PRACTICE EXAM 7: NASCLA TRADE EXAM SIMULATION (115 QUESTIONS)

Time Allowed: 330 Minutes (5 Hours 30 Minutes)

Total Questions: 115

Passing Score: 70% (81 Correct)

DOMAIN 1: GENERAL REQUIREMENTS (Questions 1–25)

1. A contractor is constructing a fourstory commercial building with Group B occupancy on the first three floors and a Group A2 restaurant on the fourth floor. The building uses Type IIA construction. During plan review, the building official questions whether the Group A2 occupancy on the fourth floor is permitted at that height in this construction type. Under the IBC, how is the allowable number of stories determined when multiple occupancies exist in a building using the separated occupancies approach?

A. The occupancy with the greatest number of allowable stories governs the entire building without restriction

B. Each occupancy must comply with the allowable number of stories for its own group and construction type — if the Group A2 occupancy is not permitted at the fourth story in Type IIA, the building does not comply

C. The average number of allowable stories for all occupancies present is calculated and applied to the building

D. The building official has sole discretion to permit any occupancy at any height regardless of code tables

2. Under the IBC, a building's fire protection system must include a fire alarm system with automatic smoke detection in certain occupancy groups. In which of the following Group B (business) occupancy configurations does the IBC require a fire alarm system?

A. All Group B occupancies regardless of size, height, or occupant load must have fire alarm systems

B. Group B occupancies require fire alarm systems only when the building contains a commercial kitchen

C. Group B occupancies never require fire alarm systems under the IBC regardless of building configuration

D. Group B occupancies require a fire alarm system when the building is two or more stories in height and the combined occupant load of all Group B floors exceeds 500

3. A contractor receives construction documents that specify both a fire alarm system and an automatic sprinkler system for a commercial building. Under the IBC, if the building is fully sprinklered with an NFPA 13 system, does the sprinkler system eliminate the requirement for a separate fire alarm system?

A. No, the sprinkler system does not eliminate the fire alarm requirement — both systems serve different functions: the sprinkler system suppresses fire while the fire alarm system provides occupant notification and initiates emergency response

B. Yes, a fully sprinklered building never requires a fire alarm system because the sprinkler flow switch provides adequate notification

C. Yes, but only in Group B and Group M occupancies where fire alarm systems are always optional

D. The decision is left entirely to the fire marshal with no code provision governing the interaction

4. Under the IBC, what is the minimum required fireresistance rating for an exterior bearing wall of a Type IIA building that is located 10 feet from the property line?

A. No fireresistance rating is required for exterior bearing walls at 10 feet from the property line

B. 2hour fireresistance rating is required regardless of the distance to the property line for all Type IIA walls

C. 1hour fireresistance rating for exterior bearing walls of Type IIA construction, matching the rating required by Table 601 for bearing walls in this construction type

D. 3hour fireresistance rating for exterior bearing walls within 15 feet of any property line

5. A building inspector discovers that a contractor has installed a door with a roller latch in an exit stairway enclosure. The door is part of a 1hour fireresistancerated assembly. Under the IBC, what hardware type is required on doors in exit stairway enclosures?

A. Roller latches are acceptable on exit stairway doors as long as the door has an automatic closer installed

B. Doors in exit stairway enclosures must have positivelatching hardware that holds the door securely in the closed position and prevents the door from being pushed open by air pressure differentials

C. Any hardware type is acceptable on exit stairway doors as long as the door swings in the direction of egress

D. Only electromagnetic holdback devices are permitted on doors in exit stairway enclosures for fire safety

6. Under the IBC, a building with an occupant load exceeding a specific threshold requires an emergency voice/alarm communication system in addition to standard fire alarm notification appliances. In which building type is this system required?

A. All singlestory commercial buildings regardless of occupancy, height, or occupant load

B. All Group M (mercantile) occupancies with floor areas exceeding 5,000 square feet on any single level

C. All Group R1 (hotel) occupancies with more than 20 guest rooms on any single floor level

D. Highrise buildings (occupied floor more than 55 feet above fire department vehicle access) require emergency voice/alarm communication as part of the fire command center

7. A contractor is constructing a commercial building and the structural engineer specifies a concrete masonry fire wall to divide the building into two separate structures for code purposes. Under IBC Section 706, what structural characteristic must this fire wall possess?

A. The fire wall must be structurally independent — designed and constructed so that it remains standing even if the structure on one side collapses during a fire

B. The fire wall may share structural support with the framing on both sides as long as it has a 1hour rating

C. The fire wall is required only to resist gravity loads and has no lateral stability requirements

D. The fire wall may be a nonloadbearing partition that is braced to the structural frame on both sides

8. Under the IBC, what is the maximum occupant load that may be served by a single means of egress from an individual tenant space within a multitenant commercial building, assuming all other conditions (travel distance, building height) are met?

A. 100 occupants may be served by a single exit from an individual tenant space

B. 75 occupants may be served by a single exit from an individual tenant space

C. 49 occupants may be served by a single exit from an individual tenant space under specific conditions

D. 25 occupants is the maximum that may use a single exit from any space in a commercial building

9. A building inspector finds that a 2hour fireresistancerated corridor wall in a Group I2 (hospital) occupancy has been penetrated by an unfirestopped electrical conduit. The conduit passes through the rated assembly without any firestop system. What IBC violation does this condition represent?

A. No violation exists because electrical conduits in metallic raceway are selfprotecting and exempt from firestop requirements

B. The violation applies only if the conduit diameter exceeds 4 inches — smaller conduits are exempt

C. This is an informational finding only and does not constitute a code violation in hospital occupancies

D. This is a violation of IBC Section 714, which requires all penetrations through fireresistancerated assemblies to be protected with approved firestop systems that maintain the assembly's fireresistance rating

10. Under the IBC, the occupant load factor for a business occupancy (Group B) is 150 gross square feet per person. A contractor is calculating the occupant load for a 15,000 square foot office floor that includes 2,000 square feet of server room classified as a specialuse area. How should the server room area be treated in the occupant load calculation?

=A. The server room area should be calculated using its own occupant load factor (typically 300 gross SF/person for accessory storage and mechanical areas), not the 150 SF/person factor for the office area

B. The server room area must use the same 150 SF/person factor as the rest of the office floor

C. The server room area is added to the office area and the total is divided by 150 SF/person

D. The server room is exempt from occupant load calculations and should be subtracted from the total

11. A contractor is building a fourstory commercial structure and the architect specifies an exterior exit balcony as one of the required means of egress from the third floor. Under the IBC, what are the minimum requirements for an exterior exit balcony to serve as a required exit?

A. The balcony must be enclosed with glass panels on all sides and have a minimum width of 36 inches

B. The balcony requires a fireresistancerated floor but no minimum width beyond the standard door width

C. The exterior exit balcony must be open on at least one long side, have a minimum clear width of 44 inches, be constructed with fireresistancerated floor assembly, and lead to a stairway or exit discharge

D. The exterior exit balcony has no specific requirements beyond providing a flat walking surface at any width

12. Under the IBC, what document must the building official maintain as a permanent record of every commercial building constructed within the jurisdiction?

A. The contractor's daily reports including weather and workforce information for every work day

B. An approved set of construction documents showing the building as approved, including any approved amendments and the certificate of occupancy

C. The contractor's schedule of values and all monthly pay applications submitted during the project

D. The architect's design development drawings showing all rejected design alternatives considered

13. A contractor is constructing a threestory commercial building with a central atrium that connects all three floors. The atrium is open from the first floor to the roof. Under the IBC, what fire protection measures are required for this atrium?

A. Atriums have no fire protection requirements beyond the standard building fire alarm system

B. Atriums are prohibited in all commercial buildings over two stories under the current IBC provisions

C. Atriums require only a smoke detector at the highest point of the atrium space for early fire detection

D. The atrium must have an automatic sprinkler system throughout, a smoke control system, and the atrium must be separated from adjacent spaces by fire barriers or glass walls with closely spaced sprinklers

14. Under the IBC, accessible routes within a building must connect all accessible building elements. When an accessible route includes a change in elevation, what methods are permitted to achieve the level change?

A. Ramps complying with ICC A117.1 slope requirements, elevators, and platform lifts are the permitted methods for accessible level changes along an accessible route

B. Standard stairways with handrails are acceptable as the sole means of accessible level change

C. Escalators are an acceptable means of accessible level change when equipped with handrails on both sides

D. Ladders with extended side rails are acceptable for accessible level changes not exceeding 4 feet

15. A contractor is reviewing the IBC requirements for a commercial cold storage warehouse (Group S2) that will maintain interior temperatures below 0°F. The building is Type IIB construction. Under the IBC, what special consideration applies to fire sprinkler systems in this lowtemperature environment?

A. Sprinkler systems are not required in cold storage occupancies regardless of fire area or building size

B. Standard wetpipe sprinkler systems must be used because the water in the piping will not freeze at 0°F

C. A drypipe or preaction sprinkler system must be used because water in wetpipe systems would freeze in the subzero temperature environment

D. Only portable fire extinguishers are required for fire protection in cold storage warehouses

16. Under the IBC, what is the maximum height that combustible materials may be stored in a building equipped with an automatic sprinkler system before the storage arrangement triggers a reclassification to a highpiled combustible storage occupancy (Chapter 32)?

A. Combustible storage exceeding 20 feet in height always triggers highpiled storage requirements

B. Combustible storage exceeding 12 feet in height in sprinklered buildings (or exceeding 6 feet in nonsprinklered buildings) triggers highpiled combustible storage requirements per IBC Chapter 32

C. There is no height limit for combustible storage as long as the building is fully sprinklered throughout

D. Combustible materials may not be stored higher than 6 feet under any conditions in commercial buildings

17. A building has a Group E (educational) occupancy — an elementary school. Under the IBC, what fire alarm system features are specifically required for Group E occupancies that differ from standard fire alarm provisions?

A. Group E occupancies require only manual pull stations with no automatic detection of any type

B. Group E occupancies are exempt from fire alarm requirements when the building is fully sprinklered

C. Group E occupancies require only visual notification appliances with no audible alarm components

D. Group E occupancies require a fire alarm system that automatically initiates a signal to the fire department (or supervising station) upon activation, and the system must include automatic smoke detection in specific locations

18. Under the IBC, a contractor must provide temporary fire protection during construction. At what point during construction of a building required to have an automatic sprinkler system must the sprinkler system be operational?

A. The automatic sprinkler system must be placed in service floor by floor as each floor is completed, or alternative fire protection measures must be provided until the permanent system is operational

B. The sprinkler system is not required until the certificate of occupancy is issued, with no interim requirements

C. The sprinkler system must be installed before the foundation is poured but does not need water service

D. Temporary sprinkler protection is required only if the building exceeds 10 stories during construction

19. A contractor reviews building plans showing that an exit stairway on the ground floor discharges through a vestibule into the main lobby before reaching the exterior door. Under the IBC, is the exit stairway required to discharge directly to the exterior?

A. Yes, all exit stairways must discharge directly to the exterior — interior discharge is never permitted

B. All exit stairways may discharge through the main lobby without any specific protection requirements

C. Up to 50% of the exits may discharge through the interior (such as a lobby) provided the discharge path is protected by sprinklers, clearly identified, and leads directly to an exterior exit door

D. Exit stairways are not required to discharge at all and may terminate at the ground floor lobby

20. Under the IBC, fireresistancerated construction assemblies must be tested by an approved testing laboratory. What standard test method is used to determine the fireresistance rating of building assemblies in the United States?

A. ASTM C39, which is the standard test for concrete compressive strength, adapted for fire testing

B. ASTM E119 (Standard Test Methods for Fire Tests of Building Construction and Materials), which subjects assemblies to a standard timetemperature curve

C. ASTM E84, which measures surface burning characteristics including flame spread and smoke development

D. ASTM D698, which is the Standard Proctor test adapted for fireresistance evaluation of soil materials

21. A contractor is constructing a Group R2 (apartment) building and the architect specifies that every dwelling unit must have a direct exit to the exterior or access to two remote exits. Under the IBC, what requirement ensures that apartment building occupants have adequate egress from their individual units?

A. Each unit must have its own private exit stairway that does not serve any other dwelling unit

B. Each unit must have a direct exterior exit at grade — no corridors or shared exit access are permitted

C. Each unit must have a minimum of three exits regardless of occupant load or travel distance

D. Each unit must have access to at least two exits or exit access doorways when the occupant load or travel distance exceeds the singleexit thresholds, and exit access corridors must be protected per the code

22. Under the IBC, certain buildings require a fire safety and evacuation plan to be developed and maintained by the building owner. Which occupancy groups typically require fire safety and evacuation plans?

A. Group A (assembly), Group E (educational), Group I (institutional), Group R1 (hotel), and highrise buildings all require fire safety and evacuation plans

B. Only Group H (highhazard) occupancies require fire safety plans — all other groups are exempt

C. Fire safety plans are recommended but never required by the IBC for any occupancy classification

D. Only buildings exceeding 100,000 square feet in floor area require fire safety and evacuation plans

23. A contractor is constructing a commercial building where the architect has specified that certain interior walls must achieve a minimum flame spread index and smokedeveloped index. Under the IBC, what test method determines the surface burning characteristics (flame spread and smoke development) of interior finish materials?

A. ASTM E119, which subjects the material to a standard fire exposure for a specified duration

B. ASTM E814, which evaluates the firestop system's ability to maintain a rated assembly's integrity

C. ASTM E84 (Standard Test Method for Surface Burning Characteristics of Building Materials), which measures flame spread index and smokedeveloped index

D. NFPA 285, which evaluates the fire propagation behavior of exterior wall assemblies with combustible components

24. Under the IBC, the interior finish requirements for exit stairway enclosures are more restrictive than for other building spaces. What is the maximum permitted flame spread index for wall and ceiling finish materials in exit stairway enclosures?

A. Class C interior finish (flame spread index 76200) is permitted in exit stairway enclosures

B. Class B interior finish (flame spread index 2675) is the maximum permitted in exit stairway enclosures

C. There is no restriction on interior finish materials in exit stairway enclosures if the building is sprinklered

D. Class A interior finish (flame spread index 025) is required for wall and ceiling finishes in exit stairway enclosures

25. A contractor is constructing a building that requires both a fire alarm system and a mass notification system (MNS). Under the IBC and NFPA 72, what is the primary function of a mass notification system that distinguishes it from a standard fire alarm system?

A. A mass notification system provides broader communication capability for multiple types of emergencies (fire, severe weather, security threats, hazmat) and can deliver specific voice instructions to building occupants, while a standard fire alarm system is limited to firerelated notification

B. A mass notification system replaces the fire alarm system entirely and eliminates the need for any fire detection

C. A mass notification system provides only visual notification without audible signals of any type

D. A mass notification system and a fire alarm system are identical systems with interchangeable terminology

DOMAIN 2: SITE CONSTRUCTION (Questions 26–40)

26. A contractor is reviewing a geotechnical report that identifies a perched water table at a depth of 6 feet and the regional water table at 25 feet. The proposed foundation is at a depth of 8 feet. What is a perched water table, and what implication does it have for the excavation?

A. A perched water table is identical to the regional water table and has no separate significance

B. A perched water table occurs only in frozen soils during winter months and is not relevant in Alabama

C. A perched water table is a localized zone of saturated soil above the regional water table, trapped by an impervious layer — it will produce water in the excavation at 6 feet even though the regional water table is at 25 feet

D. A perched water table is an artificial water table created by irrigation systems on adjacent properties

27. A contractor is performing a plate load test on the bearing soil at the foundation level to verify the allowable bearing capacity. How is a plate load test conducted?

A. A plate load test measures the soil's moisture content by placing a heated plate on the soil surface

B. A rigid steel plate is placed on the prepared bearing surface and incrementally loaded while deflection is measured, providing a direct field measurement of the soil's loadsettlement behavior

C. A plate load test involves dropping a weight from a specified height onto a steel plate and measuring the rebound

D. A plate load test measures the soil's electrical conductivity to determine its bearing classification

28. Under OSHA's excavation safety standard, what role does the "competent person" play in excavation safety, and what qualifications must this person possess?

A. The competent person is a clerical position responsible only for filing OSHA paperwork for the excavation

B. The competent person must be a licensed professional engineer registered in the state where work is performed

C. The competent person is any worker on the site who has at least one year of general construction experience

D. The competent person must be capable of identifying existing and predictable hazards and must have the authority to take prompt corrective measures including stopping work and removing workers from the excavation

29. A contractor is constructing a building on a site where the geotechnical report recommends ground improvement using stone columns (vibroreplacement). What is the purpose of stone columns as a ground improvement technique?

A. Stone columns reinforce weak or compressible soil by displacing and compacting the surrounding native soil and replacing it with columns of compacted crushed stone, creating a composite foundation system with improved bearing capacity and reduced settlement

B. Stone columns are decorative landscaping features installed around the building perimeter

C. Stone columns are loadbearing structural columns made of natural stone that extend from the foundation to the roof

D. Stone columns replace the need for any foundation system by transferring all building loads directly to bedrock

30. A contractor is grading a commercial site and the civil engineer has designed a retention pond with a permanent pool of water. What water quality benefit does a retention pond with a permanent pool provide compared to a dry detention basin?

A. A retention pond with a permanent pool provides no water quality benefit over a dry detention basin

B. A retention pond with a permanent pool is designed only for aesthetic purposes with no stormwater function

C. The permanent pool allows extended settling time for suspended sediments and biological uptake of nutrients by aquatic vegetation, providing pollutant removal that a dry basin cannot achieve because dry basins empty completely between storm events

D. The permanent pool prevents all downstream flooding by storing 100% of all rainfall on the site permanently

31. A contractor is installing a mechanically stabilized earth (MSE) retaining wall for a commercial site. What construction feature distinguishes an MSE wall from a conventional castinplace concrete retaining wall?

A. MSE walls use only unreinforced concrete without any steel reinforcement for cost savings

B. MSE walls are temporary structures that must be replaced with permanent walls within one year

C. MSE walls are identical to conventional concrete retaining walls with no distinguishing features

D. MSE walls use layers of compacted fill reinforced with geosynthetic fabrics or steel strips that extend back into the retained soil, with a precast concrete or segmental block facing, eliminating the need for massive concrete stems and foundations

32. A contractor is constructing a parking lot and the pavement crosssection design shows a 2inch asphalt surface course over a 4inch asphalt base course over 8 inches of compacted aggregate base. What is the structural function of the aggregate base course in this pavement section?

A. The aggregate base serves only as a temporary construction platform and has no permanent structural role

B. The aggregate base distributes the concentrated wheel loads from the asphalt surface over a larger area of the subgrade, reducing the stress on the underlying soil to a level the subgrade can support without deformation

C. The aggregate base provides thermal insulation to prevent frost heave damage to the asphalt surface

D. The aggregate base serves as a moisture barrier that prevents groundwater from reaching the asphalt layers

33. A contractor notices that the geotechnical report for the project site includes a recommendation for "wick drains" to accelerate consolidation of a thick layer of soft clay. How do wick drains (prefabricated vertical drains) accelerate consolidation?

A. Wick drains introduce chemicals that harden the soft clay into a rocklike material within hours

B. Wick drains remove all water from the soil permanently by pumping it to the surface for disposal

C. Wick drains heat the soil to evaporate groundwater and accelerate the drying process

D. Wick drains provide shortened drainage paths that allow water squeezed out of the clay by surcharge loading to escape more quickly, reducing the consolidation time from years to months

34. A contractor is constructing a commercial building in an area with a high water table. The foundation design includes a waterproof concrete construction technique called "tanking." What does tanking involve?

A. Tanking involves installing large water storage tanks beneath the foundation to collect groundwater

B. Tanking involves pumping water into the foundation excavation to float the building into position

C. Tanking creates a fully waterproof belowgrade structure using waterproofing membranes, waterstops at construction joints, and hydrophilic or swellable sealants to prevent any groundwater from entering the belowgrade space

D. Tanking involves filling the belowgrade space with water permanently to equalize hydrostatic pressure

35. A contractor is reviewing a geotechnical report that classifies the site's soil as SM (silty sand) under the Unified Soil Classification System. What general characteristics does SM soil exhibit for construction purposes?

A. SM soil is a highly expansive clay that swells dramatically when wet and shrinks when dry

B. SM soil is solid rock that requires blasting or mechanical breaking for any excavation work

C. SM soil is a pure gravel with no fines content and provides the highest possible bearing capacity

D. SM soil is a predominantly sandsized material with more than 12% fines (silt) content — it provides moderate bearing capacity, drains moderately well, and is generally suitable for structural fill if properly compacted

36. A contractor is installing a soil nail wall for temporary excavation support on a commercial building site adjacent to a busy road. What is a soil nail wall, and how does it provide excavation support?

A. A soil nail wall uses rows of steel bars (nails) drilled and grouted into the existing soil face, combined with a shotcrete facing, to create a reinforced soil mass that resists the lateral earth pressure and stabilizes the excavation face

B. A soil nail wall is a sheet pile wall driven into the ground to retain soil behind the excavation

C. A soil nail wall is a soldier pile and lagging system using timber boards between steel Hpiles

D. A soil nail wall uses pretensioned steel cables anchored in rock to hold back the soil above the excavation

37. A contractor is constructing a large commercial parking lot and the civil engineer specifies permeable pavers for a portion of the lot to manage stormwater. How do permeable pavers function differently from standard asphalt or concrete pavement?

A. Permeable pavers allow stormwater to infiltrate through joints between the pavers and into an aggregate storage layer below, reducing surface runoff volume and filtering pollutants through the aggregate bed

B. Permeable pavers absorb water into the paver material itself and store it permanently within the paver body

C. Permeable pavers function identically to standard pavement with no stormwater management benefit

D. Permeable pavers direct all stormwater to the pavement surface edges through channels cast into the paver

38. Under OSHA excavation safety requirements, what is the maximum height of an unbraced vertical face (bench) permitted in a Type A soil excavation using the benching method?

A. 6 feet maximum vertical bench height in Type A soil using the simple slope/bench combination

B. 10 feet maximum vertical bench height in Type A soil using the simple slope/bench combination

C. 3 feet maximum vertical bench height in Type A soil using the simple slope/bench combination

D. 4 feet maximum vertical bench height in Type A soil using the simple bench method per OSHA Appendix B

39. A contractor discovers that an existing underground fuel oil storage tank was not identified in the Phase I Environmental Site Assessment and is leaking petroleum products into the soil. Under ADEM regulations, what is the contractor's immediate obligation?

A. The contractor may continue working and report the tank during the final project closeout documentation

B. The contractor should cover the tank with fill material and note its location on the asbuilt drawings

C. The contractor must stop work in the affected area, report the discovery to the project owner and ADEM, and not disturb the tank or contaminated soil until a qualified environmental professional assesses the situation and develops a remediation plan

D. The contractor must remove the tank immediately and dispose of the contaminated soil at the nearest landfill

40. A contractor is installing a geomembrane liner in a stormwater retention pond. What is the purpose of the geomembrane liner, and what material is typically used?

A. The geomembrane liner provides structural support for the pond embankments and prevents slope failure

B. The geomembrane liner (typically HDPE or LLDPE) prevents water from seeping out of the pond into the surrounding soil, maintaining the required water level and preventing potential contamination of groundwater

C. The geomembrane liner filters sediment from the stormwater as it enters the pond through the liner surface

D. The geomembrane liner provides insulation to prevent the pond water from freezing during winter months

DOMAIN 3: CONCRETE (Questions 41–46)

41. A contractor is reviewing structural drawings for a reinforced concrete beam and notices that the engineer has specified both "tension steel" at the bottom of the beam and "compression steel" at the top. Most concrete beams require tension reinforcement at the bottom where the beam is in tension under gravity loads. Under what conditions would compression steel at the top of the beam also be required?

A. Compression steel is added when the beam's crosssection is limited by architectural constraints and the concrete alone cannot resist the compressive forces, or when the engineer needs to increase the beam's ductility, reduce longterm deflection, or meet seismic design requirements

B. Compression steel is required in every concrete beam regardless of loading or design constraints

C. Compression steel serves only as a support for the stirrups and has no structural contribution to the beam

D. Compression steel is added purely for aesthetics to create a symmetrical rebar cage within the beam form

42. A concrete contractor is placing a slab on grade and the specifications call for vapor retarder placement directly beneath the slab with no sand layer (blotter layer) between the vapor retarder and the concrete. Some contractors traditionally place a sand layer between the vapor retarder and the slab. Why has the ACI position shifted to recommend placing the slab directly on the vapor retarder without a sand blotter layer?

A. The sand layer provides beneficial curing moisture that should always be included between the slab and vapor retarder

B. The sand blotter layer is required by the IBC for all slabongrade construction regardless of conditions

C. The sand blotter layer improves the slab's compressive strength by providing a uniform bearing surface

D. The sand blotter layer can become saturated and serve as a reservoir that supplies moisture to the underside of the slab indefinitely, causing persistent moisture problems for floor finishes — placing the slab directly on the vapor retarder eliminates this moisture source

43. A contractor is constructing a concrete parking structure and the structural engineer specifies that all construction joints must include a roughened surface (minimum ¼inch amplitude) before new concrete is placed against the hardened concrete. What is the purpose of roughening the construction joint surface?

A. Roughening provides better adhesion for the paint finish that will be applied to the joint after construction

B. Roughening is purely decorative and creates an intentional exposedaggregate appearance at the joint

C. Roughening the hardened concrete surface creates mechanical interlock (aggregate interlock) that increases the shear transfer capacity across the construction joint, preventing relative slippage between the old and new concrete

D. Roughening prevents moisture from collecting at the joint by creating channels for water drainage

44. A contractor is placing concrete for a large mat foundation in hot weather (ambient temperature 95°F). The specification limits the maximum concrete temperature at the time of placement to 90°F. The batch plant reports that the concrete temperature in the truck is 93°F. What should the contractor do?

A. Proceed with placement because the 3°F overage is within standard industry tolerance for hot weather

B. Reject the load or have the batch plant add ice to the mix to reduce the concrete temperature to 90°F or below before placement, as exceeding the maximum placement temperature can cause rapid setting, plastic shrinkage cracking, and reduced ultimate strength

C. Add water to the concrete to reduce the temperature because water absorbs heat from the mix

D. Wait until nighttime when ambient temperatures drop and then place the overheated concrete

45. A contractor is reviewing specifications for a concrete parking garage that requires corrosioninhibiting admixture in the concrete mix. What does a corrosioninhibiting admixture do, and when is it specified?

A. A corrosioninhibiting admixture delays the onset of chlorideinduced corrosion of reinforcing steel by increasing the chloride threshold needed to initiate corrosion, extending the service life of concrete exposed to deicing chemicals or marine environments

B. A corrosioninhibiting admixture prevents the concrete surface from developing surface scaling and popouts

C. A corrosioninhibiting admixture accelerates the hydration process to achieve high early strength in cold weather

D. A corrosioninhibiting admixture reduces the watercement ratio by acting as a superplasticizer in the mix

46. A concrete contractor is constructing a posttensioned elevated parking slab and the engineer requires that the posttensioning tendons be stressed within a specific timeframe after the concrete reaches its minimum required stressing strength. Why is the timing of stressing important?

A. Late stressing has no effect on the concrete or the tendon system and may be delayed indefinitely

B. Early stressing before the concrete reaches minimum strength can crush the concrete at the anchorage zones

C. The timing of stressing is important only for aesthetic reasons to prevent visible deflection in the slab

D. Stressing must occur within the specified window because delayed stressing allows the concrete to undergo more shrinkage and creep before the compressive force is applied, which reduces the effective precompression in the slab and may allow shrinkage cracks to develop

DOMAIN 4: MASONRY (Questions 47–50)

47. A masonry contractor is constructing a reinforced CMU wall and the structural drawings show a bond beam at the top of the wall, at midheight, at each floor level, and above and below all openings. The bond beam reinforcement consists of two #5 bars placed horizontally in a Ushaped bond beam block filled with grout. What additional function do the bond beams above and below openings serve beyond general horizontal reinforcement?

A. The bond beams above and below openings serve as lintels that span the opening and distribute the concentrated loads around the opening to the supporting masonry on each side, preventing stress concentrations that could cause cracking

B. Bond beams above and below openings serve only as aesthetic elements that create shadow lines

C. Bond beams at openings provide thermal insulation by interrupting the thermal bridge through the wall

D. Bond beams at openings serve only as attachment points for window and door frames

48. A masonry specification requires that mortar materials be stored on the jobsite in a manner that protects them from moisture. Why is it critical to keep bagged masonry cement and hydrated lime dry before mixing?

A. Moisture exposure changes the color of the mortar but has no effect on its structural properties

B. Wet cement bags are heavier and more difficult to handle, creating an ergonomic hazard for workers

C. Bagged cement and lime that absorb moisture begin to hydrate prematurely, forming lumps and clumps that reduce the material's reactivity, producing weaker mortar with inconsistent properties

D. Moisture causes the bags to decompose, contaminating the cement with paper fiber that weakens the mix

49. A masonry contractor is building a CMU wall with flush mortar joints (no tooling) for an interior warehouse wall that will not be exposed to weather. The building inspector asks about the joint finish. Under the masonry code, are flush (untooled) joints acceptable for interior walls?

A. Flush joints are never acceptable under any condition and all mortar joints must be tooled regardless of location

B. Flush joints are acceptable only if the wall will be painted within 30 days of construction to seal the joints

C. Flush joints are acceptable only on walls exceeding 20 feet in height where tooling is impractical

D. Flush joints may be acceptable for interior walls not exposed to weather, but tooled joints (concave or Vjoint) provide better mortartounit bond and are always preferred — the structural engineer and specification should be consulted

50. A masonry contractor discovers that a section of CMU wall was laid with the wrong mortar type — Type N was used instead of the specified Type S. The wall is a structural exterior bearing wall. What is the significance of this error?

A. Type N mortar has a minimum compressive strength of 750 psi compared to Type S at 1,800 psi — using Type N in place of Type S significantly reduces the wall's structural capacity and its ability to resist lateral loads, and the affected section may need to be removed and rebuilt

B. Type N and Type S mortars are identical in strength and the substitution has no structural consequence

C. Type N is actually stronger than Type S and the substitution improves the wall's structural performance

D. The difference between mortar types affects only the mortar color and has no structural significance

DOMAIN 5: METALS (Questions 51–56)

51. A contractor is reviewing structural drawings that show a braced frame lateral forceresisting system using chevron bracing (inverted Vbracing) in certain bays of the steel frame. What structural function does the chevron bracing provide?

A. Chevron bracing provides only aesthetic symmetry to the structural frame with no lateral resistance

B. Chevron bracing carries only gravity loads from the floor above and provides no lateral resistance

C. Chevron bracing transfers lateral forces (from wind and seismic loads) to the foundation through the diagonal members, which convert the lateral forces into axial tension and compression in the braces

D. Chevron bracing supports the mechanical ductwork that runs through the braced bay of the frame

52. A structural steel fabricator discovers during shop drawing preparation that the beamtocolumn connection detail shown on the structural drawings cannot be fabricated as drawn because of a geometric conflict between the beam flange and the column web stiffener. What is the correct course of action?

A. The fabricator should modify the connection detail to resolve the conflict and fabricate the modified design

B. The fabricator must submit an RFI to the structural engineer identifying the conflict and requesting a revised connection detail before proceeding with fabrication

C. The fabricator should omit the conflicting stiffener and fabricate the connection without it

D. The fabricator should fabricate the connection exactly as drawn and let the erector resolve the conflict in the field

53. A contractor is erecting structural steel for a commercial building and the AISC Code of Standard Practice specifies that certain connections are designated as "field connections" while others are "shop connections." What is the primary advantage of making a connection in the shop rather than in the field?

A. Shop connections are made under controlled conditions (jigs, fixtures, environmental protection, quality control) that produce higherquality, more consistent connections than field connections made under variable jobsite conditions

B. Shop connections are always less expensive than field connections regardless of the connection complexity

C. Shop connections eliminate the need for any field bolting or welding during steel erection

D. Shop connections are temporary and must all be replaced with permanent field connections after erection

54. A contractor is installing a steel structure that includes a moment frame with reduced beam section (RBS) connections, commonly known as "dogbone" connections. What is the purpose of the RBS configuration?

A. The RBS connection increases the beam's capacity at the connection by adding material to the flanges

B. The RBS connection provides a decorative architectural detail for exposed structural steel applications

C. The RBS connection strengthens the column by transferring additional load from the beam to the column web

D. The RBS connection intentionally weakens the beam flanges at a location away from the column face, forcing the plastic hinge to form in the beam rather than in the connection, protecting the connection from brittle fracture during seismic events

55. A contractor is reviewing specifications for structural steel and sees a requirement for "Charpy Vnotch impact testing" on certain steel members. What property does the Charpy test evaluate?

A. The Charpy test measures the steel's resistance to corrosion when exposed to saltwater environments

B. The Charpy test evaluates the steel's weldability by testing the heataffected zone for cracking

C. The Charpy test measures the steel's toughness (ability to absorb energy without fracturing) at specified low temperatures, which is critical for members exposed to cold service temperatures or dynamic loading

D. The Charpy test determines the steel's yield strength and ultimate tensile strength under static loading

56. A contractor is installing metal stud framing for a fireresistancerated wall assembly. The wall assembly listing specifies 20gauge steel studs at 16 inches on center. The contractor has 25gauge studs available. Can the contractor substitute the 25gauge studs for the specified 20gauge studs in the rated assembly?

A. Yes, lighter gauge studs always perform better in firerated assemblies because they are more flexible

B. No, the fireresistance rating of an assembly is tested and listed with specific components — substituting a thinner gauge stud (25gauge is thinner than 20gauge) changes the assembly from the tested configuration and voids the fire rating

C. Yes, as long as the total amount of steel in the wall is equal, any gauge combination may be used

D. Yes, the stud gauge has no effect on the fireresistance rating of the wall assembly under any test

DOMAIN 6: WOOD (Questions 57–61)

57. A contractor is constructing a multistory woodframed commercial building and the building inspector asks about the shrinkage calculations for the wood framing. Why is wood shrinkage a design concern in multistory wood construction?

A. Wood shrinkage affects only the appearance of the framing and has no functional or structural significance

B. Wood shrinkage occurs only in lumber stored outdoors and does not occur in framing protected by the building envelope

C. Wood shrinkage is uniform in all directions and affects all components equally with no differential movement

D. Cumulative shrinkage across multiple floors of wood framing (primarily crossgrain shrinkage in plates, headers, and joists) can cause significant vertical shortening of the structure, potentially cracking rigid finishes, distorting plumbing risers, and creating clearance problems

58. A contractor is framing a commercial building and the structural drawings show "blocking" between floor joists at the bearing wall. What structural function does blocking serve at this location?

A. Blocking between joists at bearing walls transfers vertical loads through the floor assembly, prevents joist rotation (rollover) at the bearing point, and provides a nailing surface for wall sheathing and finishes above and below the floor

B. Blocking serves only as a fire blocking element and has no structural function at bearing locations

C. Blocking is a decorative element that conceals the joist ends from view at the bearing point

D. Blocking prevents moisture from migrating between floors and serves as a vapor barrier within the floor

59. A contractor is reviewing specifications for a crosslaminated timber (CLT) floor panel system in a mass timber commercial building. What structural advantage does CLT provide compared to traditional wood joist floor systems?

A. CLT panels are lighter than wood joist systems and require less structural support from the frame

B. CLT panels are noncombustible and do not require fire protection in any construction type

C. CLT panels provide twoway spanning capability (similar to a concrete slab), dimensional stability, and high inplane shear resistance due to their crosslaminated layup of alternating graindirection lumber layers

D. CLT panels are identical in structural performance to standard plywood sheathing with no additional benefit

60. A contractor is installing a glulam beam in a commercial building and the specification requires the beam to be "cambered." What is camber, and why is it specified for this beam?

A. Camber is a coating applied to the beam to protect it from moisture and insect damage during service

B. Camber is an intentional upward curve built into the beam during manufacturing to offset the anticipated downward deflection under design loads, so the beam appears straight (or nearly so) when loaded

C. Camber is a mechanical connection device that attaches the glulam beam to the supporting column

D. Camber is the process of cutting the beam to its final length from the fulllength manufactured member

61. A contractor is constructing a woodframed commercial building and the building official requires that all wood structural panel sheathing carry an APA trademark. What does the APA trademark on structural wood panels indicate?

A. The APA trademark indicates only that the panel was manufactured in the United States

B. The APA trademark indicates only the retail price and distribution channel for the panel product

C. The APA trademark indicates only the panel's environmental sustainability certification status

D. The APA trademark certifies that the panel has been manufactured in conformance with the applicable product standard, tested for structural performance, and graded for its intended use

— it includes the span rating, exposure classification, and other critical performance information

DOMAIN 7: THERMAL AND MOISTURE PROTECTION (Questions 62–66)

62. A contractor is installing a commercial roof assembly and the specifications require an air barrier on the roof deck before the insulation is installed. In a conventional builtup or modified bitumen roof assembly, what material typically serves as both the air barrier and the vapor retarder on the roof deck?

A. A selfadhering bituminous membrane applied directly to the metal or concrete roof deck serves as both the air barrier and the vapor retarder in this location, preventing conditioned air from exfiltrating through the roof assembly and preventing water vapor from reaching the cold insulation layer

B. The rigid insulation board itself serves as both the air barrier and vapor retarder without any additional material

C. A standard house wrap (such as Tyvek) applied to the roof deck serves as the air barrier and vapor retarder

D. No air barrier or vapor retarder is needed on roof decks because roofs do not experience air or vapor movement

63. A building envelope consultant reviews a commercial building's wall assembly and determines that the effective Rvalue of the wall is less than the nominal Rvalue of the cavity insulation. The consultant identifies three factors contributing to this reduced performance. Which of the following is NOT a factor that reduces the effective Rvalue of a wall assembly below the nominal cavity insulation value?

A. Thermal bridging through structural framing members that conduct heat around the insulation

B. Air leakage through gaps, cracks, and penetrations that bypass the insulation layer entirely

C. The color of the exterior paint on the building's cladding surface affecting radiant heat absorption

D. Insulation compression, voids, or gaps created by poor installation that reduce the insulation's coverage

64. A contractor is installing a "cold roof" (ventilated roof) assembly on a slopedroof commercial building. What distinguishes a cold roof from a "hot roof" (unventilated roof)?

A. A cold roof has no insulation while a hot roof has insulation — the terms refer only to the presence of insulation

B. A cold roof includes a ventilated air space between the insulation and the roof deck that allows outdoor air to circulate, reducing heat buildup in summer and preventing ice dams in winter by keeping the roof deck cold

C. A cold roof and a hot roof are identical assemblies — the terms are interchangeable with no difference

D. A cold roof uses refrigeration equipment to actively cool the roof deck while a hot roof uses heating cables

65. A contractor is installing throughwall flashing at the base of a brick veneer wall where it meets the foundation. The flashing must extend from the exterior face of the brick, through the cavity, and turn up behind the weatherresistive barrier on the backup wall. Why must the flashing extend through the full assembly in this manner?

A. The flashing prevents structural loads from transferring between the brick veneer and the backup wall

B. The flashing provides thermal insulation at the base of the wall where the most heat loss occurs

C. The flashing serves as an anchor for the brick veneer, connecting it structurally to the foundation below

D. The flashing catches any water that has penetrated the brick veneer or accumulated in the cavity and directs it outward through the weep holes to the building exterior, preventing moisture from reaching the interior of the wall assembly

66. A contractor is reviewing specifications for a commercial building's air barrier system. The specification requires the air barrier to achieve a maximum air leakage rate of 0.04 CFM per square foot of wall area at a pressure differential of 1.57 PSF (75 Pa). Under the IECC, why is an air barrier required in commercial buildings?

A. An air barrier reduces the structural wind loads on the building's cladding system by blocking air pressure

B. An air barrier controls air leakage through the building envelope, preventing uncontrolled heat loss in winter and heat gain in summer, reducing HVAC energy consumption, and preventing moistureladen air from entering the wall assembly where condensation could occur

C. An air barrier is required only for aesthetic purposes to create a smooth surface beneath the cladding system

D. An air barrier is required only in buildings taller than 10 stories to resist the stack effect in the elevator shaft

DOMAIN 8: DOORS, WINDOWS, AND GLAZING (Questions 67–70)

67. A contractor is installing a commercial aluminumframed window system and the specifications require that all window perimeters be sealed with a sealant compatible with the window frame material and the surrounding substrates. What is the primary performance requirement for the sealant at this location?

A. The sealant must be rigid and nonflexible to create a permanent, immovable seal at all window perimeters

B. The sealant must provide only aesthetic color matching with no functional waterproofing requirement

C. The sealant must maintain a watertight and airtight seal while accommodating the differential thermal movement between the aluminum frame and the surrounding wall materials without losing adhesion or cohesion

D. The sealant must be applied only to the interior side of the window with no exterior sealant required

68. A contractor is installing commercial entrance doors with a vestibule (airlock) between the exterior and interior doors. What energy benefit does a vestibule provide at building entrances?

A. A vestibule has no energy benefit and is installed only for architectural aesthetics at building entrances

B. A vestibule reduces infiltration of unconditioned outdoor air into the building by creating an intermediate buffer zone — when one set of doors opens, the other set remains closed, limiting the direct air exchange between the conditioned interior and the exterior environment

C. A vestibule is required only for security screening purposes and has no relationship to energy performance

D. A vestibule increases the building's energy consumption by adding additional doors that must be heated

69. A contractor is installing a unitized curtain wall system on a commercial highrise building. What distinguishes a unitized curtain wall from a stickbuilt curtain wall?

A. A unitized curtain wall uses individual mullions and glass panels assembled piecebypiece onsite

B. A unitized curtain wall uses the same assembly method as a stickbuilt system with no distinction

C. A unitized curtain wall uses only opaque panels with no glazing and cannot incorporate windows

D. A unitized curtain wall consists of factoryassembled panels (typically one story tall and one module wide) that are lifted into place as complete units, reducing onsite labor and improving quality control compared to stickbuilt systems assembled piece by piece in the field

70. Under the IBC, what type of glazing is required in commercial building shower enclosures to protect occupants from serious injury if the glass breaks?

A. Standard annealed float glass is acceptable in all shower enclosures without additional safety requirements

B. Wired glass is the only permitted glazing type for commercial shower enclosure applications

C. Safety glazing (tempered or laminated glass) is required in shower and bathtub enclosures because these are hazardous locations where wet, slippery conditions increase the likelihood of human impact with the glass

D. No glazing of any type is permitted in shower enclosures — only opaque materials may be used

DOMAIN 9: FINISHES (Questions 71–75)

71. A contractor is installing resilient sheet vinyl flooring in a commercial healthcare facility. The specification requires heatwelded seams between adjacent sheets. After heatwelding, the contractor notices that several weld seams have a visible gap where the welding rod did not fully fuse with the sheet material. What is the consequence of incomplete weld seams in this healthcare application?

A. Incomplete weld seams are purely cosmetic and have no functional consequence in healthcare facilities

B. Incomplete weld seams create pathways for moisture and bacteria to penetrate beneath the flooring, compromising the infection control performance required in healthcare environments

C. Incomplete weld seams improve the flooring's acoustic performance by creating small air gaps

D. Incomplete weld seams are preferred in healthcare facilities because they allow the flooring to expand

72. A contractor is installing Type X gypsum board on the ceiling of a large commercial space. The specifications call for the gypsum board to be installed perpendicular to the framing members rather than parallel. What is the primary reason for installing ceiling gypsum board perpendicular to the framing?

A. Perpendicular installation is required only for aesthetic purposes to minimize the visibility of panel joints

B. Perpendicular installation is identical to parallel installation with no structural or performance difference

C. Perpendicular installation is required by fire codes for all ceiling applications regardless of assembly

D. Perpendicular installation spans across more framing members, providing better bridging of any single framing irregularity and reducing the number of end joints that must be finished

73. A contractor is specifying acoustical ceiling tiles for a commercial open office and the architect requires a minimum Ceiling Attenuation Class (CAC) of 35. What does the CAC rating measure?

A. CAC measures the ceiling tile's ability to block sound transmission through the ceiling plenum from one room to another — a higher CAC means more sound is blocked from traveling over the wall partition through the plenum space above the ceiling

B. CAC measures the ceiling tile's fireresistance rating in minutes of exposure to a standard fire

C. CAC measures the ceiling tile's resistance to sagging from humidity exposure in the plenum space

D. CAC measures the ceiling tile's ability to absorb sound within the room, reducing echo and reverberation

74. A contractor is installing terrazzo flooring in the lobby of a commercial building. The specification calls for epoxy terrazzo rather than cementitious terrazzo. What advantage does epoxy terrazzo provide over cementitious terrazzo?

A. Epoxy terrazzo is significantly thicker than cementitious terrazzo and provides better structural support

B. Epoxy terrazzo is available only in white and cannot be customized with colored chips or pigments

C. Epoxy terrazzo is thinner (typically ¼ to ⅜ inch versus ½ to ⅝ inch for cementitious), lighter in weight, more flexible (reducing cracking), and offers unlimited color options compared to cementitious terrazzo

D. Epoxy terrazzo requires no grinding or polishing and is installed in a single pour with no finishing needed

75. A painting contractor discovers that a freshly painted exterior CMU wall is showing efflorescence (white powdery deposits) bleeding through the paint film within weeks of application. What is the most likely cause of this efflorescence?

A. The paint was applied too thickly, trapping moisture beneath the film and creating the white deposits

B. The paint color was mixed incorrectly, causing the white pigment to separate from the base paint

C. The paint brushes were contaminated with plaster dust that transferred to the wall surface during painting

D. Soluble salts within the CMU blocks are dissolving in moisture and migrating to the surface through the paint film — the CMU was not adequately cured or sealed before painting, and moisture within the wall is carrying salts to the exterior

DOMAIN 10: MECHANICAL AND PLUMBING SYSTEMS (Questions 76–81)

76. A contractor is constructing a commercial building with a dedicated outdoor air system (DOAS). How does a DOAS differ from a conventional rooftop unit (RTU) HVAC system?

A. A DOAS and a conventional RTU are identical systems with different manufacturer designations

B. A DOAS is a separate HVAC unit dedicated exclusively to conditioning the required outdoor ventilation air (heating, cooling, dehumidifying) before delivering it to the building, while a separate parallel system handles the recirculated air and zone temperature control

C. A DOAS provides only heating and cannot provide cooling or dehumidification of outdoor air supply

D. A DOAS eliminates the need for any outdoor ventilation air by recirculating 100% of the indoor air

77. A plumbing contractor is installing a domestic water heater in a commercial building. The plumbing code requires a temperature and pressure (T&P) relief valve on the water heater. What is the function of the T&P relief valve?

A. The T&P relief valve prevents the water temperature from dropping below 120°F during periods of low demand

B. The T&P relief valve regulates the incoming cold water pressure to protect the water heater from high pressure

C. The T&P relief valve automatically adjusts the water heater's gas burner to maintain constant temperature

D. The T&P relief valve is not required by code and is installed only at the manufacturer's recommendation

78. A contractor is installing a commercial HVAC system with an energy recovery ventilator (ERV). What energy benefit does the ERV provide?

A. The ERV generates electrical energy from the exhaust airstream using builtin turbine generators

B. The ERV eliminates the need for outdoor ventilation air by purifying and recirculating all indoor air

C. The ERV increases the building's heating demand by introducing additional unconditioned outdoor air

D. The ERV transfers heat and moisture between the outgoing exhaust air and the incoming outdoor air, preconditioning the outdoor air and recovering energy that would otherwise be lost, reducing the HVAC system's heating and cooling load

79. Under the International Plumbing Code, a commercial building's water supply system must maintain a minimum pressure at the highest and most remote fixture. What is the typical minimum residual pressure required at the most remote fixture?

A. 40 psi minimum residual pressure at all fixtures in commercial buildings regardless of fixture type

B. 5 psi minimum residual pressure at the most remote fixture for proper fixture operation

C. 8 psi minimum residual pressure at the most remote fixture, though specific fixtures may require higher pressures per the manufacturer's specifications

D. 20 psi minimum residual pressure required only at fire sprinkler heads and not at plumbing fixtures

80. A contractor is installing a commercial plumbing system and the plans show a water hammer arrestor at several locations on the supply piping. What is water hammer, and what does the arrestor do?

A. Water hammer is a pressure surge (hydraulic shock) caused by the sudden stopping of water flow in a pipe, producing a loud banging noise and potentially damaging pipes, fittings, and equipment — the arrestor absorbs the pressure surge by providing a compressible air cushion

B. Water hammer is the vibration caused by water flowing too slowly through oversized supply piping

C. Water hammer is the corrosion damage caused by highvelocity water eroding the interior of copper piping

D. Water hammer is the noise produced by air trapped in the drainage system during normal drain flow

81. A fire protection engineer specifies that a commercial building's fire sprinkler system must be designed per NFPA 13 for "Ordinary Hazard Group 2" occupancy classification. What type of building use typically falls under the OH2 classification?

A. Residential apartments and singlefamily homes with minimal combustible contents

B. Offices, restaurants, and light manufacturing facilities with moderate quantities of combustible materials stored at moderate heights, representing a moderate level of fire hazard

C. Highhazard chemical storage facilities with flammable liquids and explosive materials

D. Unoccupied parking garages with no combustible contents stored within the protected area

DOMAIN 11: ELECTRICAL SYSTEMS (Questions 82–84)

82. A contractor is installing an electrical system in a commercial building and the NEC requires that certain receptacles be "tamperresistant." What feature distinguishes a tamperresistant receptacle from a standard receptacle?

A. Tamperresistant receptacles have a builtin GFCI that trips when a foreign object is inserted

B. Tamperresistant receptacles are painted a specific color to indicate they are protected from misuse

C. Tamperresistant receptacles have internal springloaded shutters that cover the contact openings and require simultaneous insertion of both plug prongs to open, preventing children from inserting objects into a single slot

D. Tamperresistant receptacles have a locking mechanism that requires a key to insert a plug

83. A commercial building's electrical design includes an uninterruptible power supply (UPS) system for the data center. What function does a UPS provide that an emergency generator does not?

A. A UPS provides longterm backup power for days or weeks while a generator provides only minutes

B. A UPS provides higher voltage output than a generator for specialized data center equipment

C. A UPS provides a larger fuel supply than a generator and can operate indefinitely without refueling

D. A UPS provides instantaneous, seamless power during the brief transition period between normal power loss and generator startup (typically 1030 seconds), preventing any interruption to sensitive electronic equipment

84. Under the NEC, a disconnecting means (disconnect switch) must be installed within sight of certain electrical equipment. What does "within sight" mean as defined by the NEC?

A. Within sight means the disconnect must be visible from the equipment and located not more than 50 feet away from it

B. Within sight means the disconnect must be located within the same room regardless of distance or obstructions

C. Within sight means the disconnect must be located within 10 feet of the equipment with no distance limitation

D. Within sight has no specific definition in the NEC and is left to the discretion of the electrical inspector

DOMAIN 12: PROCUREMENT AND CONTRACTING REQUIREMENTS (Questions 85–115)

85. A contractor is preparing a bid for a competitive public project. The instructions to bidders state that bids will be opened publicly at a specified date, time, and location. What is the significance of a public bid opening?

A. Public bid openings are optional events with no legal significance in the competitive bidding process

B. Public bid openings provide transparency by allowing all bidders and the public to witness the opening and recording of all bids, ensuring the integrity of the competitive process and preventing bid manipulation

C. Public bid openings allow bidders to withdraw their bids after seeing the competing bid amounts

D. Public bid openings are conducted only on federal projects and are not required for state or local projects

86. Under AIA A201, the contractor is responsible for construction safety. However, the architect also has certain obligations related to safety during site visits. What is the architect's obligation if the architect observes an imminent safety hazard during a routine site observation?

A. The architect has no obligation regarding safety and may ignore any hazards observed during site visits

B. The architect must assume the role of site safety officer and direct the correction of all hazards observed

C. The architect must shut down the entire project until the hazard is corrected before any work may resume

D. The architect should notify the contractor promptly of the observed hazard — while construction safety is the contractor's responsibility, the architect has a professional and ethical duty to communicate known hazards

87. A contractor is negotiating a timeandmaterials (T&M) contract for a commercial renovation project where the scope is difficult to define in advance. What are the key components of a T&M contract that must be established before work begins?

A. The agreed labor rates (including burden and markup), material markup percentages, and equipment rates must be established before work begins — a T&M contract compensates the contractor for actual time spent and materials used, plus agreed markups

B. A T&M contract requires only a lump sum price with no breakdown of labor or material rates

C. A T&M contract requires only an estimate of total hours with no agreement on hourly rates

D. A T&M contract has no financial terms and the contractor bills whatever amount they deem appropriate

88. A contractor is reviewing a specification section titled "Division 01 — General Requirements." What types of provisions are typically found in Division 01 of the specifications?

A. Division 01 contains only the structural engineering calculations and design assumptions for the project

B. Division 01 contains the plumbing specifications including pipe materials, fixture types, and installation methods

C. Division 01 contains general administrative and procedural requirements that apply across all trades, including submittal procedures, quality control, temporary facilities, project closeout, and payment procedures

D. Division 01 contains only the fire protection specifications for the sprinkler and fire alarm systems

89. A contractor discovers midway through a project that the specified exterior cladding material has been discontinued by the manufacturer. No identical replacement product exists. Under standard contract provisions, what is the proper procedure to address this situation?

A. The contractor should notify the architect and owner immediately and submit a request for substitution

B. The contractor should submit a formal substitution request documenting the discontinued product, proposing one or more alternative products with equal or better performance, and providing supporting documentation for the architect's review and approval

C. The contractor should select the closest available product and install it without notifying anyone

D. The contractor must stop all work on the project until the architect redesigns the entire exterior

90. Under AIA A201, what is the architect's responsibility regarding the contractor's means, methods, techniques, sequences, and procedures?

A. The architect must approve all means and methods before the contractor begins any work activity

B. The architect must provide detailed construction procedures for every trade in the specifications

C. The architect shares equal responsibility with the contractor for all means, methods, and safety procedures

D. The architect has no responsibility for or control over the contractor's means, methods, techniques, sequences, or procedures — these are the contractor's sole responsibility

91. A contractor is working on a project where the owner requests early occupancy of a completed portion of the building while construction continues on the remaining portions. Under AIA A201, what must occur before the owner can occupy a completed portion?

A. The architect must issue a certificate of substantial completion for the occupied portion, and the parties must agree on the responsibilities for security, maintenance, insurance, and utilities for the occupied and unoccupied portions

B. The owner may occupy any portion at any time without any documentation or agreement required

C. Early occupancy is prohibited under AIA A201 — the owner must wait for complete project completion

D. Only the contractor may authorize early occupancy based on the construction schedule status

92. A contractor is evaluating a project's earned value metrics at the midpoint of construction. The planned value (PV) is $2,000,000, the earned value (EV) is $1,800,000, and the actual cost (AC) is $2,100,000. What do these numbers indicate about the project's schedule and cost performance?

A. The project is ahead of schedule and under budget based on the earned value analysis

B. The project is behind schedule and under budget based on the earned value analysis

C. The project is behind schedule (EV < PV, meaning less work has been completed than planned) and over budget (AC > EV, meaning the work completed has cost more than its budgeted value)

D. The project is on schedule and on budget with no corrective action required

93. Under standard construction contract provisions, the contractor is required to maintain builder's risk insurance during construction. Who typically purchases the builder's risk policy, and what does it cover?

A. The subcontractors purchase individual builder's risk policies for their own scope of work only

B. The contractor's workers' compensation policy includes builder's risk coverage automatically

C. The architect purchases the builder's risk policy as part of the professional liability coverage

D. Either the owner or the contractor purchases the builder's risk policy (as specified in the contract), and it covers physical damage to the work during construction from covered perils such as fire, wind, theft, and vandalism

94. A contractor is preparing a claim for lost productivity (labor inefficiency) caused by ownerdirected changes that disrupted the planned work sequence. What documentation does the contractor need to support a lost productivity claim?

A. Detailed daily reports, labor production records, planned versus actual productivity comparisons, identification of the specific change events that caused the disruption, and quantification of the productivity loss using an accepted methodology

B. Only a verbal statement from the project superintendent is needed to support a lost productivity claim

C. Only the original bid estimate is needed — no actual field production data is required for comparison

D. Lost productivity claims require no documentation and are automatically approved based on the contractor's assertion

95. A contractor is working on a project that includes an early completion bonus for finishing the project ahead of the contractual completion date. The bonus is $5,000 per day for each day the project is completed before the contractual date. This type of provision is commonly paired with what other schedulerelated clause?

A. An early completion bonus is typically paired with a corresponding liquidated damages provision

B. An early completion bonus is always paired with a termination for convenience clause to limit exposure

C. A bonus provision is typically paired with a corresponding liquidated damages clause for late completion, creating a balanced incentive/disincentive structure that encourages timely (or early) completion while penalizing delay

D. An early completion bonus is never paired with any other schedule provision and always stands alone

96. Under AIA A201, the contractor must provide written notice to the owner when the contractor becomes aware of any condition that will affect the cost or time of the project. This obligation extends to conditions the contractor "should have known" through reasonable investigation. What is the practical significance of the "should have known" standard?

A. The "should have known" standard has no practical significance and is merely advisory language

B. The "should have known" standard means the contractor cannot claim ignorance of conditions that a reasonably diligent contractor would have discovered through normal project management activities, site inspections, and document review

C. The "should have known" standard requires the contractor to hire a fulltime investigator on the project

D. The "should have known" standard applies only to concealed conditions and not to any visible conditions

97. A contractor is preparing a final accounting for a costplusfee project. The owner questions whether certain costs charged by the contractor are legitimate "costs of the work" or should be classified as the contractor's overhead covered by the fee. Under typical costplus contract provisions, which of the following is generally classified as a reimbursable "cost of the work"?

A. The contractor's home office rent and administrative staff salaries

B. The contractor's corporate profit target for the fiscal year in which the project is constructed

C. The contractor's entertainment expenses for client development activities unrelated to this project

D. The wages and benefits of the project superintendent assigned fulltime to the construction site

98. A contractor is evaluating the use of Building Information Modeling (BIM) for MEP coordination on a complex commercial project. What specific coordination benefit does BIM provide that traditional 2D overlay drawings cannot?

A. BIM provides automated 3D clash detection that identifies spatial conflicts between MEP systems (pipes, ducts, conduits, structural elements) before construction begins, allowing conflicts to be resolved in the model rather than in the field where corrections are far more expensive

B. BIM provides only aesthetic renderings for marketing purposes with no construction coordination value

C. BIM replaces the need for construction drawings and specifications entirely on all commercial projects

D. BIM provides only cost estimating functions and cannot detect physical conflicts between building systems

99. Under standard construction contract provisions, what is the contractor's obligation when the contractor believes that the architect has unreasonably delayed the review and return of a critical submittal, and the delay is affecting the project schedule?

A. The contractor should continue working on other activities and wait indefinitely for the submittal return

B. The contractor must submit the item to a different architect for independent review and approval

C. The contractor should document the delay, notify the architect and owner in writing that the delayed review is impacting the project schedule, and reserve the right to claim additional time and cost resulting from the delayed review

D. The contractor should proceed with fabrication based on the unreviewed submittal to avoid schedule impact

100. A general contractor on a commercial project discovers that a subcontractor has been paying its workers below the prevailing wage rate required by the DavisBacon Act on a federally funded project. What liability does the general contractor face for the subcontractor's wage violation?

A. The general contractor has no liability for the subcontractor's wage violations under any circumstances

B. The general contractor may be held jointly and severally liable for the subcontractor's prevailing wage violations, including responsibility for back wages owed to the subcontractor's underpaid workers

C. Only the subcontractor is liable and the general contractor faces no consequences from the violation

D. The building owner is exclusively liable for all wage violations by all contractors on the project

101. A contractor is reviewing a contract for a phased construction project where certain building systems will be commissioned before final completion. Under standard contract provisions, what is "partial commissioning" and how does it affect the contractor's obligations?

A. Partial commissioning involves testing and verifying the performance of building systems in completed phases or areas before the entire project reaches substantial completion, allowing those systems to be placed in service — the contractor must cooperate with the commissioning process and correct deficiencies in the commissioned systems

B. Partial commissioning means the contractor tests only half of the specified systems and skips the rest

C. Partial commissioning eliminates the need for final commissioning of any systems at project completion

D. Partial commissioning is performed only by the building owner's maintenance staff with no contractor involvement

102. Under standard construction contract provisions, the contractor is required to provide an updated project schedule at regular intervals. If the updated schedule shows negative float on the critical path, what does negative float indicate?

A. Negative float indicates that the project has excess time available and is ahead of the contractual schedule

B. Negative float indicates that the contractor has added extra activities to the schedule beyond the contract scope

C. Negative float indicates that the schedule is in balance with the contractual completion date

D. Negative float indicates that the critical path activities cannot be completed within the remaining contract time — the project is projected to finish after the contractual completion date and corrective action is needed

103. A contractor is bidding a project where the specifications include "unit prices" for certain items of work in addition to the base lump sum bid. Under what circumstances are these unit prices typically invoked during the project?

A. Unit prices are used only for the initial bid evaluation and have no effect during construction

B. Unit prices are invoked only when the contractor requests additional compensation for standard work

C. Unit prices are typically used to adjust the contract price for actual quantities of work that differ from the estimated quantities shown in the contract documents, providing a preagreed basis for adding or deducting cost as actual quantities are verified

D. Unit prices replace the lump sum contract entirely and all work is performed on a unit price basis

104. A contractor is working on a project where the owner has directed a change that the contractor believes constitutes "cardinal change" — a change so extensive that it fundamentally alters the nature of the contracted work. What is the significance of a cardinal change?

A. A cardinal change has no legal significance and is treated the same as any other change order

B. A cardinal change may give the contractor the right to treat the change as a breach of contract rather than a modification within the contract's scope, because the change goes beyond what any reasonable interpretation of the contract would encompass

C. A cardinal change automatically terminates the contract without any further action by either party

D. A cardinal change applies only to government contracts and has no relevance to private construction

105. Under AIA A201, what is the contractor's obligation when the contractor's work is damaged by a cause that would be covered under the builder's risk insurance policy?

A. The contractor must repair or replace the damaged work, and the cost is reimbursable through the builder's risk insurance proceeds — the contractor does not absorb the loss if the damage is caused by a covered peril

B. The contractor must absorb all damage costs regardless of insurance coverage or the cause of damage

C. The owner must hire a separate contractor to repair all damage regardless of the cause

D. The architect must redesign the damaged portion of the work before any repair may proceed

106. A contractor is preparing a request for equitable adjustment (REA) on a commercial construction project. What is the difference between an REA and a formal claim?

A. An REA and a formal claim are identical documents with different names and no procedural distinction

B. An REA can only be submitted on government contracts while a formal claim applies only to private work

C. An REA requires binding arbitration while a formal claim requires litigation in all circumstances

D. An REA is a request for a contract price or time adjustment submitted to the owner before the matter becomes a formal dispute — it is a negotiation tool, while a formal claim is submitted when the parties cannot agree and triggers the contract's dispute resolution procedures

107. A contractor is constructing a commercial building and the project has experienced multiple concurrent delays — some caused by the owner (excusable delays) and some caused by the contractor (nonexcusable delays). When concurrent delays exist, how is responsibility typically allocated?

A. The contractor receives both time and money for all concurrent delays regardless of fault

B. The owner is responsible for all delays whenever any portion of the delay is caused by the owner

C. When truly concurrent delays exist, the contractor typically receives a time extension (because the owner contributed to the delay) but does not receive additional compensation for the overlapping period (because the contractor also contributed to the delay)

D. All concurrent delays are ignored and the contract completion date remains unchanged

108. A contractor completes a project and the owner's facilities manager discovers that several pieces of HVAC equipment were installed without anchoring them to the structural slab as required by the seismic design provisions. Under the contractor's warranty, what is the contractor's obligation?

A. The contractor must return to the site and properly anchor all HVAC equipment to the structural slab in accordance with the seismic design requirements at no additional cost to the owner, because the missing anchors represent defective workmanship

B. The contractor has no obligation because equipment anchoring is not covered by the standard warranty

C. The facilities manager must anchor the equipment using the building's maintenance budget

D. The contractor is responsible only if an earthquake actually occurs and damages the unanchored equipment

109. Under standard construction contract provisions, the contractor must comply with the specified quality assurance and quality control (QA/QC) requirements. What is the difference between quality assurance and quality control?

A. Quality assurance and quality control are identical programs with no distinction between them

B. Quality assurance consists of the planned and systematic activities (inspections, testing, documentation) to ensure that work meets specified requirements, while quality control consists of the operational techniques used to fulfill quality requirements — QA verifies the process, QC verifies the product

C. Quality assurance applies only to the owner while quality control applies only to the contractor

D. Quality assurance applies only to materials while quality control applies only to labor

110. A contractor is reviewing a specification that requires a "commissioning authority" (CxA) to be involved from the design phase through occupancy. This level of commissioning involvement exceeds the IBC minimum. Under LEED, what level of commissioning requires designphase involvement?

A. Only fundamental commissioning per the IBC is required, with no designphase CxA involvement

B. Fundamental commissioning under LEED requires designphase CxA involvement for all projects

C. The CxA is never involved during the design phase under any commissioning standard or program

D. Enhanced commissioning under LEED requires CxA involvement during the design phase to review the owner's project requirements, basis of design, and design documents for commissioningrelated issues

111. A contractor is negotiating a subcontract for the electrical trade package on a commercial project. The electrical subcontractor requests that the subcontract include a "scope of work" exhibit that clearly defines the boundary between the electrical subcontractor's work and the work of adjacent trades (mechanical, plumbing, fire protection, low voltage). Why is a clear scope definition critical in the subcontract?

A. A clear scope definition prevents scope gaps and overlaps that create disputes, delays, and additional costs when work falls between trades — it establishes exactly what each subcontractor is responsible for and prevents the GC from having to selfperform or backcharge for unclaimed work

B. A clear scope definition is not important because all subcontractors on the project share responsibility equally

C. A clear scope definition is required only on projects exceeding $1 million in total electrical contract value

D. A clear scope definition benefits only the subcontractor and has no value for the general contractor

112. Under standard construction contract provisions, the contractor is responsible for temporary utilities during construction. At what point do temporary utilities typically transition to permanent utilities?

A. Temporary utilities remain in place throughout the warranty period and are removed only at final completion

B. Temporary utilities are never used — all construction is performed using the permanent building utilities

C. Temporary utilities typically transition to permanent utilities at or near substantial completion, when the building's permanent electrical, water, and HVAC systems are operational and the owner assumes responsibility for utility costs

D. Temporary utilities transition to permanent utilities at the midpoint of construction when 50% of work is complete

113. A contractor is preparing a bid for a project where the specifications require the contractor to carry professional liability (errors and omissions) insurance. Under what circumstances would a contractor need professional liability insurance?

A. Professional liability insurance is required on every commercial construction project regardless of scope

B. Professional liability insurance is typically required when the contractor performs professional design services, such as in designbuild delivery, delegated design of specific systems (structural connections, curtain wall engineering), or when the contractor provides engineering judgments that go beyond standard construction means and methods

C. Professional liability insurance is identical to commercial general liability insurance and provides the same coverage

D. Professional liability insurance is never required for contractors — it applies exclusively to architects and engineers

114. A contractor is closing out a project and the specifications require a "warranty walk" at the 11month mark (11 months after substantial completion). What is the purpose of the 11month warranty walk?

A. The 11month walk is a social event to celebrate the approaching end of the warranty period

B. The 11month walk is required only on government projects and has no application to private construction

C. The 11month walk replaces the need for a punch list at substantial completion and is the first inspection

D. The 11month warranty walk allows the owner and contractor to inspect the building near the end of the oneyear warranty period, identifying any deficiencies that have developed during the first year of occupancy so the contractor can correct them before the standard warranty expires

115. A contractor is working on a project where the owner has hired a construction manager as advisor (CMa). Under the CMa delivery method, who holds the trade contracts?

A. The trade contracts (subcontracts) are held directly by the owner, not by the CMa — the CMa acts as the owner's advisor, providing professional management services including schedule management, cost control, and quality oversight, but does not hold the trade contracts or provide a GMP

B. The CMa holds all trade contracts and provides a guaranteed maximum price identical to CM at Risk

C. The architect holds all trade contracts and directs the subcontractors through the construction manager

D. The trade contracts are held by a separate general contractor hired independently by the owner

Practice Exam 7: Answer Key and Explanations

DOMAIN 1: GENERAL REQUIREMENTS (Questions 1–25)

1. B — Under the separated occupancies approach, each occupancy must independently comply with the allowable height and stories limitations for its own occupancy group and construction type. If the Group A2 occupancy is not permitted at the fourth story in Type IIA construction per IBC Tables 504.3 and 504.4, the building does not comply regardless of the Group B floors below.

2. D — The IBC requires a fire alarm system in Group B occupancies when the building has two or more stories and the combined occupant load of all Group B floors exceeds 500. Many Group B buildings fall below this threshold and do not require fire alarm systems. The requirement recognizes the increased evacuation complexity in larger, multistory office buildings.

3. A — Sprinkler systems and fire alarm systems serve fundamentally different functions. The sprinkler system suppresses fire through water discharge. The fire alarm system detects fire, notifies occupants to evacuate, and transmits an alarm to the fire department or monitoring station. A sprinkler flow switch alone does not provide the occupant notification capability required by the fire alarm code.

4. C — IBC Table 601 requires a 1hour fireresistance rating for bearing walls in Type IIA construction. The distance from the property line affects the required fireresistance rating of the exterior wall's fire separation distance provisions (Table 602), but at 10 feet the 1hour rating from Table 601 for bearing walls in Type IIA governs.

5. B — Doors in exit stairway enclosures must have positivelatching hardware that holds the door securely closed. Roller latches do not provide positive latching — they rely on friction and can be pushed open by air pressure differentials created during a fire. Positive latches engage mechanically and resist opening forces until the lever or knob is operated.

6. D — Emergency voice/alarm communication systems are required in highrise buildings as part of the fire command center. The system provides twoway communication capability allowing firefighters to deliver specific voice instructions to building occupants on individual floors, direct evacuation sequences, and communicate with personnel throughout the building during emergencies.

7. A — IBC Section 706 requires fire walls to be structurally independent — designed so they remain standing even if the structure on either side collapses during a fire. This structural

independence is the defining characteristic that distinguishes fire walls from fire barriers and fire partitions, and it allows each side to be treated as a separate building.

8. C — The IBC generally limits singleexit tenant spaces to an occupant load of 49 or fewer, subject to additional conditions including travel distance limits and building height restrictions. This threshold ensures adequate egress capacity and redundancy for the number of occupants served.

9. D — Every penetration through a fireresistancerated assembly must be protected with an approved firestop system per IBC Section 714, regardless of the size or material of the penetrating item. An unfirestopped conduit creates an opening through which fire and smoke can spread between compartments, defeating the purpose of the rated assembly.

10. A — Different areas within a building may have different occupant load factors based on their use. The server room is an accessory area with significantly lower occupancy density than the general office space. Using the appropriate occupant load factor for each area (typically 300 SF/person for such spaces) provides a more accurate total occupant load calculation.

11. C — An exterior exit balcony serving as a required exit must be open on at least one long side (at least 50% open), have a minimum clear width of 44 inches, be constructed with a fireresistancerated floor assembly matching the floor it serves, and connect to a stairway or exit discharge. These requirements ensure the balcony provides safe, smokefree egress.

12. B — The building official must maintain approved construction documents and the certificate of occupancy as permanent records for every building. These records document the building as approved and constructed, providing the basis for future renovation permits, occupancy verification, and code compliance enforcement.

13. D — IBC Section 404 requires atriums to have an automatic sprinkler system throughout, a smoke control system designed to maintain the atrium space tenable during evacuation, and separation from adjacent spaces by fire barriers or by glass walls protected by closely spaced sprinklers. These combined measures address the unique fire and smoke spread risks created by the multistory open space.

14. A — Accessible level changes along an accessible route must be achieved by ramps (maximum 1:12 slope), elevators, or platform lifts. Standard stairways, escalators, and ladders are not accessible means of level change because they cannot be used independently by wheelchair users.

15. C — Wetpipe sprinkler systems cannot be used in environments where temperatures drop below 40°F because the water in the piping would freeze, expanding and rupturing the pipes. A drypipe or preaction system keeps the piping filled with pressurized air rather than water, eliminating the freezing risk while still providing automatic fire suppression.

16. B — IBC Chapter 32 defines highpiled combustible storage as combustible materials stored in excess of 12 feet in height in sprinklered buildings or 6 feet in nonsprinklered buildings. Exceeding these thresholds triggers additional requirements for fire protection, access aisles, and building construction to address the increased fire hazard.

17. D — Group E occupancies require fire alarm systems with automatic notification to the fire department or a supervising station upon activation, and automatic smoke detection in specific locations. The automatic notification requirement ensures the fire department is dispatched immediately without relying on manual pull station activation by children or staff.

18. A — IBC Chapter 33 requires the sprinkler system to be placed in service as construction progresses — typically floor by floor as each floor is enclosed. If the permanent system is not yet operational, alternative fire protection measures (standpipes, fire extinguishers, fire watch) must be provided until permanent protection is available.

19. C — IBC Section 1028.1 permits up to 50% of the required exits to discharge through the building interior, provided the interior path is protected by sprinklers, the path is readily visible and clearly identified, the path leads directly to an exterior exit door, and the level of discharge is protected by sprinklers. The remaining exits must discharge directly to the exterior.

20. B — ASTM E119 is the standard test method used in the United States to determine the fireresistance rating of building assemblies. The test subjects the assembly to a standardized timetemperature curve and evaluates its ability to maintain structural integrity, prevent flame passage, and limit temperature rise on the unexposed surface.

21. D — Each dwelling unit must have access to at least two exits or exit access doorways when the occupant load or travel distance exceeds the singleexit thresholds. Exit access corridors serving dwelling units must be protected per the code requirements for the specific occupancy and construction type. This ensures redundant egress paths for apartment residents.

22. A — Group A (assembly), Group E (educational), Group I (institutional), Group R1 (transient residential), and highrise buildings are among the occupancy groups that require fire safety and evacuation plans. These plans establish procedures for occupant notification, evacuation routes, staff responsibilities, and coordination with the fire department.

23. C — ASTM E84 (also known as the Steiner Tunnel Test) measures the surface burning characteristics of interior finish materials by exposing a sample to a controlled flame and measuring the flame spread index (FSI) and smokedeveloped index (SDI). Materials are classified as Class A (FSI 025), Class B (FSI 2675), or Class C (FSI 76200).

24. D — Exit stairway enclosures require Class A interior finish (flame spread index 025) for wall and ceiling materials. This is the most restrictive interior finish requirement in the IBC, reflecting the critical importance of keeping exit stairways free from rapid flame spread during evacuation.

25. A — A mass notification system provides broader emergency communication capability beyond fire alarm notification, covering multiple emergency types including severe weather, security threats, hazardous material releases, and other emergencies. Unlike a fire alarm system limited to fire notification, an MNS can deliver specific voice messages with tailored instructions for each emergency type.

DOMAIN 2: SITE CONSTRUCTION (Questions 26–40)

26. C — A perched water table is a localized zone of saturated soil above the regional water table, created when an impervious soil layer (such as clay) traps infiltrating water above it. The

perched water at 6 feet will produce water in the excavation even though the regional water table is at 25 feet, requiring dewatering during construction.

27. B — A plate load test involves placing a rigid steel plate on the prepared bearing surface and applying load in increments while measuring the deflection of the plate at each load level. The test produces a loadsettlement curve that directly measures the soil's bearing capacity and stiffness at the foundation level.

28. D — The competent person must be capable of identifying existing and predictable hazards, understanding soil classifications and protective systems, and must have the authority to take prompt corrective measures — including stopping work and removing workers from the excavation. The competent person need not be a licensed engineer but must have specialized training and decisionmaking authority.

29. A — Stone columns are installed by vibrating a probe into the weak soil, displacing and compacting the surrounding soil, and filling the resulting cavity with compacted crushed stone. The stone columns and the improved surrounding soil create a composite foundation system with higher bearing capacity and reduced settlement compared to the untreated soil.

30. C — A retention pond with a permanent pool provides superior water quality treatment because the permanent pool allows extended settling time for suspended sediments and supports biological processes (aquatic vegetation uptake, microbial decomposition) that remove dissolved pollutants. Dry detention basins empty completely between storms and cannot sustain these biological treatment processes.

31. D — MSE walls use layers of compacted structural fill reinforced with horizontal layers of geosynthetic fabric or galvanized steel strips that extend back into the retained soil mass. The reinforced soil mass acts as a gravity retaining structure, and the precast concrete or segmental block facing provides erosion protection and aesthetic finish without requiring massive concrete construction.

32. B — The aggregate base course distributes concentrated wheel loads from the relatively thin asphalt surface over a progressively larger area of the subgrade soil. By the time the load reaches the subgrade, the stress is spread over a large enough area that the subgrade can support it without plastic deformation, rutting, or failure.

33. D — Wick drains (prefabricated vertical drains) are thin, flexible strips installed vertically through thick clay layers. They provide shortened horizontal drainage paths that allow water squeezed out of the clay by surcharge loading to escape to the surface much more quickly than it could travel through the lowpermeability clay alone, reducing consolidation time from years to months.

34. C — Tanking creates a fully waterproof belowgrade structure (such as a basement or elevator pit) using a comprehensive system of waterproofing membranes on all surfaces, waterstops at all construction joints, and hydrophilic or swellable sealants at all penetrations. The goal is to prevent any groundwater from entering the belowgrade space under hydrostatic pressure conditions.

35. D — SM (silty sand) is a predominantly sandsized material containing more than 12% silt fines. It provides moderate bearing capacity, moderate drainage characteristics, and is generally

suitable for structural fill when properly compacted to the specified density. SM soils require moisture control during compaction to achieve optimum density.

36. A — Soil nails are steel bars drilled and grouted into the excavation face at regular spacing, creating a reinforced soil mass that resists lateral earth pressure. A shotcrete (sprayapplied concrete) facing is applied over the nail heads and wire mesh to prevent surface erosion and raveling between nails. The system stabilizes the excavation face progressively as the excavation deepens.

37. A — Permeable pavers have open joints between the individual paver units that allow stormwater to infiltrate through the joints into an engineered aggregate storage layer beneath the pavers. The storage layer temporarily detains the water, allowing it to infiltrate into the subgrade soil or drain through an underdrain system, significantly reducing surface runoff volume and filtering pollutants.

38. D — OSHA Appendix B allows benching in Type A soil with a maximum vertical face height of 4 feet per bench. The upper portion of the excavation is sloped at ¾:1, and each bench step has a maximum 4foot vertical face. Benching is not permitted in Type C soil, which requires the flattest slope of 1½:1.

39. C — A leaking underground fuel storage tank is a serious environmental hazard. The contractor must stop work in the affected area immediately, report the discovery to the project owner and ADEM, and not disturb the tank or contaminated soil further until a qualified environmental professional assesses the extent of contamination and develops a remediation plan in compliance with regulatory requirements.

40. B — A geomembrane liner (typically HDPE or LLDPE) installed in a retention pond prevents water from seeping through the pond bottom and sides into the surrounding soil. This maintains the required permanent pool level, prevents loss of stored stormwater, and in some applications prevents potentially contaminated stormwater from reaching groundwater.

DOMAIN 3: CONCRETE (Questions 41–46)

41. A — Compression steel is added to the top of a beam when the beam's crosssection is limited by architectural constraints (maximum depth restrictions), when additional ductility is needed for seismic design, or when the engineer wants to reduce longterm deflection (creep). The compression steel supplements the concrete's compressive capacity and improves the beam's overall structural performance.

42. D — ACI now recommends placing the concrete slab directly on the vapor retarder without an intervening sand blotter layer. The sand layer can become saturated with groundwater or condensation and serve as a moisture reservoir that continuously supplies water to the underside of the slab indefinitely, causing persistent moisture problems for adhesives, coatings, and floor finishes.

43. C — Roughening the hardened concrete surface to a minimum ¼inch amplitude creates mechanical interlock (aggregate interlock) between the old and new concrete, significantly

increasing the shear transfer capacity across the construction joint. Without roughening, the smooth surface relies primarily on adhesion alone, which provides much less shear resistance.

44. B — The contractor should reject the load or have the batch plant add ice to reduce the temperature to 90°F or below before placement. Concrete placed above the specified maximum temperature sets too rapidly, has reduced workability, and is prone to plastic shrinkage cracking and reduced longterm strength. Ice is the most effective method for reducing concrete temperature.

45. A — Corrosioninhibiting admixtures delay the onset of chlorideinduced reinforcing steel corrosion by raising the chloride threshold — the concentration of chloride ions at the steel surface needed to initiate corrosion. This extends the service life of concrete exposed to deicing chemicals (parking garages, bridge decks) or marine environments by decades.

46. D — The timing of stressing is critical because concrete undergoes shrinkage and creep continuously from the time it is placed. If stressing is delayed beyond the specified window, the concrete undergoes additional shortening (shrinkage) before the compressive preload is applied, reducing the net effective precompression in the slab and potentially allowing shrinkage cracks to develop.

DOMAIN 4: MASONRY (Questions 47–50)

47. A — Bond beams above openings function as lintels — horizontal structural members that span the opening and transfer the loads from the masonry above to the jamb supports on each side. Bond beams below openings distribute concentrated reactions and sill loads along the wall. Both locations are critical stress points where loads concentrate at the edges of openings.

48. C — Bagged masonry cement and hydrated lime that absorb moisture begin to hydrate (react chemically with the water) prematurely in the bag, forming hard lumps and partially reacted clumps. This prehydration consumes a portion of the material's reactivity, producing mortar with inconsistent properties and reduced compressive and bond strength.

49. D — Flush (untooled) joints may be acceptable for interior walls not exposed to weather, though tooled joints are always preferred because tooling compresses the mortar against the masonry units, improving the mortartounit bond. The specification and the structural engineer should be consulted to confirm whether flush joints are acceptable for the specific application.

50. A — Type N mortar has a minimum compressive strength of 750 psi, compared to 1,800 psi for Type S. Using Type N instead of the specified Type S reduces the wall's compressive capacity and bond strength by more than half, significantly compromising the structural bearing wall's ability to resist vertical loads and lateral forces. The affected section may need to be demolished and rebuilt.

DOMAIN 5: METALS (Questions 51–56)

51. C — Chevron (inverted V) bracing transfers lateral forces from wind and seismic loads through the diagonal brace members to the foundation. The diagonal members convert horizontal forces into axial forces (tension and compression) within the braces, providing an efficient load path for lateral resistance. The bracing bay becomes significantly stiffer than an unbraced bay.

52. B — The fabricator must submit an RFI to the structural engineer identifying the geometric conflict before proceeding. The fabricator should not modify the connection independently because the engineer's design intent and the connection's structural capacity may be compromised by unauthorized changes. The engineer will issue a revised detail that resolves the conflict.

53. A — Shop connections are made in the fabrication plant under controlled conditions with jigs, fixtures, proper positioning, environmental protection (no rain or wind), and continuous quality control inspection. These controlled conditions produce higherquality, more consistent connections than field conditions where variable weather, access limitations, and positioning challenges affect quality.

54. D — The reduced beam section (RBS) or "dogbone" connection intentionally reduces the beam flange width at a location away from the column face by cutting semicircular profiles from both flanges. This forces the plastic hinge to form in the beam at the weakened section rather than in the beamtocolumn connection, protecting the connection from brittle fracture during seismic events.

55. C — The Charpy Vnotch impact test measures the toughness of steel — its ability to absorb energy without fracturing — at a specified low temperature. Toughness is critical for members exposed to cold service temperatures or dynamic loading (such as crane runways) because steel becomes more brittle at low temperatures and may fracture suddenly without warning.

56. B — Fireresistancerated assemblies are tested and listed with specific components, including the exact stud gauge, spacing, gypsum board type and thickness, and insulation type. Substituting 25gauge studs (which are thinner than the specified 20gauge) changes the assembly from the tested configuration. A thinner stud may deform or lose structural integrity sooner during fire exposure, voiding the assembly's fire rating.

DOMAIN 6: WOOD (Questions 57–61)

57. D — Wood shrinks primarily across the grain (perpendicular to the growth rings) as it dries from its inservice moisture content. In multistory construction, the cumulative crossgrain shrinkage across plates, headers, joists, and other horizontal members at each floor level can produce significant vertical shortening, potentially cracking rigid piping, distorting drywall, and creating gaps at intersections.

58. A — Blocking between joists at bearing walls serves multiple structural functions: it transfers vertical loads from the wall above through the floor assembly to the wall below, prevents joist rollover (lateral buckling) at the bearing point where loads are concentrated, and provides a continuous nailing surface for wall sheathing and finish materials above and below the floor line.

59. C — CLT panels consist of alternating layers of lumber with grain directions rotated 90 degrees, similar to plywood construction at a structural scale. This crosslaminated layup provides twoway spanning capability, high inplane shear resistance (making CLT suitable for diaphragms and shear walls), and excellent dimensional stability compared to traditional oneway joist framing.

60. B — Camber is an intentional upward curve manufactured into the beam that offsets the anticipated downward deflection under design dead and live loads. When the beam is loaded, the camber straightens out, and the beam appears straight or nearly so. Without camber, a longspan beam may deflect visibly, causing aesthetic concerns and functional problems with attached finishes.

61. D — The APA (The Engineered Wood Association) trademark certifies that the panel meets the applicable product standard (PS 1 for plywood, PS 2 for structural panels), has been tested for structural performance, and is graded for its intended use. The stamp includes the span rating, exposure durability classification (Exterior, Exposure 1), thickness, and the mill identification number.

DOMAIN 7: THERMAL AND MOISTURE PROTECTION (Questions 62–66)

62. A — In conventional builtup or modified bitumen roof assemblies, a selfadhering bituminous membrane applied directly to the metal or concrete roof deck serves as both the air barrier (preventing conditioned air from escaping upward through the deck joints) and the vapor retarder (preventing water vapor from reaching the cold insulation layer where it could condense).

63. C — The exterior paint color affects the amount of solar radiation absorbed by the cladding surface but does not significantly affect the wall assembly's effective Rvalue. Thermal bridging, air leakage through bypass pathways, and insulation installation defects are the three primary factors that reduce the effective Rvalue below the nominal cavity insulation value.

64. B — A cold (ventilated) roof includes a ventilated air space between the insulation and the roof deck. Outdoor air circulates through this space via soffit and ridge vents, keeping the roof deck close to the outdoor temperature. This reduces heat buildup in summer and prevents ice dams in winter by keeping the roof deck cold enough to prevent snowmelt.

65. D — Throughwall flashing at the base of the brick veneer catches any water that has penetrated the brick or accumulated in the cavity and directs it outward through weep holes to the building exterior. The flashing must extend completely through the assembly — from the exterior brick face, through the cavity, and up behind the WRB on the backup wall — to capture all possible water paths.

66. B — An air barrier controls unintended air leakage through the building envelope, which is a major source of energy loss and moisture problems. Uncontrolled air movement carries both heat and moisture vapor through the envelope, increasing HVAC energy consumption and creating conditions for condensation within the wall assembly that can cause mold growth and structural damage.

DOMAIN 8: DOORS, WINDOWS, AND GLAZING (Questions 67–70)

67. C — Window perimeter sealant must maintain a watertight and airtight seal while accommodating the differential thermal movement between the aluminum frame (which has a

high coefficient of thermal expansion) and the surrounding wall materials. The sealant must have adequate elongation and adhesion to stretch and compress with these movements without failing.

68. B — A vestibule (airlock) creates a buffer zone between the exterior and the conditioned interior. When the outer door opens, the inner door remains closed, and vice versa, limiting direct air exchange between inside and outside. This significantly reduces the volume of unconditioned air that infiltrates the building each time the entrance is used.

69. D — Unitized curtain wall panels are factoryassembled as complete units — typically one story tall and one module wide — with glass, mullions, gaskets, and hardware installed under controlled shop conditions. The complete panels are transported to the site and lifted into place, reducing field labor, improving quality control, and accelerating the building enclosure process.

70. C — Safety glazing (tempered or laminated glass) is required in shower and bathtub enclosures because the wet, slippery conditions significantly increase the likelihood of slips, falls, and human impact with the glass. Tempered glass breaks into small, relatively harmless fragments; laminated glass remains intact on its plastic interlayer if broken.

DOMAIN 9: FINISHES (Questions 71–75)

71. B — Incomplete heatweld seams in healthcare flooring create gaps where moisture, cleaning chemicals, bacteria, and other contaminants can penetrate beneath the flooring surface. In healthcare environments where infection control is critical, the flooring must provide a seamless, impervious surface that can be thoroughly cleaned and disinfected.

72. D — Installing ceiling gypsum board perpendicular to the framing members causes each board to span across more framing members, providing better bridging of any single framing irregularity (a bowed or misaligned joist). Perpendicular installation also reduces the number of end joints (butt joints) that require taping and finishing.

73. A — The Ceiling Attenuation Class (CAC) measures a ceiling tile's ability to block sound transmission through the plenum space above the ceiling. When walls between rooms stop at the ceiling (not extending to the structure above), sound travels over the wall through the open plenum. A higher CAC rating means more sound is blocked from passing through the ceiling tile into the adjacent space.

74. C — Epoxy terrazzo is thinner (¼ to ⅜ inch versus ½ to ⅝ inch for cementitious), lighter in weight, more flexible (less prone to cracking), and offers virtually unlimited color options through the use of colored epoxy resin and decorative aggregate chips. The thinner profile reduces floortofloor height conflicts and allows installation over a wider range of substrates.

75. D — Efflorescence bleeding through paint on new CMU walls is caused by soluble salts within the blocks dissolving in moisture that migrates to the surface. The moisture carries dissolved salts through the paint film, where they crystallize as white deposits when the water evaporates. Proper CMU curing, surface sealing with an alkaliresistant primer, and moisture management prevent this problem.

DOMAIN 10: MECHANICAL AND PLUMBING SYSTEMS (Questions 76–81)

76. B — A dedicated outdoor air system (DOAS) is a separate HVAC unit whose sole function is conditioning the outdoor ventilation air required by ASHRAE 62.1. The DOAS heats, cools, and dehumidifies the outdoor air before delivering it to the building. A separate parallel system (such as fan coil units, VRF, or radiant panels) handles the recirculated air and zonelevel temperature control.

77. A — The temperature and pressure relief valve is a critical safety device that opens to discharge water if the water temperature or pressure inside the water heater exceeds safe limits (typically 210°F temperature or 150 psi pressure). Without a T&P valve, a malfunctioning water heater could build sufficient pressure to rupture the tank, causing an explosion.

78. D — An energy recovery ventilator transfers heat and moisture between the outgoing exhaust air and the incoming outdoor ventilation air through a heat exchanger core. In winter, the ERV preheats the cold outdoor air using heat recovered from the warm exhaust air. In summer, it precools the hot outdoor air. This reduces the HVAC system's heating and cooling energy consumption.

79. C — The IPC requires a minimum residual pressure of 8 psi at the most remote and highest fixture in the building, though specific fixtures (such as flushometervalve toilets) may require higher pressures as specified by the manufacturer. The system must be designed to provide adequate pressure at all fixtures under peak demand conditions.

80. A — Water hammer is a hydraulic shock wave caused by the sudden stopping or changing direction of water flow in a pipe, typically when a quickclosing valve (such as a solenoid valve on a washing machine or dishwasher) slams shut. The water hammer arrestor absorbs the pressure surge through a sealed, compressible air chamber, preventing pipe damage and eliminating the banging noise.

81. B — NFPA 13 Ordinary Hazard Group 2 (OH2) encompasses occupancies with moderate quantities of combustible materials, including offices, restaurants, bakeries, light manufacturing, auto showrooms, and similar uses. The OH2 classification determines the sprinkler system's design density, area of coverage, and water supply requirements.

DOMAIN 11: ELECTRICAL SYSTEMS (Questions 82–84)

82. C — Tamperresistant receptacles have internal springloaded shutters that cover the hot and neutral contact openings. Both shutters must be depressed simultaneously (as occurs when a twoprong plug is inserted) to open and allow electrical contact. This prevents children from inserting small objects into a single slot and receiving an electrical shock.

83. D — A UPS provides instantaneous, seamless power during the brief 10to30second gap between normal power loss and emergency generator startup. The UPS batteries maintain continuous power to sensitive electronic equipment during this transition, preventing the momentary power interruption that could crash servers, corrupt data, and disrupt critical operations.

84. A — The NEC defines "within sight" as visible and not more than 50 feet from the equipment. This means the disconnect must be in a direct, unobstructed line of sight from the equipment it serves and within 50 feet. This ensures the person working on the equipment can verify that the disconnect is in the off position without leaving the immediate work area.

DOMAIN 12: PROCUREMENT AND CONTRACTING REQUIREMENTS (Questions 85–115)

85. B — Public bid openings provide transparency and integrity to the competitive bidding process. By opening all bids publicly and reading the amounts aloud, the process ensures that no bids are altered, no favoritism is exercised, and all bidders and the public can verify the results. The public record of bid amounts protects all parties.

86. D — While construction safety is the contractor's primary responsibility, the architect has a professional and ethical duty to communicate known safety hazards observed during site visits. Notifying the contractor promptly allows the hazard to be addressed. The architect does not assume the contractor's safety responsibility by communicating the observation.

87. A — A timeandmaterials contract requires preagreed labor rates (including wages, benefits, taxes, insurance, and markup), material markup percentages (cost plus an agreed percentage), and equipment rates (typically based on published rental rates). These rates must be established before work begins to provide a clear, auditable basis for billing.

88. C — Division 01 (General Requirements) contains the administrative and procedural requirements that apply to all trades and all sections of the specifications. This includes submittal procedures, quality control requirements, temporary facilities and utilities, project closeout procedures, payment procedures, and other projectwide administrative provisions.

89. B — The contractor should submit a formal substitution request that documents the discontinued product, proposes one or more alternatives with equal or better performance, and provides supporting documentation (product data, testing reports, warranty comparisons) for the architect's review and approval. Simply installing a different product without approval violates the contract.

90. D — Under AIA A201 Section 3.3, the architect has no responsibility for or control over the contractor's means, methods, techniques, sequences, or procedures. These are the contractor's sole responsibility. The architect's role is limited to determining whether the completed work conforms to the contract documents, not how the work is performed.

91. A — Before the owner can occupy a completed portion of the building, the architect must issue a certificate of substantial completion for that portion, and the parties must agree in writing on the responsibilities for security, maintenance, heating/cooling, utilities, insurance, and damage for both the occupied and unoccupied portions.

92. C — EV ($1,800,000) is less than PV ($2,000,000), indicating the project is behind schedule — less work has been completed than planned. AC ($2,100,000) exceeds EV ($1,800,000), meaning the work completed has cost more than budgeted. The Schedule Performance Index (SPI = EV/PV = 0.90) and Cost Performance Index (CPI = EV/AC = 0.86) both confirm poor performance.

93. D — Either the owner or the contractor purchases the builder's risk policy, as specified in the contract. Builder's risk insurance covers physical loss or damage to the work during construction from covered perils such as fire, wind, theft, vandalism, and other insured events. The policy typically covers materials onsite and in transit.

94. A — A lost productivity claim requires detailed documentation: daily reports recording actual production rates, planned production rates from the bid estimate, comparisons between planned and actual productivity, identification of the specific change events that disrupted the work, and quantification of the labor hours lost using an accepted methodology such as the measured mile approach.

95. C — An early completion bonus is typically paired with a corresponding liquidated damages clause for late completion, creating a balanced incentive/disincentive structure. The bonus motivates early completion while the liquidated damages discourage delay. This balanced approach aligns the contractor's financial interests with the owner's schedule objectives.

96. B — The "should have known" standard holds the contractor accountable for conditions that a reasonably diligent contractor would have discovered through normal project management activities, regular site inspections, and careful document review. The contractor cannot claim ignorance of obvious conditions or conditions that were readily discoverable through reasonable investigation.

97. D — The project superintendent's wages and benefits are a reimbursable cost of the work because the superintendent is assigned fulltime to the project site. Home office rent, corporate administrative salaries, corporate profit targets, and entertainment expenses are the contractor's general overhead costs, which are covered by the contractor's fee — not reimbursed as direct project costs.

98. A — BIM provides automated 3D clash detection that identifies spatial conflicts between all building systems in a virtual model before construction begins. Traditional 2D overlays require manual comparison of separate drawings, making it easy to miss conflicts. BIM clash detection is far more comprehensive, reliable, and efficient, saving significant field rework costs.

99. C — The contractor should document the submittal submission and return dates, notify the architect and owner in writing that the delayed review is impacting the project schedule, and reserve the right to claim additional time and cost. Written notice preserves the contractor's rights and creates a record that may support a delay claim if the situation is not resolved.

100. B — Under the DavisBacon Act, the general contractor may be held jointly and severally liable for subcontractor prevailing wage violations on federally funded projects. This means the government can hold the GC responsible for back wages owed to the subcontractor's underpaid workers, even though the GC did not directly employ them.

101. A — Partial commissioning involves testing and verifying building systems in completed phases or areas before the entire project reaches substantial completion. The contractor must cooperate fully with the commissioning process, provide access to systems, support functional testing, and correct any deficiencies identified during the testing process.

102. D — Negative float on the critical path indicates that the project is projected to finish after the contractual completion date. The critical path activities cannot be completed within the remaining contract time without schedule recovery measures such as acceleration, resequencing, or a time extension.

103. C — Unit prices are preagreed prices per unit of measurement (cubic yard, linear foot, square foot, each) for specific items where the actual quantity may differ from the estimated quantity. They provide a fair, predetermined basis for adjusting the contract price when actual quantities are verified during construction without negotiating each adjustment individually.

104. B — A cardinal change is one that goes so far beyond the original scope that it cannot reasonably be considered a modification within the existing contract. It effectively creates a new and different contract. The contractor may treat a cardinal change as a breach, potentially entitling the contractor to damages beyond those available under the contract's change order provisions.

105. A — When work is damaged by a covered peril under the builder's risk policy, the contractor must repair or replace the damaged work, and the cost is reimbursable through the insurance proceeds. The contractor does not absorb the financial loss for damage caused by insured events such as fire, wind, or theft.

106. D — An REA is submitted to the owner as a negotiation tool before the matter escalates to a formal dispute. It requests a voluntary adjustment to the contract price or time based on documented entitlement. If the parties cannot agree on the REA, the contractor may then escalate it to a formal claim, triggering the contract's dispute resolution procedures.

107. C — When concurrent delays exist (both ownercaused and contractorcaused delays overlap), the contractor typically receives a time extension (because the owner's delay was a contributing cause) but does not receive additional monetary compensation for the overlapping period (because the contractor's own delay would have prevented timely completion regardless).

108. A — Missing seismic anchoring of HVAC equipment is defective workmanship — the equipment was not installed in accordance with the construction documents. Under the contractor's warranty, the contractor must return and properly anchor all equipment per the seismic design requirements at no additional cost to the owner.

109. B — Quality assurance encompasses the planned and systematic activities to provide confidence that the work meets requirements (inspection plans, testing protocols, documentation systems). Quality control encompasses the operational techniques used to fulfill those requirements (field inspections, material testing, dimensional verification). QA verifies the process; QC verifies the product.

110. D — Enhanced commissioning under LEED requires CxA involvement beginning during the design phase. The CxA reviews the owner's project requirements and basis of design, reviews the design documents for commissioningrelated issues, and develops a commissioning plan before construction begins. Fundamental commissioning begins later, typically during the construction phase.

111. A — Clear scope definitions in subcontracts prevent scope gaps (work that falls between trades with no one responsible) and scope overlaps (both trades pricing the same work). Gaps cause delays, disputes, and additional costs when unclaimed work must be assigned. Clear boundaries establish exactly what each subcontractor must furnish and install.

112. C — Temporary utilities (temporary power, temporary water, temporary heat) typically transition to permanent building utilities at or near substantial completion, when the permanent electrical service, domestic water, and HVAC systems are operational. The owner assumes responsibility for permanent utility costs from substantial completion forward.

113. B — Professional liability insurance is typically required when the contractor performs professional design services — such as in designbuild projects, delegated design of engineered systems (structural connections, curtain wall engineering, fire protection design), or any situation where the contractor provides engineering or design judgments beyond standard construction means and methods.

114. D — The 11month warranty walk is conducted near the end of the standard oneyear warranty period to identify any deficiencies that have developed during the first year of occupancy. This gives the contractor the opportunity to correct warranty items before the standard warranty expires, protecting both the owner's interests and the contractor's reputation.

115. A — Under the CMa (CM as advisor) delivery method, the trade contracts are held directly by the owner. The CMa acts as the owner's professional advisor, providing schedule management, cost control, constructability review, and quality oversight services. Unlike CM at Risk, the CMa does not hold trade contracts and does not provide a guaranteed maximum price