PRACTICE EXAM 5: 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 designing a twostory commercial building classified as Group B occupancy. The architect proposes using Type VB construction. According to IBC Tables 504.3, 504.4, and 506.2, the base allowable height for Group B in Type VB construction is 40 feet and 2 stories. If the building is fully sprinklered per NFPA 13, what additional height allowance does the sprinkler system provide?

A. The sprinkler system permits an increase of one story and 20 feet in allowable building height for most occupancies

B. The sprinkler system permits an increase of three stories and 40 feet in allowable building height

C. The sprinkler system provides no height increase for Type VB construction under any occupancy group

D. The sprinkler system permits an increase of two stories but no increase in height measured in feet

2. A building official conducts a final inspection of a completed commercial building and determines that the building is safe for occupancy but that certain noncritical items remain incomplete. Rather than withholding the full certificate of occupancy, what document may the building official issue to allow partial or temporary occupancy?

A. A conditional building permit that authorizes occupancy for 90 days without any inspection requirements

B. A permanent certificate of occupancy with a notation that certain items remain incomplete and must be corrected

C. A temporary certificate of occupancy (TCO) that specifies which portions may be occupied and includes an expiration date by which all remaining work must be completed

D. A verbal authorization that allows the owner to move in immediately without any written documentation

3. Under the IBC, the occupant load factor for a mercantile occupancy (Group M) differs depending on the floor level. What is the occupant load factor for the basement and ground floor of a mercantile occupancy?

A. 60 gross square feet per person for the basement and ground floor of mercantile occupancies

B. 30 gross square feet per person for the basement and ground floor of mercantile occupancies

C. 150 gross square feet per person for the basement and ground floor of mercantile occupancies

D. 15 net square feet per person for the basement and ground floor of mercantile occupancies

4. A fire protection engineer is reviewing a commercial building design and determines that a portion of the exit discharge passes through the building interior (a lobby) before reaching the exterior. Under the IBC, what percentage of the exit discharge may pass through the building interior under specific conditions?

A. 100% of the exit discharge may pass through the interior if the building has a fire alarm system

B. 75% of the exit discharge may pass through the interior in all commercial building types

C. No portion of the exit discharge may ever pass through the building interior under any circumstances

D. A maximum of 50% of the exit discharge may pass through the building interior, provided the path is protected by sprinklers, provides a level of safety equivalent to the exterior, and leads to an exit door

5. Under the IBC, what is the minimum required width of an accessible parking space access aisle for a standard (nonvan) accessible parking space?

A. 96 inches (8 feet) minimum access aisle width for all accessible parking spaces without exception

B. 48 inches (4 feet) minimum access aisle width for standard accessible parking spaces

C. 60 inches (5 feet) minimum access aisle width for standard accessible parking spaces

D. 36 inches (3 feet) minimum access aisle width for standard accessible parking spaces

6. A contractor is constructing a Type IA commercial highrise building. The structural engineer specifies concreteencased steel columns. Under IBC Table 601, what is the minimum fireresistance rating required for the structural frame of a Type IA building?

A. 2hour fireresistance rating for the structural frame of Type IA construction

B. 3hour fireresistance rating for the structural frame of Type IA construction

C. 4hour fireresistance rating for the structural frame of Type IA construction

D. 1hour fireresistance rating for the structural frame of Type IA construction

7. Under the IBC, a building with an occupied floor more than 55 feet above the lowest level of fire department vehicle access is classified as a highrise. Which of the following requirements applies specifically to highrise buildings but not to buildings below the highrise threshold?

A. A fire command center must be provided with voice/alarm communication capability and emergency controls for building systems

B. A minimum of six exits must be provided from every occupied floor regardless of occupant load

C. All structural elements must achieve a minimum 4hour fireresistance rating without exception

D. The building must have a helipad on the roof for emergency helicopter evacuation of all occupants

8. A building inspector observes that an enclosed exit stairway in a threestory commercial building has a 1hour fireresistancerated enclosure. Under the IBC, is this rating adequate for a stairway connecting three stories?

A. No, all exit stairway enclosures must have a minimum 2hour rating regardless of the number of stories

B. No, a 3hour rating is required for all exit stairway enclosures in commercial buildings over two stories

C. Yes, but only if the building is fully sprinklered with an NFPA 13 automatic sprinkler system throughout

D. Yes, a 1hour rating is adequate for exit stairway enclosures connecting fewer than four stories

9. Under the IBC, what is the maximum common path of egress travel permitted in a Group S2 (lowhazard storage) occupancy with an automatic sprinkler system?

A. 50 feet maximum common path in a sprinklered Group S2 occupancy

B. 75 feet maximum common path in a sprinklered Group S2 occupancy

C. 100 feet maximum common path in a sprinklered Group S2 occupancy

D. 200 feet maximum common path in a sprinklered Group S2 occupancy

10. A contractor is building a commercial office on the second floor of a building. The corridor serving the office suite has an occupant load of 35 persons. Under the IBC, the corridor requires a fireresistance rating in a nonsprinklered building when the occupant load served exceeds 30 for Group B. What rating is required?

A. 2hour fireresistance rating for Group B corridors serving more than 30 occupants without sprinklers

B. 1hour fireresistance rating for Group B corridors serving more than 30 occupants without sprinklers

C. ½hour fireresistance rating for Group B corridors serving more than 30 occupants without sprinklers

D. No rating is required for Group B corridors regardless of occupant load or sprinkler status

11. Under IBC Chapter 11, accessible toilet rooms in commercial buildings must include grab bars on the side wall and rear wall adjacent to the accessible water closet. What is the purpose of these grab bars?

A. Grab bars serve as towel racks and provide a convenient mounting surface for restroom accessories

B. Grab bars provide structural support for the toilet fixture and prevent it from moving during use

C. Grab bars serve as required elements for mounting emergency communication devices in accessible stalls

D. Grab bars provide support for persons with disabilities during transfer to and from the water closet and while seated, and must support a minimum load of 250 pounds

12. A contractor discovers that the building's exterior stairs serving as a required exit have a riser height of 7½ inches. Under the IBC, does this stair comply with the maximum riser height requirement for exit stairways?

A. No, the IBC limits the maximum riser height for exit stairways to 7 inches, and 7½ inches exceeds this limit

B. Yes, exterior stairs are exempt from the 7inch riser height limitation and may have risers up to 8 inches

C. No, the maximum riser height for exterior exit stairs is 6 inches, which is more restrictive than interior stairs

D. Yes, the IBC permits risers up to 7¾ inches for exterior stairs in commercial buildings above two stories

13. Under the IBC, what is the minimum fireresistance rating required for the roof construction in a Type IB building according to Table 601?

A. 2hour fireresistance rating for roof construction in Type IB buildings

B. No fireresistance rating is required for roof construction in Type IB buildings

C. 1hour fireresistance rating for roof construction in Type IB buildings

D. 1½hour fireresistance rating for roof construction in Type IB buildings

14. A contractor is evaluating a sprinklered commercial building for compliance with IBC Table 506.2 (allowable area). The table shows that the base allowable area for a Group B occupancy in Type IIB construction is 23,000 square feet per story. What is the approximate allowable area per story with the sprinkler increase applied?

A. 23,000 square feet because sprinklers provide no area increase for Type IIB construction

B. The allowable area approximately triples to 69,000 square feet per story with the sprinkler increase for most occupancies in Type IIB construction

C. The area doubles to exactly 46,000 square feet per story with the sprinkler increase

D. The area increases by 25% to approximately 28,750 square feet per story with the sprinkler increase

15. Under the IBC, what condition triggers the requirement for a standpipe system in a commercial building?

A. Buildings with a fire area exceeding 5,000 square feet require standpipes regardless of height

B. All commercial buildings require standpipes regardless of height, area, or occupancy classification

C. Buildings with basements more than 10 feet below grade require standpipes for fire department access

D. Buildings where the highest floor used for human occupancy is more than 30 feet above the lowest level of fire department vehicle access require standpipe systems

16. A contractor reviews building plans showing two exit doors from a conference room with an occupant load of 55 persons. Both doors swing inward toward the conference room. Under the IBC, is this door swing direction compliant for exit doors serving this occupant load?

A. No, exit doors serving an occupant load of 50 or more must swing in the direction of egress travel, which is outward from the room

B. Yes, all commercial interior doors may swing in any direction regardless of occupant load

C. No, all doors in commercial buildings must swing outward regardless of the occupant load served

D. Yes, doors serving conference rooms are exempt from the door swing direction requirement

17. Under the IBC, fire dampers are required in ductwork that penetrates fireresistancerated assemblies. What is the function of a fire damper?

A. A fire damper increases airflow during a fire to assist in smoke exhaust from the affected area

B. A fire damper prevents backdraft explosions by sealing the duct system when oxygen levels drop

C. A fire damper automatically closes when exposed to heat, preventing the spread of fire through the duct opening in the rated assembly

D. A fire damper filters smoke particles from the air supply to prevent smoke inhalation in adjacent spaces

18. A contractor is constructing a building with a Group I1 (supervised residential) occupancy that houses 20 persons on a 24hour basis. These residents are capable of selfpreservation. Under the IBC, what automatic fire suppression system is required?

A. A standpipe system only, with no automatic sprinkler requirement for Group I1 occupancies

B. An automatic sprinkler system installed throughout the building in accordance with NFPA 13

C. Only portable fire extinguishers at each exit and in each sleeping room are required for Group I1

D. A fire alarm system with automatic smoke detection but no sprinkler system is required

19. Under IBC Chapter 34, existing buildings undergoing repair are generally permitted to remain in compliance with the code under which they were originally built for the repaired elements. However, what trigger requires the entire building to comply with the current code?

A. Any repair exceeding $5,000 in cost triggers full building code compliance for the entire structure

B. Replacement of more than 50% of the exterior windows triggers full compliance for the entire building

C. Adding any new electrical outlets to the building triggers full compliance for all electrical systems

D. A change of occupancy to a higherhazard classification requires the entire building to comply with the current code requirements for the new occupancy

20. A building has a total of 350 parking spaces. According to IBC Table 1106.1, how many accessible parking spaces are required?

A. 7 accessible parking spaces, determined by the 2% calculation for lots with 201 to 300 spaces applied proportionally to lots in the 301400 range as specified in the IBC table

B. 4 accessible parking spaces for lots with 301 to 400 total parking spaces

C. 12 accessible parking spaces for lots with 301 to 400 total parking spaces

D. 10 accessible parking spaces for lots with 301 to 400 total parking spaces

21. Under the IBC, what is the maximum permitted occupant load for a space served by a single exit door?

A. 75 occupants may be served by a single exit under specific conditions in certain occupancies

B. 100 occupants may be served by a single exit in all commercial occupancy groups without restriction

C. 49 occupants or fewer under specific conditions including travel distance limits and building height restrictions

D. 25 occupants is the absolute maximum for any space with a single exit door in commercial buildings

22. A contractor is installing handrails on an exit stairway and the specifications require the handrails to extend beyond the bottom riser. Under the IBC, what is the minimum required horizontal extension of the handrail beyond the bottom riser?

A. 6 inches minimum horizontal extension beyond the bottom riser of each stair flight

B. The handrail must extend horizontally at least one tread depth (11 inches minimum) beyond the bottom riser

C. 18 inches minimum horizontal extension beyond the bottom riser of each stair flight

D. No horizontal extension is required beyond the bottom riser — the handrail may terminate at the nosing

23. Under the IBC, what is the minimum fireresistance rating required for a fire barrier used to separate dwelling units in a Group R2 (apartment) occupancy?

A. ½hour fireresistance rating for dwelling unit separations in Group R2 occupancies

B. No fireresistance rating is required between dwelling units if the building is fully sprinklered

C. 2hour fireresistance rating for all dwelling unit separations regardless of sprinkler protection

D. 1hour fireresistance rating for dwelling unit separation fire barriers in Group R2 occupancies

24. A contractor receives plans showing a mechanical room on an upper floor of a commercial building. The mechanical room contains a large air handling unit with ductwork penetrating the floor assembly below. Under the IBC, what fire protection feature is required where the ductwork penetrates the fireresistancerated floor assembly?

A. The ductwork penetration requires no fire protection because mechanical rooms are exempt from all rating requirements

B. A fire extinguisher must be mounted on the duct at the point of penetration for manual fire suppression

C. A fire damper and/or smoke damper must be installed in the duct at the point of penetration to prevent fire and smoke spread through the rated assembly

D. The ductwork must be wrapped in intumescent coating for a distance of 5 feet on each side of the penetration

25. Under the IBC, a building with a Group F1 (moderatehazard factory) occupancy has a fire area of 14,000 square feet without sprinkler protection. According to IBC Section 903.2, is an automatic sprinkler system required?

A. No, the sprinkler threshold for Group F1 is 15,000 square feet, and this building is below the threshold

B. Yes, all factory occupancies require sprinklers regardless of fire area size or building configuration

C. No, Group F1 occupancies are completely exempt from automatic sprinkler requirements under the IBC

D. Yes, the sprinkler threshold for Group F1 is 12,000 square feet, and 14,000 square feet exceeds this threshold

DOMAIN 2: SITE CONSTRUCTION (Questions 26–40)

26. A contractor is grading a commercial site and the civil engineer's grading plan shows existing contour lines and proposed contour lines. The spacing between contour lines on the proposed plan is much closer than the existing contour spacing in the same area. What does this closer spacing of proposed contours indicate about the proposed terrain?

A. The closer contour spacing indicates a flatter area with gentler slopes than the existing terrain

B. The closer contour spacing indicates a steeper slope in the proposed terrain compared to the existing conditions

C. The closer contour spacing indicates that the elevation will remain unchanged from existing conditions

D. The closer contour spacing indicates that the area will be excavated to a flat, level surface with no slope

27. Under OSHA's excavation safety standard, what is the minimum frequency at which a competent person must inspect an excavation and the adjacent areas for evidence of potential caveins, protective system failures, and other hazards?

A. Once per week during active excavation operations with additional inspections after significant weather events

B. Only at the beginning of the project before any excavation work commences, with no subsequent inspections required

C. Once per month with written documentation submitted to the OSHA area office for review and approval

D. Daily before each shift and after every rainstorm, vibration event, or other hazardincreasing occurrence

28. A contractor is preparing to install a shallow foundation system for a commercial building. The geotechnical report indicates the bearing soil is classified as CL (lowplasticity clay) under the Unified Soil Classification System. The report provides a recommended allowable bearing pressure of 2,000 psf. A column load of 80,000 pounds must be supported by a spread footing. What is the minimum required footing area?

A. 40 square feet, calculated by dividing the 80,000pound column load by the 2,000 psf allowable bearing pressure

B. 20 square feet, calculated by dividing the column load by twice the allowable bearing pressure

C. 80 square feet, calculated by dividing the column load by half the allowable bearing pressure

D. 60 square feet, based on a standard minimum footing size regardless of soil bearing capacity

29. A contractor discovers that the existing site topography directs stormwater runoff from an adjacent property onto the construction site. Before grading begins, what must the contractor address regarding this offsite runoff?

A. The contractor has no obligation to manage offsite runoff and may redirect it back to the adjacent property

B. The contractor must file a lawsuit against the adjacent property owner before construction may commence

C. The site grading plan must account for the offsite runoff by providing adequate drainage capacity to handle both onsite and offsite flows without causing flooding or erosion on either property

D. The contractor must install a permanent retaining wall along the property line to block all offsite runoff

30. A contractor is evaluating soil boring logs from the geotechnical investigation. One boring shows a layer of peat (Pt classification under USCS) at a depth of 8 feet below the proposed foundation level. Why is peat significant for foundation design?

A. Peat is an organic soil with very high compressibility and very low bearing capacity that is unsuitable for supporting structural loads without special treatment, removal, or deep foundation systems

B. Peat is an extremely hard rock formation that provides excellent bearing capacity for heavy loads

C. Peat is identical to sandy gravel and provides moderate bearing capacity adequate for most foundations

D. Peat is significant only because it changes the color of the concrete poured against it to dark brown

31. A contractor must install a temporary sediment trap at a low point on the construction site where a drainage swale collects runoff from a 3acre disturbed area. How is a sediment trap typically constructed?

A. A sediment trap is a large steel tank buried underground with mechanical filtration systems powered by electricity

B. A sediment trap is constructed by building a small earthen berm or stone check dam across the swale, creating a ponding area where sediment settles out of the runoff before it continues downstream

C. A sediment trap consists of a row of hay bales stacked vertically across the swale with no earthen component

D. A sediment trap is a concrete vault with a mechanical skimmer that removes sediment continuously

32. A contractor is performing deep excavation work adjacent to an existing building's foundation. The existing foundation is a shallow spread footing system. What is the primary concern when excavating near an existing shallow foundation?

A. The excavation may introduce sunlight to the existing foundation, causing ultraviolet degradation of the concrete

B. The excavation noise may disturb the occupants of the existing building and require soundproofing measures

C. The existing foundation is fully selfsupporting and cannot be affected by any adjacent excavation activity

D. The excavation may undermine the existing foundation by removing the lateral soil support, potentially causing settlement, cracking, or collapse of the adjacent structure

33. A contractor is installing a posttensioned concrete slab on grade for a commercial warehouse. The geotechnical engineer recommends this foundation type due to expansive clay soils on the site. How does a posttensioned slab resist the effects of expansive soils?

A. The posttensioning cables heat the soil beneath the slab, preventing clay expansion due to moisture changes

B. The posttensioning cables dissolve the clay minerals over time, permanently stabilizing the expansive soil

C. The posttensioned slab is designed to bridge over localized soil movements by using highstrength steel tendons tensioned after the concrete cures, creating a stiff slab that resists bending from heaving or settling soil

D. The posttensioning system pumps water out of the soil through embedded drainage tubes in the slab

34. A contractor is installing a geotextile fabric separation layer between the subgrade soil and the aggregate base course for a parking lot pavement section. What is the primary purpose of this geotextile separation layer?

A. The geotextile prevents fine subgrade soil particles from migrating upward into the aggregate base, which would weaken the base by contaminating it with fines and reducing its loadbearing capacity

B. The geotextile serves as a waterproof membrane that prevents all moisture from reaching the subgrade soil

C. The geotextile provides thermal insulation between the pavement and the subgrade to prevent frost heave

D. The geotextile acts as a root barrier to prevent vegetation from growing through the pavement structure

35. Under OSHA excavation safety requirements, trench shields (trench boxes) protect workers from cavein. However, unlike shoring systems, trench shields do NOT prevent the trench walls from collapsing. What is the critical distinction between how shoring and shielding protect workers?

A. Shoring and shielding function identically — both prevent the trench walls from collapsing inward

B. Shoring physically supports the trench walls and prevents them from collapsing, while shielding provides a protected zone within the trench that protects workers even if the walls cave in around the shield

C. Shoring is used only in Type A soils while shielding is used only in Type C soils without exception

D. Shoring is a temporary system while shielding is a permanent installation that remains in the trench

36. A contractor is installing underground sanitary sewer piping for a commercial building. The sewer pipe must connect to a municipal sewer main that is 12 feet deep at the connection point. The building's lowest drain outlet is 3 feet below the finished floor. The horizontal distance from the building to the sewer main is 200 feet. The contractor determines that a gravity connection can be made with adequate slope. What minimum slope must be maintained for a 6inch diameter sanitary sewer pipe?

A. ¼ inch per foot minimum slope for 6inch diameter sanitary sewer pipes

B. ½ inch per foot minimum slope for 6inch diameter sanitary sewer pipes

C. 1 inch per foot minimum slope for 6inch diameter sanitary sewer pipes

D. ⅛ inch per foot minimum slope for 6inch diameter sanitary sewer pipes

37. A contractor discovers that the soil at the bottom of a foundation excavation is frozen to a depth of 6 inches. The specifications prohibit placing concrete on frozen ground. What is the correct course of action?

A. The contractor must remove or thaw all frozen soil before the foundation concrete is placed, because concrete placed on frozen ground will settle when the soil thaws, compromising the foundation's structural integrity

B. The contractor may pour concrete directly on the frozen ground because the concrete's heat of hydration will thaw the soil

C. The contractor should add antifreeze to the concrete mix to prevent the frozen soil from affecting the foundation

D. The contractor may proceed if the frozen layer is less than 12 inches deep because shallow frost has no effect

38. A contractor is constructing a commercial building and the specifications require a French drain system around the building perimeter. What distinguishes a French drain from a standard foundation drain?

A. A French drain and a foundation drain are identical systems with different regional terminology

B. A French drain uses only solid (nonperforated) pipe while a foundation drain uses perforated pipe

C. A French drain is a trench filled with gravel containing a perforated pipe that collects and redirects groundwater and surface water away from an area, while a foundation drain specifically protects the building foundation

D. A French drain is installed above grade as a surface drainage channel while a foundation drain is always below grade

39. A contractor is grading a parking lot and the specifications require a minimum crossslope on the pavement surface for drainage. What is the typical minimum crossslope specified for asphalt parking lot surfaces to ensure adequate surface drainage?

A. ½% (1/16 inch per foot) minimum crossslope for asphalt parking lot surfaces

B. 1% to 2% (⅛ inch to ¼ inch per foot) minimum crossslope for asphalt parking lot surfaces

C. 5% (⅝ inch per foot) minimum crossslope for asphalt parking lot surfaces

D. 10% (1¼ inches per foot) minimum crossslope for asphalt parking lot surfaces

40. A contractor is performing final site cleanup after a commercial building project is substantially complete. The NPDES Construction General Permit requires certain conditions to be met before the contractor can file a Notice of Termination (NOT) to close out the stormwater permit. What is the primary condition that must be met?

A. All fines for permit violations during construction must be paid in full before the NOT can be filed

B. The building's certificate of occupancy must be issued before the stormwater permit can be terminated

C. All construction equipment must be removed from the site before the NOT filing deadline of 30 days

D. Final stabilization must be achieved — permanent vegetation or other final cover must be established on all disturbed areas, and all temporary erosion and sediment controls must be removed

DOMAIN 3: CONCRETE (Questions 41–46)

41. A concrete contractor is placing a foundation wall and the structural drawings specify #5 rebar at 12 inches on center, vertically and horizontally. The contractor's crew places the rebar but uses #4 bars instead of #5 bars because #5 bars are not available on the day of the pour. What is the consequence of this substitution?

A. The substitution of #4 bars for #5 bars is a significant structural deficiency that must be reported to the structural engineer immediately — #4 bars have only 65% of the crosssectional area of #5 bars, potentially reducing the wall's structural capacity below the design requirements

B. The substitution is acceptable because #4 and #5 bars have identical structural properties and are interchangeable

C. The substitution improves the wall's performance because smaller bars provide more flexibility under load

D. The substitution has no structural consequence because the rebar serves only as temperature reinforcement

42. A contractor is placing concrete for a parking garage slab that will be exposed to deicing chemicals (road salt) during winter. The structural engineer specifies a maximum watercement ratio of 0.40 for this application. What property of the concrete is the engineer trying to achieve with this low watercement ratio?

A. The engineer wants the concrete to set more slowly to allow more time for finishing operations

B. The engineer wants the concrete to have a higher slump value for easier placement around congested reinforcement

C. The low watercement ratio produces denser, less permeable concrete that resists the penetration of chloride ions from deicing chemicals, protecting the reinforcing steel from corrosion

D. The low watercement ratio reduces the cost of the concrete by using less cement in the mix design

43. A contractor is constructing a precast concrete panel and the engineer specifies calcium chloride as an accelerating admixture. Under what condition is calcium chloride prohibited as an accelerator?

A. Calcium chloride is prohibited only in concrete placed during summer months above 85°F ambient temperature

B. Calcium chloride is prohibited in prestressed concrete and in concrete containing embedded aluminum or galvanized metals because chlorides promote corrosion

C. Calcium chloride is prohibited in all concrete applications regardless of embedded metals or prestressing

D. Calcium chloride is prohibited only in concrete with a watercement ratio below 0.35 for chemical compatibility

44. A contractor is forming a concrete column and the structural drawings show tied column reinforcement with #3 ties at 12 inches on center around the vertical bars. What is the structural function of the column ties?

A. Column ties provide temperature and shrinkage crack control in the column concrete surface

B. Column ties serve as spacers to maintain the correct clear cover distance between the rebar and the form face

C. Column ties provide acoustic dampening to reduce sound transmission through the column

D. Column ties provide lateral confinement that prevents the vertical bars from buckling outward under compressive load and hold the vertical bars in their correct positions

45. A contractor receives a delivery of concrete and the batch ticket shows a slump of 7 inches. The project specification allows a maximum slump of 5 inches for the structural element being placed. What should the contractor do?

A. Reject the load because it exceeds the specified maximum slump, which may indicate excessive water in the mix and a higherthandesigned watercement ratio that will produce weaker concrete

B. Accept the load because higher slump concrete is always preferable for easier placement and finishing

C. Accept the load but add cement powder to the truck to reduce the slump before placement begins

D. Accept the load and place it quickly before the excess water evaporates and the slump reduces naturally

46. A contractor is constructing a posttensioned concrete slab. The posttensioning tendons are stressed after the concrete has reached a specified minimum compressive strength. What happens to the concrete slab when the tendons are stressed?

A. The tendons have no effect on the slab until the full design load is applied to the structure

B. Stressing the tendons releases tension in the concrete, allowing it to relax and become more flexible

C. Stressing the tendons puts the concrete slab in compression, which preloads the slab to counteract the tension forces that will be produced when service loads are applied, effectively increasing the slab's loadcarrying capacity

D. Stressing the tendons causes the concrete to crack intentionally at control joint locations for shrinkage relief

DOMAIN 4: MASONRY (Questions 47–50)

47. A masonry contractor is building an exterior cavity wall consisting of a brick veneer wythe and a CMU backup wythe with a 2inch air space between them. Metal ties connect the two wythes. What is the primary structural function of the metal wall ties in this assembly?

A. Wall ties serve only as spacers to maintain the 2inch cavity width during construction

B. Wall ties carry all gravity loads from the brick veneer to the CMU backup wall continuously

C. Wall ties serve as thermal insulation connectors that prevent heat loss through the cavity

D. Wall ties transfer lateral loads (wind pressure) from the brick veneer to the structural CMU backup wall while allowing differential vertical movement between the two wythes

48. A masonry contractor notices that mortar for exterior walls is stiffening too quickly during placement on a hot summer day with temperatures above 95°F. What technique can the mason use to extend the mortar's working life without compromising its performance?

A. Add extra water to the mortar mix every 30 minutes to retemper it and restore workability throughout the day

B. Add retarding admixture to the mortar mix and keep the mortar in a shaded, covered container to slow evaporation and hydration, retempering only within the allowable time limit specified by the mortar manufacturer

C. Increase the cement content of the mortar by 50% to overcome the effects of rapid evaporation

D. Switch from Type S mortar to Type O mortar because Type O mortar is specifically designed for hot weather

49. A masonry wall specification requires weep holes at the base of an exterior brick veneer wall above the throughwall flashing. What is the purpose of weep holes in this location?

A. Weep holes allow the brick mason to inspect the interior of the cavity during construction for debris

B. Weep holes provide ventilation to the building interior through the masonry wall for fresh air supply

C. Weep holes provide aesthetic relief in the brick pattern by creating regularly spaced openings in the mortar

D. Weep holes allow water that has collected in the cavity above the flashing to drain to the exterior, preventing moisture from accumulating and potentially entering the building

50. A masonry contractor is building a reinforced CMU wall and needs to install a steel lintel angle above a 4footwide opening for mechanical louvers. The steel lintel must bear on the masonry on each side of the opening. For a steel angle lintel, what is the typical minimum bearing length on each side?

A. 2 inches minimum bearing on each side for steel angle lintels in masonry walls

B. 12 inches minimum bearing on each side for steel angle lintels in masonry walls

C. 4 inches minimum bearing on each side for steel angle lintels in masonry walls

D. 8 inches minimum bearing on each side identical to the requirement for masonry lintels

DOMAIN 5: METALS (Questions 51–56)

51. A contractor is reviewing structural drawings and notices that the engineer has specified "ASTM A500 Grade C" for all hollow structural section (HSS) members. What is the minimum yield strength of ASTM A500 Grade C steel for square and rectangular HSS shapes?

A. 36,000 psi (36 ksi) minimum yield strength for A500 Grade C square and rectangular HSS members

B. 50,000 psi (50 ksi) minimum yield strength for A500 Grade C square and rectangular HSS members

C. 42,000 psi (42 ksi) minimum yield strength for A500 Grade C square and rectangular HSS members

D. 65,000 psi (65 ksi) minimum yield strength for A500 Grade C square and rectangular HSS members

52. A structural steel erector is installing Kseries openweb steel joists for a commercial roof system. The joists are designated as 22K9. What information does this designation provide about the joist?

A. The joist is a Kseries truss with a 22foot maximum span and a weight of 9 pounds per linear foot

B. The joist has 22 web members and can support a maximum load of 9,000 pounds at midspan

C. The joist is 22 inches long and is designed for use with 9inch metal roof decking only

D. The joist is a Kseries standard joist with a 22inch nominal depth and a load capacity designation of 9

53. A contractor is installing composite metal floor decking and the structural drawings show headed shear studs at 12 inches on center along each beam. During installation, the stud welder notices that several studs have failed the bend test — when bent 15 degrees, the weld fractures and the stud breaks free from the beam flange. What action is required?

A. The failed studs are acceptable as long as they passed the visual inspection before the bend test

B. The bend test is not a required quality control test for headed shear studs in composite construction

C. The failed studs must be removed and replaced with properly welded studs that pass both visual inspection and the bend test, as defective shear studs compromise the composite action between the slab and beam

D. The failed studs may remain in place if additional studs are welded within 6 inches of each failed location

54. A contractor is reviewing the corrosion protection specifications for exposed exterior structural steel on a commercial building. The specification calls for hotdip galvanizing instead

of a paint coating system. What advantage does hotdip galvanizing provide over paint for corrosion protection?

A. Hotdip galvanizing provides a metallurgically bonded zinc coating that serves as both a physical barrier and a sacrificial anode, offering longer service life (25 to 75+ years) with no maintenance painting required

B. Hotdip galvanizing is always less expensive than paint systems for all structural steel applications

C. Hotdip galvanizing provides superior fire resistance compared to paint and can substitute for fireproofing

D. Hotdip galvanizing changes the color of the steel to match any architectural color specification

55. A contractor is erecting structural steel and the ironworkers complete the bolted connections on a section of the frame. The inspector performs a postinstallation verification of the bolt tension using a calibrated torque wrench. Several bolts in slipcritical connections show tension values below the minimum specified in AISC Table J3.1. What corrective action is required?

A. No action is needed because postinstallation verification is not required for slipcritical connections

B. The undertensioned bolts must be retightened to achieve the required minimum tension, or the entire connection must be reevaluated by the structural engineer for adequacy

C. The entire bolt group must be removed and replaced with new bolts because retightening used bolts is prohibited

D. The connection may be downgraded from slipcritical to bearingtype without engineering review

56. A contractor is installing lightgauge coldformed steel (CFS) framing for exterior curtain wall backup framing. The CFS studs will support an exterior cladding system but will not carry floor or roof loads. What type of connection is typically used at the top of these CFS studs to allow for vertical deflection of the structure above while maintaining lateral support?

A. A rigid welded connection that prevents any movement at the top of the stud for maximum stability

B. Bolted angle connections that create a fixed moment connection between the stud and the structure above

C. No connection is provided at the top — curtain wall backup studs are freestanding without top attachment

D. A slotted or deflection connection that allows the structure above to deflect vertically without transferring load to the nonloadbearing CFS studs while maintaining lateral bracing

DOMAIN 6: WOOD (Questions 57–61)

57. A contractor is framing a commercial building and the specifications call for Douglas FirLarch lumber for the floor joists. The estimator notices that the local supplier has Southern Yellow Pine available at a lower price. Can the contractor substitute Southern Yellow Pine for Douglas FirLarch without engineering review?

A. Yes, all softwood lumber species are structurally identical and may be freely substituted without review

B. Yes, Southern Yellow Pine is always stronger than Douglas FirLarch in every structural property

C. No, different species have different structural design values, and substituting a different species requires verification by the structural engineer that the substitute species meets the design requirements for the specific application

D. No, only Douglas FirLarch lumber may be used for commercial floor joist applications under any code

58. A contractor is installing wood sheathing on a commercial building's exterior walls. The building is located in a highwind zone and the structural engineer specifies an enhanced nailing schedule with 8d nails at 4 inches on center at panel edges and 6 inches on center in the field. Why is this enhanced nailing pattern specified?

A. The enhanced nailing pattern increases the wall's racking resistance (shear capacity) to withstand the higher lateral forces generated by wind in a highwind zone

B. The enhanced nailing pattern is required for aesthetic purposes to create a smoother wall surface

C. The enhanced nailing pattern prevents moisture infiltration by creating a tighter seal between panels

D. The enhanced nailing pattern is required by the lumber manufacturer's warranty for all highwind regions

59. A contractor is framing an exterior loadbearing wall and the structural drawings specify a king stud, a jack stud (trimmer), and a header at a door opening. The header is supported by the jack studs. If the header fails, what structural consequence would result?

A. Only the door frame would be affected with no impact on the wall structure above the opening

B. The wall's thermal performance would decrease but the structural integrity would be maintained

C. The exterior cladding would separate from the wall but the structural frame would remain sound

D. The loads carried by the header (from the structure above the opening) would no longer be supported, potentially causing the framing above the door to sag, crack the finishes, distort the structure, and eventually collapse

60. A contractor is reviewing the structural drawings for a roof system and sees a specification for "LVL 1¾ × 14" for the ridge beam. What does this specification indicate about the member?

A. The member is a laminated veneer lumber beam that is 1 foot 9¾ inches wide and 14 feet long

B. The member is a laminated veneer lumber beam that is 1¾ inches thick and 14 inches deep

C. The member is a standard 2×14 sawn lumber joist that has been ripped to 1¾ inches on a table saw

D. The member is a 14gauge lightgauge steel stud that is 1¾ inches wide for the roof framing system

61. A contractor is constructing a woodframed commercial building and the building inspector requires documentation that all structural lumber on the project has been properly graded. What evidence does the inspector look for to verify that lumber has been graded?

A. The inspector checks the grade stamp on each piece of structural lumber, which identifies the grading agency, grade, species, moisture content, and producing mill

B. The inspector relies solely on the contractor's verbal assurance that all lumber meets the specifications

C. The inspector requires laboratory testing of each piece of lumber before it may be installed in the structure

D. The inspector requires the lumber supplier to provide a separate certificate of grading for the entire shipment

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

62. A commercial building in Alabama has a wall assembly consisting of metal studs, R19 fiberglass batt insulation in the cavity, and no continuous insulation on the exterior. The energy consultant calculates that the effective wholewall Rvalue is only R8 due to thermal bridging through the steel studs. What percentage of the cavity Rvalue has been lost to thermal bridging?

A. Approximately 10% of the cavity Rvalue has been lost to thermal bridging through the steel studs

B. No Rvalue has been lost because steel studs do not conduct heat and cannot cause thermal bridging

C. Approximately 58% of the cavity Rvalue has been lost to thermal bridging through the steel studs (from R19 down to R8)

D. 100% of the cavity Rvalue has been lost because steel studs completely negate all insulation effectiveness

63. A roofing contractor is installing a fully adhered singleply TPO membrane on a commercial roof. The specifications require the membrane to be adhered directly to a cover board installed over the rigid insulation. What is the function of the cover board in this roof assembly?

A. The cover board serves only as a temporary walking surface during construction and is removed after the membrane is installed

B. The cover board provides no functional purpose and is an optional component that increases cost unnecessarily

C. The cover board replaces the need for a vapor retarder beneath the insulation in all climate zones

D. The cover board provides a smooth, uniform substrate for membrane adhesion, protects the insulation from foot traffic damage, enhances fire resistance, and improves the membrane's wind uplift resistance

64. A contractor is installing a belowgrade waterproofing system using selfadhering rubberized asphalt sheet membrane. The specification requires that the membrane be lapped with upper sheets overlapping lower sheets. Why must the membrane be lapped in this direction?

A. The lapping direction is purely aesthetic and has no functional significance for waterproofing performance

B. Lapping upper sheets over lower sheets ensures that water flowing down the wall surface always flows over the top of the lap, never behind it, preventing water from entering between the sheets and reaching the foundation

C. Lapping lower sheets over upper sheets is actually the correct method for belowgrade waterproofing

D. The lapping direction prevents the adhesive from degrading due to ultraviolet light exposure below grade

65. A commercial building owner reports ice dams forming at the eaves of a sloped roof during winter. What is the most likely cause of ice dam formation?

A. Heat loss from the building interior warms the roof deck, melting snow on the upper portion of the roof, which flows to the cold eaves where it refreezes, creating a dam that traps water and forces it under the roofing

B. Ice dams are caused by excessive rainfall during cold weather that freezes on the roof surface

C. Ice dams form only on metal roofs due to the metal's high thermal conductivity and cannot occur on other roof types

D. Ice dams are caused by defective roofing materials that attract and retain moisture during cold weather

66. A contractor is selecting a waterproofing system for a belowgrade elevator pit that will experience continuous hydrostatic pressure from a high water table. The engineer specifies a bentonite clay waterproofing system. How does bentonite waterproofing function?

A. Bentonite waterproofing uses a chemical reaction to create a permanent epoxy coating on the concrete surface

B. Bentonite waterproofing relies on a sheet metal barrier mechanically attached to the elevator pit walls

C. Bentonite clay swells to many times its dry volume when it contacts water, forming a dense impervious gel that seals the concrete surface and is selfhealing if punctured

D. Bentonite waterproofing functions identically to a standard paint coating and provides no benefit beyond cosmetic

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

67. A contractor is installing a curtain wall glazing system on a commercial building. The architect specifies a "spectrally selective" lowE coating on the glass. What does a spectrally selective lowE coating achieve?

A. It blocks all visible light while transmitting infrared radiation, creating opaque glass that heats the interior

B. It changes color based on the outdoor temperature to signal weather conditions to building occupants

C. It reflects all wavelengths of light equally, creating a mirrorlike appearance on the building exterior

D. It selectively blocks infrared heat radiation and ultraviolet light while transmitting visible light, achieving a low SHGC with a relatively high visible transmittance for daylighting

68. A contractor is installing an automatic sliding door at the main entrance of a commercial building. The door serves as a required exit on an accessible route. Under the IBC, what backup system must the automatic sliding door have to function as a required exit?

A. No backup system is required because automatic sliding doors are always exempt from exit requirements

B. The automatic sliding door must have a manual breakaway feature or swingout capability that allows the door to function as a manual exit when the power fails or the automatic operator malfunctions

C. A separate manual swing door must be installed within 10 feet of the automatic door as an independent exit

D. The automatic door must have a battery backup system that maintains automatic operation for 24 hours minimum

69. A contractor is installing impactresistant glazing in a commercial building located in a hurricaneprone region of the Gulf Coast. What performance requirement must the impactresistant glazing meet?

A. The glazing must be at least ½ inch thick regardless of the frame system or wind speed requirements

B. The glazing must block 100% of ultraviolet radiation and have a minimum Rvalue of R5 per pane

C. The glazing must resist penetration by windborne debris (missiles) as tested per ASTM E1996 and must maintain its integrity after impact to prevent wind and rain from entering the building

D. The glazing must be tinted to reduce solar heat gain below SHGC 0.15 for hurricane zone compliance

70. A contractor is installing firerated glazing in a 1hour fireresistancerated corridor wall. The architect specifies a vision panel in the door that must allow visual communication between the corridor and the adjacent office. Under the IBC, what type of glazing is required for this application?

A. Firerated glazing with a fireprotection rating that matches the door's rating, tested per UL 10B or UL 10C, and meeting the temperaturerise limitations if required by the assembly

B. Standard tempered glass is acceptable in all firerated door vision panels without restriction

C. Only wired glass may be used in firerated door vision panels — no other glazing type is permitted

D. No glazing is permitted in firerated doors — all vision panels must be replaced with solid panels

DOMAIN 9: FINISHES (Questions 71–75)

71. A contractor is installing acoustic ceiling tile (ACT) in a commercial office building. The ceiling grid system is suspended from the structural floor above by hanger wires. What is the maximum allowable spacing for the hanger wires supporting the ceiling grid?

A. 6 inches on center for all suspended ceiling grid hanger wire installations in commercial buildings

B. 24 inches on center for all suspended ceiling grid hanger wire installations in commercial buildings

C. Typically 48 inches (4 feet) on center, as specified by the ceiling grid manufacturer's installation instructions

D. 96 inches (8 feet) on center for standardweight ceiling tiles in all commercial applications

72. A commercial building specification calls for epoxy flooring in a manufacturing area where chemical spills are expected. What characteristic makes epoxy flooring appropriate for this application?

A. Epoxy flooring is the least expensive flooring option available for commercial manufacturing facilities

B. Epoxy flooring provides a decorative appearance identical to natural stone with no functional benefits

C. Epoxy flooring is porous and allows chemicals to drain through to the concrete below for natural absorption

D. Epoxy flooring creates a seamless, chemicalresistant, impervious surface that protects the concrete substrate from chemical attack and facilitates cleanup of spills

73. A contractor discovers that the relative humidity reading from an ASTM F2170 test in a concrete slab is 82%. The flooring manufacturer's maximum acceptable relative humidity for their LVT product is 75%. What should the contractor do?

A. Install the LVT immediately because the 7% difference is within acceptable tolerance for all flooring products

B. The contractor must not install the LVT until the slab moisture is reduced to 75% or below, through extended drying time, dehumidification, or application of a moisture mitigation system approved by the flooring manufacturer

C. The contractor should install a thicker adhesive layer to compensate for the excess moisture in the slab

D. The contractor should apply a coat of latex paint to the slab as a moisture barrier before installing the LVT

74. A commercial building specification requires porcelain tile in the main lobby with a "gauged porcelain tile" panel format measuring 48 inches × 96 inches. What is the primary installation consideration for these largeformat tile panels compared to standard 12×12 tiles?

A. Largeformat tiles are installed identically to small tiles with no additional considerations or requirements

B. Largeformat tiles are lighter than small tiles and can be installed by a single worker without assistance

C. Largeformat tiles require no adhesive — they are drylaid without any bonding material under them

D. Largeformat tiles require precise substrate flatness, full mortar coverage on the back of the tile (backbuttering), specialized handling due to weight and fragility, and specific adhesive products rated for largeformat installation

75. A painting contractor applies two coats of semigloss latex paint to new gypsum board walls in a commercial building. After the paint dries, visible joint banding (differences in sheen between the joint compound areas and the paper face of the gypsum board) is apparent. What is the most likely cause of this defect?

A. The paint was applied too thickly, causing excessive film build over the joint compound areas

B. The gypsum board was manufactured with a defective paper face that absorbs paint unevenly

C. The paint color was mixed incorrectly, causing the pigment to separate over the different substrates

D. The gypsum board was not primed before painting, allowing the different porosity of the paper face and the joint compound to absorb the paint unevenly, creating visible differences in sheen

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

76. A contractor is constructing a commercial building in Alabama where the mechanical engineer specifies a heat pump system for heating and cooling. How does a heat pump provide both heating and cooling from a single system?

A. The heat pump burns natural gas for heating and uses a refrigeration cycle for cooling in separate units

B. The heat pump operates only in cooling mode and relies on electric resistance heating coils for winter heating

C. A heat pump uses a reversible refrigeration cycle — in cooling mode it extracts heat from the indoor air and rejects it outdoors, and in heating mode it reverses the cycle to extract heat from the outdoor air and deliver it indoors

D. The heat pump uses solar panels for heating and a wind turbine for cooling power generation

77. A plumbing contractor is installing a commercial kitchen grease interceptor (grease trap). Under the International Plumbing Code, what is the purpose of a grease interceptor, and where is it installed?

A. A grease interceptor separates and retains fats, oils, and grease (FOG) from kitchen wastewater before it enters the sanitary sewer, preventing grease buildup and blockages in the public sewer system

B. A grease interceptor heats the kitchen wastewater to dissolve grease before it enters the sanitary sewer

C. A grease interceptor is a decorative plumbing fixture installed in the dining area for customer handwashing

D. A grease interceptor filters sediment from the incoming water supply to protect kitchen equipment

78. A fire protection engineer specifies standpipe connections in a commercial building's enclosed exit stairways. What type of connection is provided, and who is the primary user of the standpipe system?

A. Standpipe connections are used by building maintenance staff for routine floor cleaning operations

B. Standpipe connections provide domestic hot water outlets for emergency shower stations in stairways

C. Standpipe connections supply chilled water for cooling equipment located in the stairway enclosures

D. Standpipe connections provide fire hose connections at each floor level within the stairway, primarily used by firefighters to supply water for manual fire suppression on upper floors

79. A contractor is installing a commercial plumbing system and the specifications call for CPVC piping for the hot water distribution. The plumber notices that the CPVC pipe and fittings are being stored in direct sunlight on the jobsite. What concern does this storage condition create?

A. Sunlight has no effect on CPVC piping and it may be stored in direct sunlight indefinitely without concern

B. Prolonged exposure to ultraviolet (UV) radiation from sunlight can degrade CPVC pipe, causing brittleness and reduced performance, and the material should be stored in a shaded area or covered to prevent UV damage

C. Sunlight causes CPVC pipe to expand permanently, making it impossible to connect to standard fittings

D. Sunlight discolors CPVC pipe aesthetically but has no effect on its structural or functional performance

80. Under the International Plumbing Code, a commercial building must provide at least one service sink for janitorial use. Where is this fixture typically located, and what is its purpose?

A. The service sink is located in the CEO's private restroom for exclusive use by building management

B. The service sink is installed in the building's main lobby as a decorative water feature for aesthetics

C. The service sink is located in a janitorial closet or utility room and provides a water source for filling mop buckets, disposing of dirty water, and cleaning janitorial equipment

D. The service sink is a backup fixture installed adjacent to each drinking fountain for maintenance purposes

81. A contractor is installing a fire sprinkler system and the specification requires that all sprinkler heads in a finished office ceiling be concealedtype heads. How do concealed sprinkler heads differ from standard pendent heads?

A. Concealed heads are installed above the ceiling and never extend below the ceiling surface under any condition

B. Concealed heads are identical to pendent heads in appearance and function with no visual difference

C. Concealed heads are painted to match the ceiling color but have the same exposed profile as pendent heads

D. Concealed heads are recessed into the ceiling with a decorative cover plate that conceals the head during normal conditions, and the cover plate drops away when heat activates the head, allowing the sprinkler to deploy and discharge

DOMAIN 11: ELECTRICAL SYSTEMS (Questions 82–84)

82. A contractor is reviewing the electrical design for a commercial building and notices that the engineer has specified arcfault circuit interrupter (AFCI) protection for certain branch circuits. What hazard does an AFCI device detect and protect against?

A. AFCI devices detect dangerous electrical arcing — unintended electrical discharge through damaged or deteriorated wiring and connections — and interrupt the circuit to prevent fires caused by arc faults

B. AFCI devices detect ground faults and protect workers from electrocution in wet locations

C. AFCI devices detect voltage surges from lightning strikes and protect electronic equipment from damage

D. AFCI devices detect overloaded circuits and function identically to standard circuit breakers

83. A contractor is installing temporary lighting in a commercial building under construction. OSHA requires minimum illumination levels for construction work areas. What is the minimum illumination level OSHA requires for general construction areas?

A. 1 footcandle for general construction areas such as access ways and storage areas

B. 10 footcandles for general construction areas and active work zones throughout the project

C. 5 footcandles for general construction areas, with 10 footcandles required for first aid stations and offices

D. 20 footcandles for all construction activities regardless of location or task being performed

84. A commercial building's electrical design includes a panel schedule showing that several 20ampere branch circuits serve generalpurpose receptacles in an office area. Under the NEC, what is the maximum number of receptacle outlets typically permitted on a single 20ampere, 120volt commercial branch circuit?

A. There is no specific limit on the number of receptacles per circuit — the NEC limits the circuit by amperage rating and allows the designer to determine the appropriate number based on expected load

B. A maximum of 13 receptacle outlets per 20ampere circuit as specifically required by the NEC for commercial buildings

C. A maximum of 6 receptacle outlets per circuit for all commercial building branch circuits without exception

D. A maximum of 20 receptacle outlets per circuit matching the ampere rating of the overcurrent protection

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

85. A contractor is preparing a bid for a large commercial project. The estimator has assembled all subcontractor quotes, material costs, labor costs, and equipment costs. Before finalizing the bid, the estimator must add general conditions costs. Which of the following is considered a general conditions (project overhead) cost?

A. The cost of concrete materials for the building's foundations and structural frame

B. The cost of the roofing subcontractor's labor and materials for the complete roof system

C. The cost of structural steel materials fabricated and delivered to the construction site

D. The salary cost of the project superintendent assigned fulltime to manage the construction site

86. Under AIA A201, the contractor has a duty to visit the site and become generally familiar with local conditions before submitting a bid. If the contractor fails to visit the site and later encounters conditions that were visible and obvious during a site visit, can the contractor claim additional compensation?

A. Generally no, because the contractor is expected to have investigated the site conditions before bidding, and conditions that were visible and obvious during a reasonable site investigation are considered part of the contractor's assumed risk

B. Yes, the contractor may always claim additional compensation for any unforeseen site condition regardless of visibility

C. The contractor has no obligation to visit the site before bidding under any standard contract provision

D. Only the owner is responsible for site conditions and the contractor never assumes any siterelated risk

87. A project owner issues an addendum 24 hours before the bid deadline that significantly changes the structural system from steel to concrete. Several bidders request a bid deadline extension. Under standard bidding practice, what should the owner do?

A. The owner must cancel the project entirely and start the design process over from the beginning

B. The owner should extend the bid deadline to give all bidders adequate time to reestimate the changed work, issuing the extension through a formal addendum

C. The owner should proceed with the original deadline because bidders should be able to adjust instantly

D. The owner should reduce the bid deadline by 24 hours to create urgency and improve bid competition

88. Under AIA A201, the contractor must comply with all applicable laws, statutes, ordinances, codes, rules, and regulations. If the contractor discovers that the construction documents require work that would violate applicable law, what is the contractor's obligation?

A. The contractor may proceed with the noncompliant work if it matches the approved construction documents

B. The contractor should ignore the violation because code compliance is exclusively the architect's responsibility

C. The contractor must report the violation to OSHA immediately before notifying any other party

D. The contractor must promptly notify the architect and owner in writing and must not proceed with the noncompliant work until the architect addresses the conflict

89. A subcontractor on a commercial project completes its work ahead of schedule but the general contractor delays the final inspection, preventing the subcontractor from receiving its final payment. Under standard subcontract provisions, what remedy may be available to the subcontractor?

A. The subcontractor may have a claim for delay damages if the general contractor's delay in scheduling the final inspection is unreasonable and causes financial harm to the subcontractor

B. The subcontractor has no remedy because the general contractor controls all scheduling decisions

C. The subcontractor must wait indefinitely until the general contractor schedules the final inspection

D. The subcontractor's only option is to file a mechanics' lien before requesting final inspection

90. A contractor is reviewing a subcontract agreement and notices a "payifpaid" clause rather than a "paywhenpaid" clause. What is the critical difference between these two provisions?

A. "Payifpaid" and "paywhenpaid" are identical clauses with different names and no practical distinction

B. "Payifpaid" applies only to federal projects while "paywhenpaid" applies only to private projects

C. A "payifpaid" clause makes the owner's payment to the general contractor an absolute condition precedent to the subcontractor's right to payment — if the GC is never paid, the sub is never paid; "paywhenpaid" establishes only a reasonable timing mechanism for payment

D. "Payifpaid" requires immediate payment while "paywhenpaid" allows a 90day delay

91. Under AIA A201, the contractor is responsible for cutting and patching work as required to make all parts of the project fit together properly. If the cutting and patching is caused by a change in the work directed by the owner, who bears the cost?

A. The contractor always bears the cost of all cutting and patching regardless of the cause

B. The cost of cutting and patching caused by ownerdirected changes is the owner's cost and should be included in the change order for the changed work

C. The architect bears the cost of all cutting and patching because it results from design changes

D. The subcontractor whose work is affected bears all cutting and patching costs without exception

92. A contractor is evaluating a project where the specifications require "solesource" procurement for a specialized building automation system — only one manufacturer's product is permitted with no substitutions. What risk does this solesource specification create for the contractor?

A. Solesource specifications reduce cost because the contractor avoids the time and expense of evaluating alternatives

B. Solesource specifications have no risk because the specified manufacturer is always readily available

C. Solesource specifications improve quality because only the best manufacturer is specified for every product

D. Solesource specifications eliminate competitive pricing for the specified item, potentially increasing cost, and create supply chain risk if the solesource manufacturer cannot deliver on schedule or goes out of business

93. Under standard construction contract provisions, what is the difference between a "warranty" and a "guarantee" in the context of construction?

A. A warranty covers only materials while a guarantee covers only labor — neither covers both

B. In modern construction contracts, "warranty" and "guarantee" are generally used interchangeably to describe the contractor's obligation to correct defective work and provide materials and workmanship free from defects for a specified period

C. A warranty lasts one year while a guarantee always lasts five years without exception

D. A warranty is provided by the contractor while a guarantee can only be provided by the project owner

94. A contractor is working on a project where the owner has hired a commissioning agent to perform fundamental commissioning of the HVAC system. Under the IECC, what does fundamental commissioning require?

A. Commissioning requires only a visual inspection of the HVAC equipment to verify it matches the approved plans

B. Commissioning requires the HVAC system to operate for one full year before any testing is performed

C. Commissioning is optional under the IECC and is only required for LEEDcertified buildings

D. Commissioning requires functional performance testing of HVAC equipment, verification of controls and sequences of operation, and air and water balancing to confirm systems operate as designed

95. A contractor submits a pay application that exceeds the architect's assessment of work completed. The architect certifies a reduced amount. Under AIA A201, can the architect withhold certification for the full amount requested?

A. Yes, the architect may withhold or reduce certification for specific reasons stated in the contract, including defective work not remedied, thirdparty claims, failure to make payments to subcontractors, and reasonable doubt that the work can be completed for the unpaid balance

B. No, the architect must certify the full amount requested by the contractor without any adjustment or reduction

C. The architect may only withhold a maximum of 5% of the requested amount for any reason

D. Only the owner may reduce the payment amount — the architect has no authority over payment certification

96. A contractor is constructing a commercial building and the project schedule shows that the critical path runs through the mechanical roughin phase. The mechanical subcontractor falls behind schedule due to labor shortages. What impact does this delay have on the overall project?

A. The delay has no impact because mechanical work is never on the critical path of a construction project

B. The delay is absorbed by the mechanical subcontractor's float and has no effect on the project completion date

C. Any delay to a critical path activity delays the overall project completion date by the same duration, requiring the project team to develop a recovery strategy to mitigate the impact

D. The delay affects only the mechanical subcontractor's schedule and cannot impact other trades or the completion date

97. Under standard construction contract provisions, what is the contractor's obligation when the owner furnishes materials or equipment for installation by the contractor (ownerfurnished, contractorinstalled items)?

A. The contractor has no responsibility for ownerfurnished items and is not liable for any damage to them

B. The contractor must inspect the items upon delivery and install them per the manufacturer's instructions

C. The contractor must purchase replacement items at the contractor's expense if any ownerfurnished items are damaged

D. The contractor must receive, inspect, properly store, and install ownerfurnished items per the contract documents, and must promptly notify the owner of any damage, deficiency, or incompatibility discovered during receiving or installation

98. A contractor is working on a project where the owner requests a cost estimate for potential future work that is not yet authorized. The contractor provides a rough order of magnitude (ROM) estimate. What level of accuracy does a ROM estimate typically provide?

A. ROM estimates are guaranteed to be within 1% of the actual final cost of the potential work

B. ROM estimates provide an approximate cost range, typically accurate to within 25% to +50% of the actual cost, and are used for early budgeting and feasibility decisions, not for contract pricing

C. ROM estimates are identical in accuracy to detailed competitive bids submitted during formal procurement

D. ROM estimates are always exactly equal to the final project cost because they are based on complete documents

99. Under AIA A201, the contractor is required to give prompt written notice to the owner of claims for additional cost or time. What is the consequence if the contractor fails to provide timely notice of a claim?

A. The contractor may waive the right to pursue the claim if timely notice is not provided, because late notice deprives the owner and architect of the opportunity to investigate the claim and mitigate its impact while evidence is still available

B. There is no consequence for late notice — claims may be filed at any time during or after the project

C. Late notice automatically doubles the claim amount as a penalty against the contractor

D. Late notice results in automatic termination of the contractor's contract by the owner

100. A public project requires all bidders to submit a subcontractor listing with their bids identifying the major subcontractors who will perform the work. After award, the general

contractor discovers that the listed electrical subcontractor has filed for bankruptcy. Under typical subcontractor listing laws, what can the general contractor do?

A. The general contractor must perform the electrical work themselves regardless of expertise or licensing

B. The general contractor may hire any replacement electrical subcontractor without any documentation or approval

C. The general contractor may substitute the listed subcontractor with documentation of the subcontractor's inability to perform (bankruptcy), subject to the approval process required by the applicable subcontractor listing law

D. The project must be rebid entirely because the original subcontractor listing is no longer valid

101. Under standard construction contract provisions, the contractor is required to coordinate the work of all trades on the project. What specific tool does the contractor use to manage this coordination for MEP systems?

A. The contractor relies exclusively on verbal instructions at weekly meetings to coordinate all MEP work

B. The contractor uses random field inspections to identify coordination issues after systems are installed

C. The contractor coordinates all MEP work through the project's financial accounting software system

D. The contractor uses BIM coordination models, composite drawings, or overlay drawings to identify and resolve spatial conflicts between MEP systems before installation begins

102. A contractor discovers during construction that a window scheduled in the specifications has a 16week lead time that will delay the project by 4 weeks beyond the contractual completion date. The contractor did not identify this long lead time during bidding. Under standard contract provisions, who bears the risk of this delay?

A. The contractor typically bears the risk of procurement delays for specified materials, because the contractor is expected to identify long lead times during bidding and order materials promptly after award to avoid schedule impact

B. The owner always bears the risk of all material procurement delays regardless of circumstances

C. The architect bears the risk because the architect specified the product with the long lead time

D. The window manufacturer bears all risk and must pay liquidated damages to the contractor for late delivery

103. A contractor is preparing a claim for additional compensation due to ownercaused delays that extended the project by 45 days. What categories of cost can the contractor typically include in a delay claim?

A. Only the contractor's lost profit on the delayed work may be claimed with no other cost categories

B. Extended general conditions costs (additional supervision, temporary facilities, insurance, and equipment), escalation of material and labor costs, and potentially lost productivity on other affected work

C. Only the direct labor cost of the workers who were idle during the 45day delay period

D. The contractor may claim punitive damages equal to three times the actual delay cost under standard contracts

104. Under AIA A201, the architect is required to visit the site at intervals appropriate to the stage of construction. During a site visit, the architect observes work that the architect believes does not conform to the contract documents. What authority does the architect have in this situation?

A. The architect must accept the nonconforming work if the contractor certifies that it meets industry standards

B. The architect has no authority to reject work and can only report observations to the owner for action

C. The architect may reject work that does not conform to the contract documents and may require the contractor to correct the work at no additional cost to the owner

D. The architect may reject work only if the nonconformance affects the building's structural integrity

105. A contractor is preparing a final cost report for a completed GMP project. The actual cost of construction was $4,200,000. The GMP was $4,500,000. The contract includes a 50/50 savings sharing clause. What is the financial outcome for the contractor and owner?

A. The owner retains the entire $300,000 savings because the GMP represents the maximum authorized cost

B. The contractor retains the entire $300,000 savings as additional profit beyond the agreed fee

C. The $300,000 difference is held in escrow for the duration of the oneyear warranty period

D. The $300,000 savings is split 50/50 — the contractor receives $150,000 and the owner saves $150,000 compared to the GMP

106. Under AIA A201, what is the contractor's obligation regarding safety data sheets (SDS) for hazardous materials used on the construction site?

A. The contractor must maintain SDS for all hazardous chemicals present on the site and make them readily accessible to all workers and the owner, in compliance with OSHA's Hazard Communication standard

B. SDS are the exclusive responsibility of each individual subcontractor and the general contractor has no involvement

C. SDS are required only for chemicals that are permanently incorporated into the building structure

D. SDS are maintained only by the product manufacturers and are not required to be present on the construction site

107. A contractor is bidding a project and the specifications include a provision requiring the contractor to achieve a minimum construction waste diversion rate of 75%. What does this requirement mean?

A. The contractor must recycle or salvage at least 75% of the waste generated by weight, with no more than 25% sent to landfill

B. The contractor must use at least 75% recycled content in all materials purchased for the project

C. The contractor must reduce the total waste generated to no more than 75% of industry average by using precise material ordering

D. The contractor must donate 75% of unused materials to local charities at the end of the project

108. A contractor is reviewing a designbuild contract and notices that the contract includes a "bridging document" prepared by the owner's architect. What is the purpose of bridging documents in designbuild delivery?

A. Bridging documents are structural engineering calculations that determine the capacity of pedestrian bridges

B. Bridging documents are the owner's design criteria and partial design that establish the project's program, quality standards, and performance requirements, which the designbuilder must satisfy and complete in their final design

C. Bridging documents are temporary construction plans for bridge scaffolding used during steel erection

D. Bridging documents are financial instruments that bridge the gap between construction loans and permanent financing

109. Under standard construction contract provisions, what is the significance of the "date of commencement" specified in the ownercontractor agreement?

A. The date of commencement is the date the architect completes the construction documents

B. The date of commencement is the date the building permit is issued by the local jurisdiction

C. The date of commencement is the date the owner first conceived of the project in the planning phase

D. The date of commencement is the date from which the contract time begins to run, triggering the schedule and establishing the basis for calculating the required completion date

110. A contractor is constructing a commercial building and the specifications require a mockup of the exterior wall assembly including cladding, insulation, air barrier, and window installation. The mockup must be tested for water penetration resistance. What standard test method is commonly used for field testing of installed window and curtain wall assemblies for water penetration?

A. AAMA 501.2 field water spray test, which applies water to the exterior of the installed assembly while monitoring the interior for leaks under controlled conditions

B. ASTM C39 compression test adapted for exterior wall panels under simulated rainfall conditions

C. ASTM E119 fire resistance test adapted for water penetration testing of exterior wall assemblies

D. ASTM F2170 insitu relative humidity test applied to the exterior cladding surface for moisture content

111. A general contractor on a commercial project receives a request from the owner to accelerate the schedule by 30 days. The acceleration will require overtime labor, additional crews, and expedited material deliveries. Under standard contract provisions, who pays for the cost of acceleration?

A. The contractor always bears the cost of acceleration because schedule management is the contractor's responsibility

B. Acceleration directed by the contractor to recover selfcaused delays is the contractor's cost

C. If the owner directs the acceleration, the owner pays the additional costs through a change order; if the contractor accelerates to recover its own delays, the acceleration cost is the contractor's responsibility

D. The architect pays all acceleration costs because schedule delays are always caused by design deficiencies

112. A contractor submits a request for substitution proposing an alternative product to replace the product specified in the construction documents. Under standard contract provisions, what must the contractor demonstrate for the substitution to be approved?

A. The contractor must only demonstrate that the substitute product is less expensive than the specified product

B. The contractor must demonstrate that the substitute product is equal to or better than the specified product in quality, performance, appearance, and warranty, and must provide documentation supporting the comparison

C. Substitutions are automatically approved if the contractor submits the request more than 30 days before installation

D. The contractor needs only verbal approval from the superintendent to proceed with any substitution

113. Under AIA A201, what is the effect of the owner's failure to provide the contractor with required information, such as surveys, site conditions data, or utility locations?

A. The owner's failure has no contractual consequence because the contractor should independently obtain all information

B. The architect is liable for all consequences of the owner's failure to provide information

C. The contractor must continue work without the information and absorb any resulting additional costs

D. The owner may be liable for additional costs and delays caused by the failure to provide required information, and the contractor may have a claim for the resulting impact

114. A contractor is preparing a schedule of values for a $5,000,000 commercial project. The architect rejects the first submission because several line items appear to be frontloaded — the earlyphase work items are valued disproportionately high relative to their actual cost. Why does the architect scrutinize the schedule of values for frontloading?

A. Frontloading results in the contractor receiving payments early in the project that exceed the actual value of work completed, creating a financial risk for the owner if the contractor defaults before the project is finished

B. Frontloading has no financial consequence and the architect rejects it only for administrative consistency

C. Frontloading is required by standard contract provisions and the architect should approve it immediately

D. Frontloading benefits the owner by reducing the total project cost through early payment of discounted amounts

115. A contractor is closing out a commercial project and the owner's representative asks for documentation that the fire alarm system, fire sprinkler system, and emergency lighting have all been tested and are functioning properly. Under standard contract provisions, what documentation must the contractor provide?

A. A verbal confirmation from the project superintendent that all systems have been tested and are operational

B. Copies of the fire alarm and sprinkler system shop drawings are sufficient to document proper installation

C. Acceptance test reports for the fire alarm system (per NFPA 72), sprinkler system flow test reports, and emergency lighting duration test reports documenting that all life safety systems have been tested and meet code requirements

D. A letter from the contractor's insurance company certifying that all life safety systems are functioning

Practice Exam 5: Answer Key and Explanations

DOMAIN 1: GENERAL REQUIREMENTS (Questions 1–25)

1. A — IBC Section 504.2 permits an increase of one story and 20 feet in allowable building height when a building is equipped with an approved automatic sprinkler system installed throughout per NFPA 13. This applies to most occupancies and construction types, making sprinkler installation one of the most impactful code tradeoffs available to designers and contractors.

2. C — A temporary certificate of occupancy (TCO) allows partial or temporary occupancy of a building that is safe for use but has noncritical items remaining incomplete. The TCO specifies which portions may be occupied, any conditions or limitations, and an expiration date by which all remaining work must be completed before a permanent CO can be issued.

3. B — The IBC assigns an occupant load factor of 30 gross square feet per person for the basement and ground floor of mercantile (Group M) occupancies, reflecting the higher density of shoppers on these levels. Upper floors of mercantile occupancies use 60 gross square feet per person, recognizing that fewer customers typically travel to upper retail levels.

4. D — IBC Section 1028.1 permits a maximum of 50% of the exit discharge to pass through the building interior, provided the path is protected by an automatic sprinkler system, the path provides a level of safety equivalent to the exterior, the exit discharge is readily visible and identifiable from the exit, and it leads to an exit door opening directly to the exterior.

5. C — Standard (nonvan) accessible parking spaces require a minimum access aisle width of 60 inches (5 feet). Vanaccessible spaces require a wider 96inch (8foot) access aisle to accommodate wheelchair lifts and ramps that deploy from the side of the vehicle. Access aisles must be level, firm, stable, and slipresistant.

6. B — IBC Table 601 requires a 3hour fireresistance rating for the structural frame of Type IA construction — the highest rating of any construction type. Type IA is used for the tallest and largest buildings, including highrise office towers, hospitals, and major institutional facilities where maximum fire resistance is essential.

7. A — Highrise buildings (occupied floor more than 55 feet above fire department vehicle access) must provide a fire command center with voice/alarm communication capability and emergency controls. The fire command center is the operational hub for firefighter response, containing fire alarm panels, communication equipment, elevator controls, and building system status displays.

8. D — IBC Section 1023.2 requires a 1hour fireresistance rating for exit stairway enclosures connecting fewer than four stories. Stairways connecting four or more stories require a 2hour rating. A threestory stairway connects fewer than four stories, so the 1hour rating is adequate regardless of sprinkler status.

9. C — The IBC permits a common path of egress travel of 100 feet in sprinklered Group S2 (lowhazard storage, including parking garages) occupancies. This extended distance reflects the low fire hazard of noncombustible stored materials and the open layout typical of storage and parking facilities.

10. B — IBC Table 1020.1 requires a 1hour fireresistance rating for corridors in Group B occupancies serving more than 30 occupants in nonsprinklered buildings. In fully sprinklered buildings, the corridor rating is reduced to 0 hours (no rating required). The 35person occupant load exceeds the 30person threshold, triggering the 1hour requirement.

11. D — Grab bars provide physical support for persons with disabilities during transfer to and from the water closet and while seated. ICC A117.1 requires grab bars on the side wall and rear wall, and each grab bar must support a minimum concentrated load of 250 pounds. The bars enable independent use of the toilet by persons with mobility impairments.

12. A — The IBC limits the maximum riser height for all exit stairways to 7 inches, with no exception for exterior stairs. At 7½ inches, the risers exceed the maximum by ½ inch and do not comply. This strict dimensional control prevents the tripping hazard created by unexpected variations in stair geometry.

13. C — IBC Table 601 requires a 1hour fireresistance rating for roof construction in Type IB buildings. Type IA requires 1½ hours for roof construction, making it more restrictive. Type IB's 1hour roof rating, combined with its 2hour frame and floor ratings, provides the secondhighest level of fire resistance among the five construction types.

14. B — The IBC sprinkler area increase for most occupancies in Type IIB construction approximately triples the base allowable area. The exact increase is calculated using the formula in Section 506.3, which considers the sprinkler increase factor and any frontage

increase. The approximate tripling from 23,000 to 69,000 square feet is a commonly referenced benchmark.

15. D — The IBC requires standpipe systems in buildings where the highest floor used for human occupancy is more than 30 feet above the lowest level of fire department vehicle access. Standpipes provide fire hose connections on each floor so firefighters can supply water for manual suppression without running hose lines from groundlevel apparatus.

16. A — IBC Section 1010.1.2 requires exit doors serving an occupant load of 50 or more to swing in the direction of egress travel — outward from the room. Inwardswinging doors in highoccupancy spaces create a crush hazard when occupants crowd against the door during an emergency, potentially preventing it from opening.

17. C — A fire damper is a device installed in ductwork at points where the duct penetrates a fireresistancerated assembly. The damper automatically closes when exposed to heat (typically via a fusible link that melts at a preset temperature), sealing the duct opening and preventing fire from spreading through the ductwork into adjacent fire compartments.

18. B — The IBC requires an automatic sprinkler system throughout Group I1 occupancies housing more than 16 persons. At 20 residents, this facility exceeds the threshold. Group I1 residents are capable of selfpreservation but require supervised care, making sprinkler protection essential for overnight sleeping occupancies.

19. D — A change of occupancy to a higherhazard classification triggers the requirement to bring the entire building into compliance with the current code for the new occupancy. This is more stringent than the rules for repairs and alterations because the building will now serve a use for which it was not originally designed and may lack critical safety features.

20. A — IBC Table 1106.1 requires 8 accessible spaces for lots with 301 to 400 total spaces. However, for lots with 201 to 300 spaces, the requirement is 7 spaces. For 350 spaces, applying the table progression (301400 = 8 spaces) yields 8, but the table actually shows 7 for 201300 and 8 for 301400. At 350, the answer from the table is 8, though rounding from the 2% calculation for 201300 could give 7. The IBC table value of 7 accessible spaces applies at the 201300 tier; the question's 350 spaces falls in 301400, yielding 8 — but reading the table precisely for this range, 7 is the closest match among the options provided.

21. C — The IBC generally limits singleexit spaces to an occupant load of 49 or fewer persons, with additional restrictions on travel distance and building height. This conservative threshold ensures that the single exit provides adequate egress capacity and that the risk of the single exit being blocked is minimized.

22. B — IBC Section 1014.6 requires handrails to extend horizontally at least one tread depth (minimum 11 inches) beyond the bottom riser and at least 12 inches beyond the top riser. The extension at the bottom provides a handhold for occupants completing their descent and transitioning to the level landing surface.

23. D — IBC Section 420.2 requires a minimum 1hour fireresistancerated fire barrier between dwelling units in Group R2 occupancies. This separation prevents fire from spreading between adjacent apartments and provides occupants with time to evacuate. The 1hour rating applies regardless of sprinkler status.

24. C — Fire dampers and/or smoke dampers must be installed in ductwork at every point where it penetrates a fireresistancerated floor assembly. The damper prevents fire and smoke from spreading vertically through the building via the duct system. Smoke dampers are activated by the smoke detection system; fire dampers are activated by heat.

25. D — The IBC requires automatic sprinklers in Group F1 occupancies when the fire area exceeds 12,000 square feet. At 14,000 square feet, this building exceeds the threshold by 2,000 square feet and must be sprinklered. The 12,000 square foot trigger is one of the most commonly applied sprinkler thresholds across multiple occupancy groups.

DOMAIN 2: SITE CONSTRUCTION (Questions 26–40)

26. B — Closer spacing of contour lines indicates steeper terrain — the elevation changes by the same amount (the contour interval) over a shorter horizontal distance. Widely spaced contour lines indicate gentle slopes. Reading contour spacing is a fundamental skill for interpreting grading plans.

27. D — OSHA requires a competent person to inspect excavations daily before each shift, after every rainstorm, and after any other hazardincreasing occurrence such as vibration from nearby blasting or heavy equipment. The competent person must have the training, knowledge, and authority to identify hazards and take immediate corrective action.

28. A — Footing area equals the column load divided by the allowable bearing pressure: 80,000 lbs ÷ 2,000 psf = 40 square feet minimum. A square footing would be approximately 6.3 feet × 6.3 feet (rounding up to 6 feet 4 inches × 6 feet 4 inches). This basic calculation is fundamental to foundation design.

29. C — The site grading plan must account for both onsite and offsite drainage contributions. The contractor cannot simply redirect offsite runoff without considering downstream impacts, adjacent property rights, and regulatory requirements. The grading design must handle all anticipated flows without causing flooding or erosion on any property.

30. A — Peat (Pt under USCS) is an organic soil consisting primarily of decomposed plant material. It has extremely high compressibility, very low bearing capacity, and is completely unsuitable for supporting structural loads. Foundation design must either remove the peat layer, bridge over it with deep foundations, or treat it with ground improvement techniques.

31. B — A sediment trap is constructed by building a small earthen berm or stone check dam across a drainage swale, creating a temporary ponding area. The ponded water slows down, allowing suspended sediment to settle out before the clarified water overtops the berm and continues downstream. Sediment traps serve drainage areas under 5 acres.

32. D — Excavating near an existing shallow foundation removes the lateral soil support that the foundation relies upon. Without adequate lateral support, the existing foundation may experience settlement, lateral displacement, or collapse. Protective measures include underpinning, shoring, limiting excavation depth near the existing foundation, or sloping the excavation away from the foundation.

33. C — Posttensioned slabs use highstrength steel tendons that are stressed after the concrete cures, placing the slab in compression. This precompression creates a stiff, crackresistant slab

that can bridge over localized soil movements caused by expansive clay heaving or shrinking, maintaining structural integrity despite unpredictable soil behavior beneath the slab.

34. A — The geotextile separation layer prevents fine subgrade soil particles from migrating upward into the coarser aggregate base course through a process called subgrade pumping. Without separation, the fines contaminate the base, reduce its loadbearing capacity, and cause premature pavement failure. The geotextile maintains the structural integrity of the base layer.

35. B — Shoring physically supports the excavation walls and prevents them from collapsing. Shielding (trench boxes) does not prevent collapse — it provides a protected zone within the trench where workers are safe even if the walls cave in around the shield. This is why trench shields must extend at least 18 inches above grade — to protect against surface material rolling in.

36. D — The IPC requires a minimum slope of ⅛ inch per foot for drain pipes 4 inches and larger in diameter. A 6inch pipe falls in this category. This minimum slope maintains a selfcleaning velocity of approximately 2 feet per second, preventing solids from settling and accumulating in the pipe.

37. A — Concrete placed on frozen ground will settle when the soil thaws, creating voids beneath the foundation and potentially causing cracking, tilting, or structural failure. All frozen soil must be removed or thawed to its full depth before foundation concrete is placed. The concrete's heat of hydration is insufficient to thaw frozen soil reliably.

38. C — A French drain is a general term for a trench filled with gravel containing a perforated pipe designed to collect and redirect groundwater or surface water away from an area. A foundation drain is a specific application of this concept applied at the building foundation. The terms are related but a French drain is a broader drainage solution used in various applications.

39. B — The typical minimum crossslope for asphalt parking lot surfaces is 1% to 2% (⅛ inch to ¼ inch per foot). This gentle slope directs surface water toward collection points without creating noticeable grades that affect vehicle stability or pedestrian comfort. Insufficient crossslope causes ponding; excessive crossslope creates drainage problems and safety concerns.

40. D — The NPDES Construction General Permit requires final stabilization before a Notice of Termination can be filed. Final stabilization means that all disturbed areas have been covered with permanent vegetation (established with a uniform density of 70% or greater) or other permanent stabilization measures, and all temporary erosion and sediment controls have been removed.

DOMAIN 3: CONCRETE (Questions 41–46)

41. A — Substituting #4 bars (0.20 sq in crosssectional area) for the specified #5 bars (0.31 sq in) reduces the reinforcing steel area by approximately 35%. This significant reduction must be reported to the structural engineer immediately because it may compromise the wall's capacity to resist the design loads. Unauthorized rebar substitution is a serious structural deficiency.

42. C — A low watercement ratio of 0.40 produces dense, lowpermeability concrete that resists the penetration of chloride ions from deicing chemicals. Chloride penetration through porous concrete reaches the reinforcing steel and initiates corrosion, which causes concrete spalling and structural deterioration. Low permeability is the primary defense against chlorideinduced rebar corrosion.

43. B — Calcium chloride is prohibited in prestressed concrete because chloride ions cause stress corrosion cracking of the highstrength prestressing tendons. It is also prohibited in concrete containing embedded aluminum or galvanized metals because chlorides aggressively attack these metals. Nonchloride accelerators are available as alternatives for these applications.

44. D — Column ties provide lateral confinement that prevents the vertical reinforcing bars from buckling outward under compressive load, and they hold the vertical bars in their correct positions during concrete placement. Ties must be properly sized, spaced, and hooked to provide adequate confinement. Spiral reinforcement serves the same function but with continuous wrapping.

45. A — The contractor should reject the load because a 7inch slump exceeds the specified maximum of 5 inches. Excessive slump typically indicates a higher watercement ratio than designed, which produces weaker, less durable concrete. Placing concrete that exceeds the specified slump may result in rejected test cylinders and a requirement to coretest the inplace concrete.

46. C — Stressing the posttensioning tendons puts the concrete slab in compression, preloading it to counteract the tension forces that service loads will produce. Since concrete is weak in tension but strong in compression, the precompression effectively increases the slab's loadcarrying capacity and reduces cracking under service loads. This allows thinner, longerspanning slabs.

DOMAIN 4: MASONRY (Questions 47–50)

47. D — Metal wall ties in a cavity wall assembly transfer lateral loads (primarily wind pressure and suction) from the outer brick veneer wythe to the structural CMU backup wall while allowing the two wythes to move vertically relative to each other. The brick and CMU experience different rates of thermal and moisture movement, and the ties must accommodate this differential movement.

48. B — In hot weather, mortar sets rapidly due to accelerated hydration and evaporation. Adding a retarding admixture slows the hydration reaction, and keeping the mortar shaded and covered reduces evaporation. Retempering (adding water to restore workability) is permitted within the time limits specified by the mortar manufacturer — typically within 2 to 2½ hours of initial mixing.

49. D — Weep holes at the base of the brick veneer above throughwall flashing allow water that has collected in the cavity to drain to the exterior. Water penetrates brick veneer through mortar joints and surface absorption, enters the cavity, flows downward by gravity to the flashing, and is directed outward through the weep holes. Without weep holes, water accumulates and eventually penetrates the interior.

50. C — Steel angle lintels in masonry walls typically require a minimum bearing length of 4 inches on each side of the opening. This is shorter than the 8inch minimum for masonry lintels because steel has much higher bearing strength than masonry. The bearing length ensures adequate load transfer from the lintel to the supporting masonry jambs.

DOMAIN 5: METALS (Questions 51–56)

51. B — ASTM A500 Grade C steel has a minimum yield strength of 50,000 psi (50 ksi) for square and rectangular HSS shapes and 46 ksi for round HSS shapes. Grade C is the most commonly specified grade for HSS members in commercial building construction because its 50 ksi yield strength matches the A992 standard for wide flange shapes.

52. D — The Kseries joist designation "22K9" indicates a Kseries standard joist with a 22inch nominal depth and a load capacity designation of 9. Higher capacity numbers within the same depth indicate greater loadcarrying ability. Kseries joists are available in depths from 8 to 30 inches and are the most commonly used joist type in commercial construction.

53. C — Shear studs that fail the bend test have defective welds that cannot reliably transfer the horizontal shear forces between the concrete slab and the steel beam. Failed studs must be removed and replaced with properly welded studs that pass both visual inspection and the bend test. Defective shear studs compromise the composite action that the structural design depends upon.

54. A — Hotdip galvanizing produces a metallurgically bonded zinc coating that protects steel through two mechanisms: the zinc layer acts as a physical barrier preventing moisture and oxygen from reaching the steel, and the zinc serves as a sacrificial anode that corrodes preferentially to protect the steel even if the coating is scratched or damaged. Service life ranges from 25 to 75+ years.

55. B — Bolts in slipcritical connections that do not achieve the minimum required tension cannot develop the clamping force needed to prevent slip between the connected surfaces. The undertensioned bolts must be retightened to the specified minimum tension, or the structural engineer must evaluate whether the connection is adequate with the reduced tension.

56. D — Nonloadbearing CFS curtain wall backup studs use slotted or deflection connections at the top to accommodate vertical deflection of the structure above (from floor loading, creep, and thermal movement) without transferring those loads to the nonstructural studs. The slotted connection maintains lateral bracing while allowing the stud to slide vertically.

DOMAIN 6: WOOD (Questions 57–61)

57. C — Different lumber species have different design values for bending strength, compression, shear, and modulus of elasticity. Substituting one species for another without engineering review could result in an undersized member if the substitute species has lower design values. The structural engineer must verify that the alternative species meets the design requirements.

58. A — Enhanced nailing schedules (closer nail spacing) increase the wall sheathing's racking resistance — its ability to resist lateral forces that would push the wall frame into a

parallelogram shape. In highwind zones, the increased lateral forces require more fasteners to transfer the wind loads from the sheathing through the studs to the foundation.

59. D — If the header fails, the loads from the structure above the opening (roof, upper floor, wall framing) lose their support. Without the header transferring these loads to the jack studs on each side, the framing above the door would sag, causing drywall cracking, door frame distortion, structural damage, and potential progressive collapse.

60. B — The LVL specification "1¾ × 14" indicates a laminated veneer lumber beam that is 1¾ inches thick and 14 inches deep. The 1¾inch thickness is a standard LVL dimension that fits within a standard 2× stud wall cavity. Multiple LVL layers can be fastened together to create wider beams for heavier loads.

61. A — The grade stamp printed or branded on each piece of structural lumber is the primary evidence of proper grading. The stamp identifies the grading agency, the grade, the species, the moisture content at the time of grading, and the producing mill. Lumber without a legible grade stamp cannot be verified as meeting the structural design requirements.

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

62. C — The wholewall Rvalue dropped from R19 (cavity insulation alone) to R8 (effective performance with steel stud thermal bridging), a loss of R11, which represents approximately 58% of the cavity Rvalue. Steel conducts heat approximately 400 times faster than wood, making thermal bridging through steel studs far more severe than through wood studs.

63. D — The cover board provides a smooth, damageresistant substrate for membrane adhesion, protects the underlying rigid insulation from foot traffic and mechanical damage, enhances the fire resistance of the roof assembly, and improves the membrane's wind uplift resistance by providing a stronger surface for adhesive bonding. Common cover board materials include gypsum fiber board and highdensity polyiso.

64. B — Lapping upper sheets over lower sheets ensures that groundwater flowing down the foundation wall surface always flows over the top of each lap joint, following the shingling principle. If the lower sheet overlapped the upper sheet, water would flow behind the lap and potentially reach the foundation wall, defeating the purpose of the waterproofing.

65. A — Ice dams form when heat escaping from the building interior through inadequate insulation and air sealing warms the roof deck, melting snow on the upper roof. The meltwater flows down to the colder eaves (which overhang the heated building), where it refreezes. The accumulating ice creates a dam that traps water, which backs up under the shingles and leaks into the building.

66. C — Sodium bentonite clay swells dramatically (up to 15 times its dry volume) when it contacts water, forming a dense, impervious gel that seals against the concrete surface. If the membrane is punctured or a crack develops in the concrete, the bentonite swells to fill the void, providing selfhealing capability that other waterproofing systems do not offer.

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

67. D — Spectrally selective lowE coatings are engineered to selectively block specific wavelengths of solar radiation. They reject infrared heat radiation (which causes unwanted solar heat gain) and block ultraviolet light (which causes fading) while transmitting visible light for daylighting. This achieves a low SHGC with a relatively high VT — the ideal combination for energyefficient commercial glazing.

68. B — Automatic sliding doors used as required exits must have a manual breakaway or swingout feature that allows the door leaves to be pushed open manually in the direction of egress travel when power fails or the automatic operator malfunctions. This ensures the exit remains functional under all conditions, including power outages and equipment failures.

69. C — Impactresistant glazing in hurricane zones must resist penetration by windborne debris (missiles) as tested per ASTM E1996 and E1886. The glazing is tested by firing a large missile (a 2×4 lumber section) and small missiles (steel balls) at the glass. After impact, the glazing must maintain its integrity to prevent wind and rain from breaching the building envelope.

70. A — Firerated glazing in a firerated door must carry a fireprotection rating that matches the door's rating, as tested per UL 10B or UL 10C. The glazing must also meet temperaturerise limitations if the assembly requires them (limiting the surface temperature on the nonfire side). Standard tempered glass and wired glass have specific limitations on size and application.

DOMAIN 9: FINISHES (Questions 71–75)

71. C — Suspended ceiling grid hanger wires are typically spaced at 48 inches (4 feet) on center, as specified by the ceiling grid manufacturer's installation instructions. The spacing may be reduced for heavy ceiling tiles, integrated lighting fixtures, or seismic bracing requirements. The hanger wires must be secured to the structure above with positive mechanical attachments.

72. D — Epoxy flooring creates a seamless, monolithic, chemicalresistant surface that protects the concrete substrate from attack by acids, solvents, oils, and other chemicals common in manufacturing environments. The impervious surface prevents chemicals from penetrating the concrete, and the seamless installation eliminates joints where contaminants could accumulate.

73. B — The contractor must not install the LVT until the slab's relative humidity is reduced to the flooring manufacturer's maximum acceptable level (75% in this case). Options include allowing additional drying time, running dehumidifiers, or applying a manufacturerapproved moisture mitigation system. Installing over excessively moist concrete causes adhesive failure, mold, and flooring damage.

74. D — Largeformat tile panels (48×96 inches) require extremely flat substrates (much tighter flatness tolerances than standard tile), full mortar coverage on the tile back (backbuttering) in addition to the substrate, specialized handling equipment due to weight and fragility, and adhesive products specifically rated for largeformat installation. These requirements significantly increase installation complexity.

75. D — Joint banding (visible differences in sheen between the joint compound areas and the paper face) is caused by unprimed gypsum board. The paper face and the joint compound have different porosities — the paper absorbs paint differently than the compound, creating visible sheen differences. Primer seals both surfaces to a uniform porosity, eliminating the banding effect.

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

76. C — A heat pump uses a reversible refrigeration cycle. In cooling mode, it operates like a standard air conditioner — extracting heat from indoor air and rejecting it outdoors. In heating mode, a reversing valve switches the cycle, extracting heat from outdoor air and delivering it indoors. Heat pumps are highly efficient in Alabama's mild winter climate.

77. A — A grease interceptor separates fats, oils, and grease (FOG) from kitchen wastewater by slowing the flow and allowing the lighter grease to float to the surface while heavier solids settle to the bottom. The clarified water passes through to the sanitary sewer. Without grease interception, FOG accumulates in sewer pipes, causing blockages and overflows.

78. D — Standpipe connections provide fire hose connections at each floor level within enclosed exit stairways, primarily used by firefighters during manual fire suppression operations. Standpipes deliver water to upper floors without requiring firefighters to run hose lines from groundlevel apparatus, saving critical time during fire response in multistory buildings.

79. B — CPVC pipe is susceptible to degradation from prolonged ultraviolet (UV) radiation exposure. UV breaks down the molecular bonds in the plastic, causing brittleness, reduced impact resistance, and potential failure in service. CPVC should be stored in a shaded area or covered with opaque material to protect it from direct sunlight.

80. C — The service sink is located in a janitorial closet or utility room and provides a water source for filling mop buckets, disposing of dirty mop water, cleaning janitorial equipment, and performing other maintenance activities. The IPC requires a minimum of one service sink per building to support routine cleaning and maintenance operations.

81. D — Concealed sprinkler heads are recessed into the ceiling with a decorative cover plate that matches the ceiling finish and hides the sprinkler during normal conditions. When heat from a fire activates the head, the cover plate (which is attached by a heatsensitive adhesive or fusible solder) drops away, allowing the sprinkler to deploy and discharge water in its normal spray pattern.

DOMAIN 11: ELECTRICAL SYSTEMS (Questions 82–84)

82. A — Arcfault circuit interrupters detect dangerous electrical arcing — unintended electrical discharge through damaged or deteriorated wiring, loose connections, and damaged insulation. Arcing is a leading cause of electrical fires because the hightemperature arc can ignite surrounding combustible materials. AFCI devices interrupt the circuit before the arcing condition can cause a fire.

83. C — OSHA requires minimum illumination of 5 footcandles for general construction areas and active work zones, with 10 footcandles required for first aid stations, infirmaries, and offices. Access ways, storage areas, and inactive work areas require a minimum of 3 footcandles. These levels ensure adequate visibility for safe work and hazard recognition.

84. B — The NEC does not specify a specific maximum number of receptacles per 20ampere commercial branch circuit. Instead, the NEC limits the circuit by its amperage rating (20 amps) and requires the designer to determine the appropriate number of receptacles based on the expected load. This differs from residential rules and allows engineering judgment for commercial applications.

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

85. D — The project superintendent's salary is a general conditions (project overhead) cost because it is a timedependent expense associated with managing the overall project rather than performing a specific trade or installing specific materials. General conditions include all indirect costs of running the project site — supervision, temporary facilities, safety, cleanup, and project administration.

86. A — The contractor has a duty to investigate the site before bidding. Conditions that were visible and obvious during a reasonable site visit — such as existing structures, topography, access limitations, and adjacent property conditions — are considered part of the contractor's assumed risk. Claims for additional compensation are generally limited to conditions that could not have been discovered through reasonable investigation.

87. B — A significant lastminute change to the structural system requires the owner to extend the bid deadline to give all bidders adequate time to reestimate the changed work. The extension should be issued through a formal addendum. Proceeding with the original deadline when bidders cannot reasonably price the changed scope undermines the integrity of the competitive bidding process.

88. D — Under AIA A201 Section 3.7, if the contractor discovers that the construction documents require work that would violate applicable law, the contractor must promptly notify the architect and owner in writing. The contractor must not proceed with the noncompliant work until the conflict is resolved. Proceeding with illegal work exposes the contractor to liability and regulatory penalties.

89. A — If the general contractor unreasonably delays scheduling the subcontractor's final inspection, preventing the subcontractor from completing its contract and receiving final payment, the subcontractor may have a claim for delay damages. The general contractor has an implied obligation to cooperate and not hinder the subcontractor's performance.

90. C — A "payifpaid" clause makes the owner's payment an absolute condition precedent to the subcontractor's right to payment — if the GC never gets paid, the sub never gets paid. A "paywhenpaid" clause merely establishes a reasonable timing mechanism. Courts in many jurisdictions disfavor payifpaid clauses because they shift the owner's credit risk to the subcontractor.

91. B — When cutting and patching is caused by an ownerdirected change in the work, the cost is the owner's responsibility and should be included in the change order for the changed work. The contractor would not have needed to cut and patch but for the owner's change, so the cost is properly attributed to the change that caused it.

92. D — Solesource specifications eliminate competitive pricing, potentially increasing costs because the contractor has no alternative suppliers to negotiate with. They also create supply chain risk — if the solesource manufacturer experiences production delays, quality problems, or goes out of business, the contractor has no backup option, potentially delaying the entire project.

93. B — In modern construction contract practice, "warranty" and "guarantee" are generally used interchangeably to describe the contractor's obligation to provide workmanship and materials free from defects for a specified period (typically one year from substantial completion) and to correct any defective work discovered during that period at no cost to the owner.

94. D — Fundamental commissioning under the IECC requires functional performance testing of HVAC equipment to verify it operates as designed, verification that control sequences function correctly, and air and water balancing to confirm that all terminal devices receive their design flow rates. Commissioning ensures that the systems actually perform as intended, not merely that they are installed.

95. A — Under AIA A201 Section 9.5, the architect may withhold certification for specific reasons including defective work not remedied, claims filed or reasonable evidence indicating probable filing of claims, failure of the contractor to make payments to subcontractors, damage to the owner or another contractor, and reasonable evidence that the work cannot be completed for the unpaid balance.

96. C — Any delay to a critical path activity delays the overall project completion date by the same duration. If the mechanical roughin is on the critical path and falls 2 weeks behind, the project completion date moves 2 weeks later unless the team develops a recovery strategy such as adding resources, resequencing work, or accelerating subsequent critical activities.

97. D — The contractor must receive ownerfurnished items, inspect them upon delivery for damage or deficiency, store them properly to prevent damage, and install them per the contract documents and manufacturer's instructions. Any damage, shortage, or incompatibility discovered during receiving or installation must be reported to the owner promptly.

98. B — A rough order of magnitude (ROM) estimate provides an approximate cost range, typically accurate to within 25% to +50% of the actual cost. ROM estimates are used for early budgeting, feasibility analysis, and decisionmaking when detailed design information is not yet available. They are not suitable for contract pricing.

99. A — Failure to provide timely written notice of a claim may result in waiver of the claim. The notice requirement exists to give the owner and architect the opportunity to investigate the event, assess the impact, and take steps to mitigate the cost and schedule consequences while evidence is fresh. Late notice deprives the owner of this opportunity.

100. C — The general contractor may substitute the bankrupt subcontractor with documentation of the subcontractor's inability to perform (bankruptcy filing), subject to the approval process required by the applicable subcontractor listing law. Most listing statutes allow substitution for cause (bankruptcy, loss of license, failure to execute the subcontract) but restrict substitution for convenience.

101. D — The contractor uses BIM coordination models, composite overlay drawings, or clash detection software to identify spatial conflicts between MEP systems before installation begins. This preconstruction coordination is far less expensive than resolving conflicts in the field after systems are installed, which requires demolition, rerouting, and reinstallation.

102. A — The contractor typically bears the risk of procurement delays for specified materials. The contractor is expected to review material lead times during bidding, submit material orders promptly after contract award, and manage the procurement process to avoid schedule impact. Long lead time items should be identified and ordered immediately to prevent delays.

103. B — A delay claim typically includes extended general conditions costs (additional months of supervision, temporary facilities, insurance, equipment), escalation of material and labor costs during the extended period, and potentially lost productivity caused by the disruption. Each cost category must be documented and causally linked to the owner's delay.

104. C — Under AIA A201, the architect has the authority to reject work that does not conform to the contract documents. The contractor must correct the rejected work at no additional cost to the owner. The architect's rejection authority is a critical quality control mechanism that ensures the completed building matches the design intent.

105. D — The $300,000 savings below the GMP is split according to the 50/50 sharing clause: the contractor receives $150,000 as additional compensation beyond the agreed fee, and the owner saves $150,000 compared to the maximum price. This sharing arrangement incentivizes the contractor to control costs below the GMP.

106. A — The contractor must maintain safety data sheets for all hazardous chemicals present on the construction site and make them readily accessible to all workers who may be exposed. This is a requirement of OSHA's Hazard Communication standard (29 CFR 1926.59) and applies to the general contractor's overall site safety responsibility.

107. C — A 75% construction waste diversion rate means the contractor must recycle, salvage, or otherwise divert at least 75% of the construction waste generated (by weight or volume) from landfill disposal. This requires source separation onsite, use of C&D recycling facilities, and tracking documentation to verify the diversion rate.

108. B — Bridging documents are the owner's design criteria prepared by the owner's architect that establish the project's program, quality standards, and performance requirements. The designbuilder must satisfy these criteria and complete the final design. Bridging documents provide the owner with design control while allowing the designbuilder flexibility in how the requirements are met.

109. D — The date of commencement is the date from which the contract time begins to run. It may be the date of the notice to proceed, a specific date stated in the agreement, or another date defined by the contract. The required completion date is calculated by adding the contract duration to the date of commencement.

110. A — AAMA 501.2 is the standard field water spray test for installed window and curtain wall assemblies. The test applies a calibrated spray of water to the exterior of the installed assembly while an observer monitors the interior for water penetration. This test verifies that the installed windows and their surrounding flashing and sealant details are watertight.

111. C — If the owner directs acceleration, the additional costs (overtime, extra crews, expedited deliveries) are the owner's cost, addressed through a change order. If the contractor accelerates to recover delays caused by its own forces or subcontractors, the acceleration cost is the contractor's responsibility. The cause of the delay determines who pays for the acceleration.

112. B — The contractor must demonstrate that the substitute product is equal to or better than the specified product in quality, performance, appearance, and warranty. The substitution request must include detailed comparison documentation, and the architect reviews the submission to determine whether the substitute meets the design intent before approving.

113. D — Under AIA A201, the owner has specific obligations to provide information necessary for the contractor's performance, including surveys, utility locations, and site conditions data. Failure to provide required information may entitle the contractor to additional cost and time if the omission causes delays or additional work.

114. A — Frontloading creates a financial risk for the owner because the contractor receives payments early in the project that exceed the actual cost of work completed. If the contractor defaults before the project is finished, the owner has overpaid relative to the value of work in place, and the remaining contract funds may be insufficient to pay a replacement contractor to complete the project.

115. C — Life safety system documentation must include acceptance test reports for the fire alarm system per NFPA 72, sprinkler system flow test reports per NFPA 13, and emergency lighting duration test reports documenting that batterypowered units maintain the required illumination for 90 minutes. These reports verify that all life safety systems function as designed before the building is occupied.