future foundation of the proposed community center.

Which specification section will the architect need to add to address hydrostatic pressure?

A. 07 11 13 - Dampproofing
B. 07 14 00 - Waterproofing
C. 07 21 00 - Polystyrene Insulation

Correct answer: B

CORRECT RESPONSE
07 14 00 - Waterproofing
Due to the high levels of hydrostatic pressure, the architect will need to specify waterproofing between the slab and the ground.

CASE STUDY RESOURCES USED
Scenario
Wall Sections

Section: Project Manual & Specifications

Question 100
The nonprofit organization wants to change the use of the 3,115-net-square-foot Banquet Hall that was previously designed for tables and chairs. It will now be used for lectures, meetings, and other audience events with unfixed chairs only.

What will be the new occupant load?

A. 208 occupants
B. 237 occupants
C. 445 occupants
D. 623 occupants

Correct answer: C

CORRECT RESPONSE
445 occupants

CALCULATIONS
1. Determine the revised occupant load for the Banquet Hall: 3,115 nsf / 7 (occupant load factor for concentrated assembly spaces) = 445 occupants

CASE STUDY RESOURCES USED
Scenario
IBC Excerpts

Section: Codes & Regulations

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.