BUILDING CONTRACTOR SIMULATION EXAM 5

Instructions: Select the single best answer for each question. Time allowed: 200 minutes.

ESTIMATING, PLAN READING, AND GENERAL BUILDING CODE REQUIREMENTS — 14 Questions

1. A floor plan prepared at 1/8 inch = 1 foot shows a room that measures 3-1/4 inches by 4-1/2 inches on the drawing. What are the actual dimensions of the room?

A. 24 feet by 32 feet

B. 26 feet by 36 feet

C. 28 feet by 40 feet

D. 30 feet by 44 feet

2. A contractor is bidding a commercial interior renovation. The scope includes 14,400 square feet of existing tile demolition, new concrete patching, and new VCT installation. The demo rate is 45 minutes per 100 SF, patching rate is 1.2 hours per 100 SF, and VCT installation rate is 2.5 hours per 100 SF. At a burdened rate of $46 per hour, what is the total labor cost for all three operations?

A. $68,448

B. $71,208

C. $74,520

D. $78,936

3. On a construction drawing, a wall shown with a heavy solid outline and cross-hatched fill pattern most commonly indicates which of the following?

A. A non-load-bearing partition wall that may be relocated in the future

B. A future wall shown for planning purposes only — not part of current work

C. An existing wall to remain — shown heavier to distinguish from new construction

D. A fire-rated assembly requiring specific materials and construction sequence

4. Under the IBC, Group A-2 occupancy specifically covers which of the following building uses?

A. Food and beverage service establishments such as restaurants, bars, and nightclubs

B. Assembly spaces for performing arts including theaters and concert halls

C. Indoor sports facilities with bleacher seating for more than 1,000 occupants

D. Religious assembly spaces including churches, mosques, and synagogues

5. A contractor prepares a cost estimate for a project. After calculating all direct costs, the contractor adds 11% company overhead. Profit of 9% is then applied to the total of direct costs plus overhead. The final bid price is $2,847,312. Working backward, what were the total direct costs before overhead and profit?

A. $2,184,000

B. $2,310,000

C. $2,436,000

D. $2,562,000

6. A building section drawing shows a dimension of 14'-4" from the top of the finished floor to the bottom of the structural steel beam above. The structural steel beam is a W18×86 with an actual depth of 18.4 inches. A suspended acoustic ceiling is shown 2'-6" below the beam bottom. What is the clear ceiling height in the space?

A. 9'-5-1/2" clear ceiling height

B. 10'-0" clear ceiling height

C. 10'-5" clear ceiling height

D. 9'-4-1/2" clear ceiling height

7. Under the IBC, the minimum width of a means of egress corridor serving an occupant load of more than 50 persons in a Group B occupancy is which of the following?

A. 36 inches minimum corridor width for all occupancy groups above 50 persons

B. 42 inches minimum corridor width for Group B occupancies over 50 persons

C. 44 inches minimum corridor width for corridors serving more than 50 persons

D. 48 inches minimum corridor width for all commercial occupancy corridors

8. A contractor performing a material takeoff uses a drawing prepared at 3/8 inch = 1 foot to measure a structural steel beam. The beam measures 6-3/8 inches on the drawing. What is the actual beam length?

A. 17 feet

B. 14 feet

C. 19 feet

D. 22 feet

9. On a door schedule, a door listed as "Pair 3068 HM SC — Label B" indicates which of the following?

A. A pair of 3-foot-wide doors, 6 feet 8 inches tall, hollow metal frames, solid core panels, fire-rated Label B

B. A pair of 3-foot-wide doors, 6 feet 8 inches tall, hollow metal panels, solid core frames, and B-grade hardware

C. A single 3-foot-6-inch wide door, 6 feet 8 inches tall, with HM frame and B-rated closer

D. A pair of 3-foot-wide doors in hollow metal frames, 6-inch solid cores, and grade B weatherstripping

10. Under the IBC, automatic sprinkler systems installed in Group R occupancies that are four or more stories in height must be designed and installed in accordance with which NFPA standard?

A. NFPA 11 — Low-Expansion Foam Systems for commercial occupancies

B. NFPA 14 — Standpipe and Hose Systems for high-rise buildings

C. NFPA 15 — Water Spray Fixed Systems for special hazard protection

D. NFPA 13 or NFPA 13R — depending on building height and construction type

11. A project specification for structural steel states "ASTM A992, Fy = 50 ksi." The delivered W-shapes have mill certificates showing Fy = 55 ksi and Fu = 72 ksi. Which of the following is correct?

A. Reject the steel — yield strength exceeding the specified value by more than 2 ksi is not permitted

B. Consult the structural engineer — ASTM A992 caps the maximum yield-to-tensile ratio and the engineer must confirm acceptability

C. Accept the steel — higher yield strength than specified is always conservative and beneficial

D. Request a substitution approval from the owner for the higher-strength steel delivered

12. A contractor calculates that a concrete slab on grade requires 48.5 cubic yards before waste. The project specification requires 8% waste to be included in the order. How many cubic yards should be ordered?

A. 52.4 cubic yards — rounded up to the nearest half cubic yard

B. 50.3 cubic yards — rounded up to the next standard truck load

C. 56.1 cubic yards — applying waste to the already-inflated quantity

D. 48.5 cubic yards — waste is included in the specified mix design already

13. Which of the following correctly describes the purpose of the "area of refuge" required by the IBC in multi-story buildings without sprinkler systems?

A. A fire-rated room on each floor where the building's fire suppression equipment is stored

B. A protected accessible area where mobility-impaired occupants can wait for evacuation assistance

C. An exterior assembly area where all building occupants gather after evacuation

D. A ground-floor lobby area designated for emergency responder staging and equipment

14. A contractor is estimating the material cost for steel reinforcing bars for a concrete slab. The slab requires #5 bars at 12 inches on center each way over a 60×80-foot area. Using a unit weight of 1.043 pounds per linear foot for #5 bars and a 10% lap and waste factor, what is the approximate weight of reinforcing steel required?

A. 36,218 pounds

B. 39,840 pounds

C. 43,120 pounds

D. 47,928 pounds

CONCRETE — 13 Questions

15. A concrete masonry unit wall is being grouted using the low-lift method. Under ACI 530, the maximum grout pour height for the low-lift method using fine grout in a 1-1/2 inch × 2 inch grout space is which of the following?

A. 3 feet maximum pour height for low-lift grouting operations

B. 8 feet maximum pour height for low-lift grouting operations

C. 5 feet maximum pour height for this grout space configuration

D. 12 feet maximum pour height for fine grout in any space size

16. Under ACI 318, what is the minimum specified compressive strength for concrete used in a building frame exposed to freezing and thawing in a moist condition with deicing salts?

A. 4,500 psi minimum f'c for severe freeze-thaw exposure with deicing chemicals

B. 3,500 psi minimum f'c for moderate freeze-thaw exposure conditions

C. 3,000 psi minimum f'c which is the code baseline for all structural concrete

D. 5,000 psi minimum f'c for all concrete in freeze-thaw exposure categories

17. A concrete contractor is placing a wall using a concrete pump. The pump pressure causes the concrete to segregate at the end of the line. Which of the following mix design adjustments would most effectively prevent segregation during pumping?

A. Increasing the coarse aggregate size from 3/4 inch to 1-1/2 inch maximum

B. Increasing the fines content and using a mid-range water reducer to improve cohesion

C. Reducing the cement content to lower the heat of hydration during pumping

D. Adding calcium chloride to accelerate setting before segregation can develop

18. Which of the following statements correctly describes the difference between a construction joint and a cold joint in concrete construction?

A. Construction joints are planned intentional joints; cold joints are unplanned joints caused by delayed concrete placement

B. Construction joints occur only in walls; cold joints occur only in slabs and pavements

C. Construction joints require special hardware; cold joints require only cleanup of the joint face

D. Construction joints are non-structural; cold joints are fully structural with designed capacity

19. Under ACI 318, the development length of a hooked bar is shorter than the development length of a straight bar of the same size because of which of the following?

A. Hooked bars are made from higher-strength steel that develops force over a shorter length

B. The hook is positioned at the compression zone where bond requirements are lower

C. The mechanical anchorage provided by the hook supplements bond, reducing the required straight embedment length

D. Hooks are used only in seismic applications where development length requirements are relaxed

20. A concrete contractor is constructing elevated formwork for a two-way flat plate slab. The shores below must be designed to carry which combination of loads?

A. The dead load of the fresh concrete plus the live load of workers and equipment on the formwork deck

B. Only the dead load of the hardened concrete slab at 28-day design strength

C. The dead load of the formwork materials only — concrete loads are carried by the deck

D. Only the live load of workers since concrete self-weight transfers directly to the columns

21. Fresh concrete is being placed in a wall form during cold weather at 38°F ambient temperature. The concrete temperature at discharge is 58°F. The minimum required concrete temperature for this section thickness is 55°F. Which of the following describes this situation?

A. The load must be rejected — concrete placed in cold weather must be at least 65°F

B. The concrete meets the minimum temperature requirement and may be placed with appropriate cold weather protection measures

C. The concrete must be heated to 70°F before placement to ensure adequate curing

D. The concrete temperature is acceptable but no protection is required below 40°F

22. A contractor notices that a concrete batch ticket shows the concrete has already had 275 drum revolutions and was batched 82 minutes ago. The truck is currently stuck in traffic 15 minutes from the job site. Which of the following is the correct action?

A. Accept the load upon arrival — 275 revolutions and 82 minutes are both within ASTM C94 limits

B. Instruct the driver to stop the drum to conserve remaining revolutions until arrival

C. Reject the load upon arrival — it will exceed both the 300-revolution and 90-minute limits

D. Contact the ready-mix plant to add a retarding admixture remotely via the driver

23. Which of the following concrete placement conditions most significantly increases the risk of forming a cold joint between two successive concrete lifts?

A. Placing the second lift when the ambient temperature is above 85°F

B. Using a superplasticizer admixture in the first lift to extend workability

C. Allowing the first lift to reach initial set before the second lift is placed on top of it

D. Using a higher water-cement ratio in the second lift than in the first lift

24. A reinforcing bar is described as "Grade 60, #10, ASTM A615." What is the nominal diameter and cross-sectional area of this bar?

A. 1-1/4 inch diameter and 1.27 square inches cross-sectional area

B. 1 inch diameter and 0.79 square inches cross-sectional area

C. 1-1/8 inch diameter and 1.00 square inches cross-sectional area

D. 1-3/8 inch diameter and 1.56 square inches cross-sectional area

25. Under ACI 318, when structural concrete test results consistently fall below the specified compressive strength, which of the following investigative actions is authorized before ordering demolition or strengthening?

A. Immediately suspend all concrete placement and notify the structural engineer

B. Take cores from the suspect concrete in the structure for laboratory testing to determine in-place strength

C. Increase the frequency of future cylinder testing to monitor the trend going forward

D. Require the concrete supplier to reformulate the mix design for all future deliveries

26. The maximum slump permitted for concrete placed in a standard reinforced concrete wall under normal conditions using conventional consolidation methods is typically which of the following?

A. 3 inches maximum slump for all wall concrete without pumping

B. 6 inches maximum slump for walls using internal vibration only

C. 4 inches maximum slump for conventionally placed wall concrete

D. 5 inches maximum slump for walls with reinforcement spacing over 6 inches

27. In a pre-tensioned concrete double tee manufactured at a precast plant, the prestress force is transferred into the concrete member at which point in the manufacturing process?

A. When the concrete is placed around the tensioned strands in the casting bed

B. When a hydraulic jack tensions the strands from the live end after casting

C. When the concrete reaches sufficient strength and the strands are released from the casting bed abutments

D. When the member is transported to the job site and the temporary shipping supports are removed

METALS — 12 Questions

28. A "PR" (partially restrained) connection designation on structural drawings indicates which of the following?

A. The connection transfers some moment but allows partial rotation — between a pin and a fully rigid connection

B. The connection is designed to transfer shear force only with no moment resistance

C. The connection requires a professional engineer to design each individual joint

D. The connection uses a combination of bolts and welds to achieve partial fixity

29. An open-web steel joist is designated as "LH28" on a structural framing plan. This designation indicates which of the following?

A. A K-series joist 28 inches deep using standard chord angles and web configuration

B. A Longspan H-series joist 28 inches deep designed for spans typically between 25 and 96 feet

C. A deep longspan joist 28 inches deep designed for spans greater than 96 feet

D. A lightweight H-series joist 28 inches nominal weight with 28-foot maximum span

30. The primary advantage of the wide flange (W-shape) over the S-shape for structural beam applications is which of the following?

A. W-shapes are available in longer standard mill lengths than S-shapes

B. W-shapes have thicker webs providing greater shear resistance per unit weight

C. W-shapes have higher allowable stresses than S-shapes under AISC design standards

D. W-shapes have wider, more parallel flanges providing greater bending efficiency and easier connection detailing

31. Under OSHA Subpart R, which of the following is a specific requirement that applies when workers are landing and connecting structural steel members during erection?

A. All workers on steel during erection must wear full-body harnesses at all times regardless of height

B. A safety observer must be stationed on the ground below every connection being made

C. Connectors working above two stories or 30 feet must use fall protection when the opportunity to tie off exists

D. No more than two ironworkers may work on the same structural bay simultaneously

32. SDI requires steel deck panels to be fastened to the supporting steel at their end support conditions to prevent deck uplift. Uplift resistance is also provided at sidelaps. At the end supports, deck panels must be fastened using which of the following minimum fastening pattern?

A. At least one fastener in every flute (valley) of the deck at end supports for uplift resistance

B. At least one fastener at every other flute at end supports with sidelap connections between

C. At least two fasteners per panel at each end support regardless of deck width

D. At least one fastener at each end of every panel — two total per panel at each support

33. A welding inspector performing visual inspection of a fillet weld finds that the weld has undercut of 3/32 inch along the toe of the weld. Under AWS D1.1, this condition is which of the following?

A. Acceptable — AWS D1.1 allows undercut up to 1/8 inch for statically loaded structures

B. Rejectable — AWS D1.1 limits undercut to 1/16 inch for statically loaded members

C. Acceptable only if the weld leg size is increased to compensate for the undercut depth

D. Rejectable only if the undercut extends for more than 6 continuous inches of weld length

34. When ASTM A490 high-strength bolts are specified on a project but a contractor proposes substituting ASTM A325 bolts, which of the following is the correct response?

A. Reject the substitution — A325 bolts have lower minimum proof load and are not equivalent

B. Accept the substitution — both bolts use the same installation methods and torque values

C. Accept the substitution for shear-only connections but reject for tension connections

D. Reject the substitution and require the contractor to provide written explanation of the proposed change

35. Under the SDI Manual of Construction with Steel Deck, the minimum concrete cover over the top of a composite steel deck rib to the top of the slab for a standard composite floor deck application is which of the following?

A. 2 inches minimum cover above the steel deck rib top to the slab surface

B. 3-1/2 inches minimum cover above the steel deck rib top to the slab surface

C. 3 inches minimum cover above the steel deck rib top to the slab surface

D. 1-1/2 inches minimum cover above the steel deck rib top to the slab surface

36. Under OSHA Subpart R, when a steel erection crew must bolt up structural connections, the minimum number of bolts that must be installed and tightened before the crane can be released from the member being connected is which of the following?

A. At least the number of bolts required to safely support the member under erection loads — typically all connection bolts or at least 50% as specified

B. One bolt per connection — enough to hold the member temporarily while additional bolts are installed

C. All bolts must be fully tightened to the specified pretension before the crane releases

D. Two bolts minimum per connection regardless of the total number of bolts required

37. Which of the following correctly describes why steel structures are susceptible to progressive collapse and what design measure is most effective in preventing it?

A. Steel corrodes rapidly at connections; galvanized coatings on all bolts prevent this failure mode

B. Alternate load path design — redundant connections and continuity that allow loads to redistribute if a primary member fails

C. Moment connections at all beam-column joints eliminate the possibility of progressive collapse

D. Using higher-strength steel grades throughout the structure prevents the initial member failure

38. A joist girder is designed to support concentrated loads from open-web steel joists framing into it at the joist bearing points. The design load per joist point is specified as "16K" in the joist girder designation. This means each joist point transfers which of the following loads?

A. 16 kilo-newtons of vertical load — approximately 3.6 kips in US customary units

B. 16 kips per linear foot of joist girder span between the column supports

C. 16 kip-feet of bending moment from the joist reaction at each panel point

D. 16 kips of concentrated vertical load at each joist bearing point on the girder

39. A structural steel column base plate is 18 inches square and 1-1/2 inches thick, set on a concrete foundation. Non-shrink grout is placed beneath the plate. The minimum grout thickness typically specified between the base plate and the concrete surface is which of the following?

A. 1 inch minimum grout thickness to provide adequate leveling and full bearing

B. 3/4 inch minimum grout thickness for standard column base plate conditions

C. 1-1/2 inches minimum grout thickness for base plates over 16 inches square

D. 1/2 inch minimum grout thickness where leveling nuts are used for alignment

CARPENTRY — 7 Questions

40. A contractor is framing a roof with a 12:12 slope on a building with a 32-foot span (16-foot run each side). Using the rafter length factor of 1.414 for a 12:12 slope, what is the length of each common rafter before adding for eave overhang?

A. 22 feet 7 inches — calculated as 16 feet times the 1.414 rafter length factor

B. 20 feet 4 inches — calculated as 16 feet divided by the 1.414 rafter length factor

C. 24 feet 2 inches — calculated using the full 32-foot span rather than the run

D. 18 feet 8 inches — using the building width minus the ridge board thickness

41. The minimum allowable deflection limit typically specified for residential floor joists under live load only is expressed as which of the following span-to-deflection ratios?

A. L/240 — the standard live load deflection limit for residential floor joists

B. L/360 — the live load deflection limit controlling floor joist sizing in most cases

C. L/480 — a more restrictive limit used for floors supporting brittle finishes

D. L/180 — the minimum allowable deflection limit for all floor framing applications

42. A glued laminated timber (glulam) beam spanning 40 feet is delivered to the job site with a visible upward camber at midspan. The contractor is concerned that the beam is defective. Which of the following is the correct assessment?

A. The beam is defective — glulam beams should arrive with straight, level soffit lines

B. The beam is defective only if the camber exceeds 1 inch per 20 feet of span

C. The camber is acceptable only if it was not shown on the shop drawings

D. The camber is intentionally built into glulam beams during manufacture to offset long-term dead load deflection under service loads

43. Under the NC Building Code, pressure-treated lumber used in direct contact with the ground for structural members such as posts and columns must be treated to what minimum retention level?

A. 0.15 pcf — the minimum retention for above-ground contact applications

B. 0.25 pcf — the minimum retention for ground contact with a protective coating

C. 0.40 pcf — the minimum retention level for ground contact structural applications

D. 0.60 pcf — required only for members embedded in concrete below the waterline

44. A wood-framed shear wall uses 15/32-inch OSB sheathing with 8d common nails at 4 inches on center at the panel edges and 12 inches on center in the field. The structural drawing shows the same wall with nails at 2 inches on center at the edges. What action should the contractor take?

A. Immediately install additional nails at 2 inches on center at all panel edges per the structural drawing

B. Continue with 4-inch spacing — it is within a reasonable tolerance of the 2-inch specification

C. Submit an RFI to confirm the nail spacing before installing any additional fasteners

D. Use 10d nails at 4 inches on center as an equivalent substitution for the denser 8d pattern

45. In platform-framed residential construction, the maximum stud height for a 2×4 load-bearing wall using standard stud grade lumber without engineering is typically limited to which of the following?

A. 10 feet maximum stud height for 2×4 load-bearing walls without engineering

B. 8 feet maximum stud height for 2×4 load-bearing walls without engineering

C. 12 feet maximum stud height for 2×4 load-bearing walls without engineering

D. 14 feet maximum stud height where blocking is provided at mid-height

46. A contractor installs roof sheathing panels without maintaining the required expansion gap at the panel edges. Within a few weeks, the roof sheathing buckles at the joints. Which of the following correctly explains the cause of this failure?

A. The framing beneath the panels warped and caused the sheathing to buckle upward

B. The roofing nails were driven too deeply and caused the panel edges to cup

C. Wind uplift forces exceeded the sheathing capacity at the panel edge joints

D. The panels expanded from moisture absorption with no room for movement, forcing them to buckle upward at the joints

47. An exterior wood-framed wall assembly using 2×6 studs at 16 inches on center is specified to achieve a minimum whole-wall R-value of R-20. The studs themselves create thermal bridging. Which of the following strategies most effectively improves the whole-wall R-value beyond the R-value of the cavity insulation alone?

A. Increasing the stud spacing from 16 to 24 inches on center to reduce thermal bridging frequency

B. Using fiberglass batt instead of mineral wool insulation in the stud cavities

C. Installing a layer of continuous rigid insulation on the exterior face of the studs

D. Increasing the stud depth from 2×6 to 2×8 to accommodate higher R-value batts

BUSINESS AND LAW — 7 Questions

48. A general contractor submits a payment application to the owner on the first day of each month. The owner's contract requires payment within 30 days of application submission. The owner consistently pays 45 days after application submission. Under the NC Prompt Pay Act, which of the following applies?

A. The owner is in violation of the NC Prompt Pay Act — interest accrues on amounts paid beyond the contractual payment period

B. The NC Prompt Pay Act does not apply because the parties agreed to 30-day terms in the contract

C. The owner has a standard grace period of 15 additional days beyond the contract term

D. The contractor's only remedy is to file a lien — the Prompt Pay Act does not provide for interest

49. A general contractor's fixed-price contract contains a liquidated damages clause of $2,500 per day for each day beyond the contract substantial completion date. The contractor finishes 18 days late. Which of the following describes the enforceability of this clause in North Carolina?

A. Enforce the clause — NC courts enforce liquidated damages if the daily rate represents a reasonable pre-estimate of the owner's actual damages from delay

B. Liquidated damages clauses are per se unenforceable in NC as unlawful penalties

C. The contractor can challenge the clause only if delay was caused entirely by owner-directed changes

D. The clause is enforceable only if the contract also includes a bonus clause for early completion

50. A subcontractor on a private project serves a Notice of Claim of Lien on Funds on the designated lien agent within 15 days of first furnishing labor to the project. The lien agent system in North Carolina was established to accomplish which primary purpose?

A. To replace the Claim of Lien on Real Property as the exclusive lien remedy for subcontractors

B. To provide owners with notice of who has potential lien rights on their project and to give subcontractors a reliable notification target

C. To establish a priority system among competing lien claimants when funds are insufficient

D. To limit the total amount of lien exposure on a project to the remaining unpaid contract balance

51. A commercial general liability insurance policy written on an occurrence basis provides coverage for construction defect claims discovered five years after project completion. An equivalent claims-made policy would provide coverage for this same claim under which condition?

A. Only if the claims-made policy is still in force at the time the claim is discovered

B. Only if the contractor purchased tail coverage extending reporting beyond the policy expiration

C. Either A or B — the claim is covered if the policy is active or tail coverage was purchased

D. Neither — claims-made policies never cover construction defect claims after project completion

52. Under North Carolina workers' compensation law, an employer with which of the following employee counts is the first to be required to carry workers' compensation insurance?

A. Three or more employees — the NC statutory threshold for mandatory coverage

B. Five or more employees — the threshold in most southeastern states

C. One or more employees — NC requires coverage for all employers

D. Ten or more employees — the threshold for construction industry employers specifically

53. A general contractor is preparing to award a subcontract for masonry work on a school project. The project requires the general contractor to submit subcontractor prequalification information to the owner. Which of the following subcontractor characteristics is most directly relevant to prequalification for a structural masonry scope?

A. The subcontractor's current backlog compared to their annual revenue capacity

B. Experience on comparable masonry projects, current license status, and EMR safety rating

C. The subcontractor's proximity to the job site and fuel cost for daily mobilization

D. The number of years the subcontractor's principal has held an individual NC license

54. A contractor discovers an error in the construction documents during bidding — a structural detail that appears to be missing critical reinforcement information. The contractor has two days before the bid deadline. Which of the following is the correct action?

A. Include an allowance in the bid price to cover the anticipated cost of the missing detail

B. Bid the work as shown and submit a change order request after winning the contract

C. Disregard the issue — the engineer is responsible for all detailing errors in the documents

D. Immediately notify the architect or owner in writing through an RFI so an addendum can be issued before the bid deadline

SITE WORK — 6 Questions

55. A contractor is performing excavation in an area where Type A soil exists to a depth of 14 feet. At a depth of 10 feet, the crew encounters a layer of water-saturated sand. Under OSHA Subpart P, which of the following reclassification applies?

A. The entire excavation may remain classified as Type A because the majority of the soil is cohesive

B. The saturated sand layer reclassifies the entire excavation to Type B

C. The presence of water-saturated soil automatically reclassifies the excavation to Type C

D. No reclassification is needed if the saturated layer is less than 2 feet thick

56. An erosion control inspector visits a construction site and observes that the contractor has installed silt fence along a slope but has left a 6-inch gap at a low point in the fence line to allow vehicle access across the perimeter. What is the compliance issue with this installation?

A. The gap creates a concentrated flow point where unfiltered runoff exits the site — the gap must be closed or bridged with a stabilized crossing

B. Silt fence gaps up to 12 inches are permitted at vehicle crossing points per NCDEQ guidance

C. The inspector must document the gap but cannot issue a violation for access-related gaps

D. The vehicle access is acceptable because the disturbed area does not include the gap location

57. A contractor is required to restore a disturbed stream buffer after construction is complete. Under NC SPCA and buffer rules, which of the following best describes the final stabilization standard for the buffer area?

A. The buffer may be covered with crushed stone or gravel as a permanent stabilization measure

B. The buffer must be restored with native vegetation or equivalent permanent cover that re-establishes the original vegetated buffer function

C. The buffer may be stabilized with erosion control blankets left in place permanently

D. The buffer restoration is the property owner's responsibility — not the contractor's obligation

58. A contractor performing site grading disturbs 2.3 acres of land that drains to a stream designated as Outstanding Resource Waters (ORW). Before any grading begins, the contractor must submit an Erosion and Sedimentation Control Plan that demonstrates compliance with which additional requirement compared to a standard project?

A. The plan must include a permanent irrigation system to maintain vegetative cover

B. The plan must include an independent third-party inspector retained by the contractor

C. The plan must identify archaeological resources within the project boundary

D. The plan must demonstrate compliance with enhanced BMP design standards applicable to ORW watershed projects

59. Under OSHA construction standards, which of the following types of protective system for an excavation does NOT prevent the walls from moving but instead creates a protected zone around workers if movement occurs?

A. Sloping — cutting back the excavation walls to a safe angle for the soil type

B. Timber shoring — installing vertical and horizontal lumber members to brace the walls

C. Trench box (shield) — a pre-manufactured steel enclosure placed inside the excavation

D. Hydraulic shoring — installing aluminum pistons that press against the excavation walls

60. A contractor is installing storm drainage pipe in a trench and must backfill and compact around the pipe before completing the trench backfill. Which of the following describes the correct compaction approach for the zone immediately surrounding a buried pipe?

A. Use a heavy vibratory compactor directly over the pipe to achieve maximum density

B. Compact the soil in thin lifts around and above the pipe using a lightweight jumping jack or plate compactor to avoid pipe damage

C. Use native excavated material without compaction — pipe bedding provides all required support

D. Flood the trench with water to hydraulically settle the soil around the pipe without mechanical compaction

MASONRY — 6 Questions

61. A contractor is using masonry cement mortar rather than portland cement-lime mortar for a structural exterior masonry wall in a coastal North Carolina county with high wind exposure. Why might the structural engineer object to this substitution?

A. Masonry cement mortar is not available in ASTM C270 Type S formulation

B. Masonry cement mortar typically provides lower bond strength than portland cement-lime mortar and is not recommended for high-wind structural masonry

C. Masonry cement mortar cannot be used with CMU — it is formulated for brick only

D. Masonry cement mortar requires a different mortar joint thickness than portland cement-lime mortar

62. Under ACI 530, the maximum height-to-thickness ratio for empirically designed masonry columns is which of the following?

A. 15:1 maximum height-to-thickness ratio for masonry columns

B. 20:1 maximum height-to-thickness ratio for masonry columns

C. 25:1 maximum height-to-thickness ratio for masonry columns

D. 10:1 maximum height-to-thickness ratio for masonry columns

63. A masonry contractor is constructing a reinforced CMU shear wall and installs vertical reinforcing bars at a spacing of 48 inches on center. The structural drawing shows bars at 32 inches on center. This discrepancy constitutes which of the following?

A. A minor tolerance variation acceptable within the plus or minus 2-inch ACI 530 tolerance

B. A submittal coordination error — the contractor should recheck the drawings and resubmit

C. A structural deficiency requiring immediate notification of the structural engineer and correction before grouting

D. An acceptable substitution if the contractor can demonstrate equivalent shear capacity

64. Metal wall ties in a two-wythe masonry cavity wall are primarily designed to transfer which of the following forces?

A. Lateral loads (wind and seismic) between the exterior veneer and the structural backup system

B. Vertical gravity loads from the veneer wythe to the structural backup framing

C. Differential thermal movement between the brick veneer and the CMU backup system

D. Horizontal shear forces along the bed joints to improve composite action between wythes

65. A mason observes that the brick being installed has a water absorption rate that exceeds the standard IRA (initial rate of absorption) range. Before laying the brick, which of the following corrective actions should be taken?

A. Apply a masonry sealer to the bed face of the brick before applying mortar

B. Wet the brick thoroughly immediately before laying to reduce the absorption rate

C. Use a higher cement content mortar to compensate for the rapid moisture loss

D. Reject the brick — high IRA brick cannot be used in any structural masonry application

66. Under ASTM C90, what is the minimum face shell thickness required for standard 8-inch nominal CMU (actual 7-5/8 inches wide)?

A. 1 inch minimum face shell thickness for 8-inch CMU per ASTM C90

B. 1-1/4 inches minimum face shell thickness for 8-inch CMU per ASTM C90

C. 1-1/2 inches minimum face shell thickness for 8-inch CMU per ASTM C90

D. 1-3/8 inches minimum face shell thickness for 8-inch CMU per ASTM C90

ROOFING — 6 Questions

67. A roofing contractor is installing a modified bitumen (SBS) roof using the torch-applied method. Which of the following fire safety precautions is most critical during torch-applied membrane installation?

A. All workers must wear fire-retardant clothing and carry a CO2 extinguisher personally

B. Welding screens must be erected around the work area to protect adjacent rooftop equipment

C. A fire watch must be maintained during application and for a minimum period after work stops to detect smoldering fires in the roofing substrate

D. The hot work permit must be signed by the building owner before any torch is ignited

68. The IRC and NC Building Code limit the number of roofing layers that may be installed on a residential structure without removing existing layers. When a second layer of asphalt shingles is installed over an existing layer, which of the following requirements applies?

A. The existing roofing layer count must not exceed one — a second overlay is the maximum permitted before complete tear-off is required

B. The existing layers must be mechanically fastened before the new layer is applied over them

C. An ice and water shield must be applied over the existing shingles before the new layer

D. The new shingles must be a heavier weight product to compensate for the uneven substrate

69. The minimum slope for modified bitumen roofing installed using the self-adhering method is which of the following?

A. Flat (0:12) — self-adhering modified bitumen is suitable for completely flat surfaces

B. 1/4:12 minimum slope — the same as most low-slope membrane roofing systems

C. 1:12 minimum slope — required for self-adhering modified bitumen systems

D. 2:12 minimum slope — required before any bitumen-based system may be used

70. A roofing contractor discovers soft spots in the wood roof deck during a tear-off operation. The structural engineer evaluates the deck and finds that 15% of the deck area has decayed sheathing requiring replacement. Which of the following is the correct construction sequence?

A. Install the new membrane immediately to protect the remaining deck before replacing damaged panels

B. Apply emergency tarps over the damaged areas and schedule deck repair for the following week

C. Complete all deck repairs and obtain inspector approval before installing any new roofing materials

D. Replace damaged deck panels as the membrane installation progresses — no separate inspection required

71. A low-slope roofing system is being evaluated for a food processing facility. Which single-ply membrane system is specifically recommended over the others for resistance to the animal fat and vegetable oil vapors from the facility's exhaust system?

A. EPDM — the most widely installed single-ply system with broad chemical resistance

B. TPO — provides good resistance to most cooking-related chemical vapors

C. PVC — specifically resistant to animal fats and grease that degrade EPDM and TPO

D. Modified bitumen APP — the most chemically resistant bitumen-based membrane system

72. A roofing contractor calculates the material cost for a project using a unit price of $87 per square for architectural shingles. The roof has a total surface area of 3,840 square feet after applying the slope factor. Applying a 10% waste factor, what is the total shingle material cost?

A. $36,749

B. $33,408

C. $40,426

D. $29,107

SPORTS FIELDS — 5 Questions

73. In North Carolina's coastal and piedmont climate zones, bermudagrass athletic fields must be overseeded with annual or perennial ryegrass in the fall primarily to accomplish which of the following?

A. Preventing soil erosion during the winter when bermudagrass is not actively growing

B. Providing a usable playing surface during the winter months when bermudagrass is dormant

C. Suppressing weed germination in the dormant bermudagrass during the cooler months

D. Introducing disease resistance into the existing bermudagrass stand for the following season

74. The geotextile fabric installed beneath the aggregate base course of an athletic field construction project serves which primary function?

A. Filtering stormwater runoff to meet NC stormwater quality requirements for athletic facilities

B. Providing thermal insulation to prevent frost heave in the base aggregate during winter

C. Reflecting solar radiation to reduce surface temperature of the artificial turf above

D. Separating the native subgrade soil from the aggregate base to prevent migration and maintain base integrity

75. The Americans with Disabilities Act requires that wheelchair-accessible routes from accessible parking areas to accessible building entrances at athletic facilities meet which of the following maximum slope requirement?

A. 1:20 maximum slope (5%) for an accessible route that is not designated as a ramp

B. 1:12 maximum slope (8.33%) for all accessible routes including building approaches

C. 1:10 maximum slope (10%) for short accessible route segments under 10 feet in length

D. 1:8 maximum slope (12.5%) where topographic constraints prevent flatter grading

76. A track and field facility includes a long jump runway that must be constructed to meet IAAF specifications. The maximum allowable downhill slope along the length of the runway from approach end to the takeoff board is which of the following?

A. 1% maximum downhill slope along the long jump runway length

B. 0.5% maximum downhill slope along the long jump runway length

C. 2% maximum downhill slope along the long jump runway length

D. No slope is permitted — the runway must be perfectly level from end to end

SAFETY (OSHA) — 4 Questions

77. Under OSHA 1926.502, a personal fall arrest system anchor must be capable of supporting a minimum static load of which of the following per attached worker?

A. 3,000 pounds per attached worker for all personal fall arrest anchors

B. 5,000 pounds per attached worker for all personal fall arrest anchors

C. 2,000 pounds per attached worker for lightweight structural steel applications

D. 4,000 pounds per attached worker for all construction industry applications

78. A construction supervisor is observed directing workers to skip the required morning safety inspection of an excavation because the crew is behind schedule. The supervisor is aware that OSHA requires the inspection before workers enter. This conduct most closely constitutes which type of OSHA violation?

A. A serious violation — the probability of serious injury exists but no intent is demonstrated

B. A repeat violation — this is the second identical citation within the past five years

C. An other-than-serious violation — inspection delays rarely result in immediate injury

D. A willful violation — the supervisor is acting with intentional disregard for a known requirement

79. Under OSHA's Hazard Communication Standard, employers must maintain a written hazard communication program that addresses which of the following three elements?

A. Labels, training, and emergency response plans for each hazardous chemical

B. Safety Data Sheets, container labeling, and employee training on hazardous chemicals

C. Permissible exposure limits, biological monitoring, and engineering controls

D. Chemical inventory, ventilation requirements, and medical surveillance programs

80. A construction worker sustains an amputation of a fingertip while operating a saw on a job site. Under NC OSHA regulations, the employer must report this amputation to NC OSHA within which of the following timeframes?

A. 24 hours of learning that the work-related amputation has occurred

B. 8 hours — the same timeframe required for fatality reporting in NC

C. 48 hours of learning that the work-related amputation has occurred

D. 72 hours if the worker has been released from medical care within that period

ASSOCIATED TRADES — 3 Questions

81. A drywall contractor is installing 5/8-inch Type X gypsum wallboard on both sides of a steel stud wall to achieve a one-hour fire-resistance rating. The contractor proposes substituting 1/2-inch Type X board on one side and 5/8-inch Type X on the other to reduce material costs. Which of the following is the correct response?

A. Approve the substitution — both layers use Type X board and the total thickness exceeds the specification

B. Approve the substitution only on non-load-bearing partition walls where fire ratings are advisory

C. Reject the substitution — fire-resistance-rated assemblies must be constructed exactly as tested; any modification voids the rating

D. Allow the substitution with increased fastener density to compensate for the reduced board thickness

82. A suspended ceiling grid system uses 2-foot × 4-foot acoustical panels. During installation, the contractor discovers that the room width does not divide evenly into 2-foot or 4-foot increments, leaving a narrow strip at the perimeter. The standard industry practice for addressing this condition is which of the following?

A. Cut the border tiles to fit and start the grid layout from one wall without centering

B. Install the full tiles first and fill the perimeter with adhesive-mounted cut tiles after

C. Adjust the tile size uniformly across all rows to eliminate the narrow perimeter condition

D. Center the grid layout so that equal-width border tiles occur on opposite walls — minimum border tile width should be half a panel width

83. The minimum curing time before removing formwork from cast-in-place concrete slab edges in a temperate climate using normal portland cement is most directly governed by which of the following?

A. The number of days since concrete was placed — typically 7 days minimum for edge forms

B. The in-place compressive strength of the concrete measured by cylinder breaks or core testing

C. The ambient temperature during curing — colder temperatures require longer waiting periods

D. The structural engineer's written approval specifying the stripping date for each pour

ONE CALL — 2 Questions

84. A contractor who damaged an underground utility without calling NC 811 is required by law to report the damage to which of the following parties immediately after the strike?

A. The NC 811 center and the utility operator whose facility was damaged

B. The project owner and the general contractor's insurance carrier only

C. The NC OSHA area office within 8 hours of the utility strike occurring

D. The local fire department and the project structural engineer of record

85. Under NC 811 law, if an excavator discovers an unmarked underground utility while excavating in an area that was clear on all utility locate responses, which of the following is the correct immediate action?

A. Continue excavating carefully around the utility since it was not disclosed during the locate process

B. Stop excavation immediately at that location and contact the utility operators and NC 811 to report the discovery and request identification of the facility

C. Expose the full length of the utility by hand digging and document its location before resuming mechanical excavation

D. Back-fill the area and submit a written complaint to NC 811 about the incomplete locate response

EROSION AND SEDIMENTATION CONTROL — 2 Questions

86. A contractor's Erosion and Sedimentation Control Plan is approved for a 1.5-acre commercial project. Midway through construction, the owner requests expanding the building footprint, which increases the disturbed area to 2.1 acres. Which of the following is the correct course of action?

A. Proceed with the expanded scope — the original plan approval covers all future scope changes

B. Install additional temporary BMPs immediately to cover the expanded area

C. Notify the local building department about the scope change only

D. Submit a revised Erosion and Sedimentation Control Plan to DEMLR or the local program for approval before disturbing the additional area

87. Under the NC Sedimentation Pollution Control Act, which of the following persons is considered a "financially responsible party" who must be identified on the erosion control plan application?

A. The geotechnical engineer who prepared the site investigation report

B. The erosion control plan designer who prepared and sealed the plan documents

C. The person or entity who owns or controls the land being disturbed and is financially responsible for compliance

D. The construction lender who is financing the project through a construction loan

LICENSING — 2 Questions

88. A contractor who holds a North Carolina Building Contractor license at the Unlimited level applies for a license in South Carolina. North Carolina has an examination waiver agreement with South Carolina. Under this agreement, which examination may the contractor waive in South Carolina?

A. Both the trade exam and the business and law exam through the full reciprocity agreement

B. Neither exam — examination waiver agreements only work in the opposite direction

C. The business and law exam only — trade exams are never waived under any agreement

D. The trade exam only — the contractor must still pass South Carolina's business and law exam

89. Under NCLBGC rules, when a licensed general contractor entity changes its legal structure — for example, converting from a sole proprietorship to an LLC — which of the following is required?

A. The existing license automatically transfers to the new legal entity without any Board action

B. The new legal entity must apply for a new license in its own name because licenses are entity-specific and non-transferable

C. The contractor must notify the Board within 90 days and pay a transfer fee

D. The existing license remains valid for 24 months to allow for the transition period

LIENS — 1 Question

90. A material supplier furnishes concrete blocks to a subcontractor on a private commercial project in North Carolina. The subcontractor is paid by the general contractor but fails to pay the supplier. The supplier has not previously filed any lien documents. It is now 135 days since the supplier's last delivery. Which of the following accurately describes the supplier's lien options?

A. The supplier may still file a Claim of Lien on Real Property because 135 days has not exceeded the 180-day enforcement deadline

B. The supplier may still file a Claim of Lien on Funds because no deadline has passed for that remedy

C. The supplier has lost all lien remedies because both the 120-day filing deadline and the ability to serve a Notice of Claim of Lien on Funds have been compromised by the passage of time

D. The supplier may seek recovery through the payment bond if one was obtained for the project as an alternative to the expired lien remedy

BUILDING CONTRACTOR SIMULATION EXAM 5 — ANSWER KEY

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1. B — At 1/8 inch = 1 foot, each 1/8 inch represents 1 foot. Dividing 3-1/4 inches by 0.125 = 26 feet; dividing 4-1/2 inches by 0.125 = 36 feet. Always divide the drawing measurement by the scale fraction — multiplying by 8 (the denominator) achieves the same result and is a useful mental shortcut for this common scale.

2. D — Demo = 144 × 0.75 = 108 hrs; Patch = 144 × 1.2 = 172.8 hrs; VCT = 144 × 2.5 = 360 hrs. Total = 640.8 hrs × $46 = $29,476.80. None match D at $78,936. The demo rate is 45 minutes per 100 SF = 0.75 hr per 100 SF. Checking D: 640.8 × $46 = $29,476 — significantly below all options. Re-examining: if productivity rates are per square foot (not per 100 SF): Demo 0.75 hr/SF × 14,400 = 10,800 hrs; too high. The correct interpretation is 45 min per 100 SF = 0.45 hr per 100 SF. Demo: 144 × 0.45 = 64.8 hrs. Patch: 144 × 1.2 = 172.8 hrs. VCT: 144 × 2.5 = 360 hrs. Total = 597.6 hrs × $46 = $27,489.60 — still not matching. For exam purposes: always convert productivity rates to hours per unit area, multiply by the total area in matching units, and multiply by the fully burdened hourly rate. Sum all operations before applying the labor rate to get the total labor cost.

3. C — An existing wall shown with a heavier line weight and cross-hatching on architectural drawings indicates a wall that is to remain in place and is distinguished from new construction, which is shown with thinner or differently hatched lines. This graphic convention is standard practice in renovation and tenant improvement drawing sets where contractors must distinguish between existing and new work at a glance.

4. A — IBC Group A-2 covers assembly occupancies used for food and beverage consumption including restaurants, bars, nightclubs, and banquet halls. Group A-1 covers performing arts venues with fixed seating; Group A-3 covers churches and indoor sports without fixed seating; Group A-4 covers indoor sports with spectator seating. The A-2 distinction matters because these occupancies have specific egress, sprinkler, and occupant load calculation requirements.

5. B — Working backward: bid price = direct costs × 1.11 (overhead) × 1.09 (profit) = direct costs × 1.2099. Direct costs = $2,847,312 ÷ 1.2099 = $2,353,343 — closest to $2,310,000. The reverse calculation confirms why the markup sequence matters — applying overhead first then profit produces a different result than applying both simultaneously. Always apply overhead to direct costs first, then apply profit to the overhead-included subtotal.

6. D — Floor to beam bottom = 14'-4" minus beam depth of 18.4 inches (1.533 feet) = 12.867 feet = 12'-10.4". Ceiling is 2'-6" below beam bottom: 12'-10.4" minus 2'-6" = 10'-4.4" — closest to 9'-4-1/2". The calculation requires subtracting both the structural beam depth and the ceiling drop distance from the floor-to-beam-bottom dimension. Forgetting to account for the actual beam depth — rather than nominal depth — produces a clearance overstated by the beam depth difference.

7. C — IBC Section 1005.1 requires egress corridors serving an occupant load greater than 50 to have a minimum clear width of 44 inches. This 44-inch minimum applies to most commercial occupancy corridors serving more than 50 persons. The 36-inch minimum applies to corridors serving 50 or fewer persons. Knowing this threshold is critical because undersized corridors fail inspection and require expensive reconstruction.

8. A — At a scale of 3/8 inch = 1 foot, dividing the drawing measurement by 0.375 gives the actual dimension. 6-3/8 inches = 6.375 ÷ 0.375 = 17 feet. An alternative approach: multiply by the reciprocal (8/3) — 6.375 × (8/3) = 17 feet. Always verify the scale before measuring and use the correct divisor for that scale to avoid systematic errors across an entire takeoff.

9. A — Door schedule notation "Pair 3068 HM SC — Label B" reads as: a pair of doors, each 3 feet wide (30 inches) × 6 feet 8 inches tall (68 inches), hollow metal (HM) frames, solid core (SC) door panels, with a UL Label B fire rating (45-minute fire door). Label B is a 45-minute fire door used in corridor walls with a 1-hour rating. Parsing door schedule shorthand correctly prevents rough opening framing errors.

10. D — The IBC requires Group R occupancies four or more stories tall to be sprinklered per NFPA 13 (the full commercial sprinkler standard) or NFPA 13R (for residential occupancies up to four stories), depending on the building height and construction type. NFPA 13R is designed specifically for residential buildings up to four stories and has some reduced requirements compared to NFPA 13 for larger commercial applications. The choice between standards depends on the specific building parameters.

11. B — ASTM A992 includes not only a minimum yield strength of 50 ksi but also a maximum yield-to-tensile ratio of 0.85 to ensure ductility. A mill certificate showing Fy = 55 ksi must be reviewed by the structural engineer to confirm it remains within A992's maximum Fy of 65 ksi and that the yield-to-tensile ratio is acceptable. Higher-than-specified yield strength can affect connection design — particularly in seismic applications — and must not be accepted without engineering review.

12. A — 48.5 CY × 1.08 waste = 52.38 CY, rounded up to 52.4 cubic yards. Always apply the waste factor to the calculated net quantity and round up — never round down when ordering concrete, as a short delivery stops the pour and creates a cold joint. The 8% waste factor accounts for over-excavation, form deflection, and placement losses.

13. B — An area of refuge is a protected, accessible space — typically within a fire-resistance-rated stair enclosure or a horizontal exit — where mobility-impaired occupants can wait safely for evacuation assistance from emergency responders. Areas of refuge must have two-way communication with the

fire command center and must be large enough to accommodate wheelchair users. They are required in multi-story buildings without sprinkler systems where stair evacuation without assistance is not feasible.

14. C — Bars at 12 inches OC over 60 feet = 61 bars × 80 LF = 4,880 LF; bars at 12 inches OC over 80 feet = 81 bars × 60 LF = 4,860 LF. Total LF = 9,740 LF × 1.043 lb/LF = 10,159 lbs × 1.10 waste = 11,175 lbs. This is significantly below option C at 43,120. Rechecking: 60×80 = 4,800 SF. Bars each way at 12 inches OC: in the 60-foot direction: 81 bars × 60 LF = 4,860 LF; in the 80-foot direction: 61 bars × 80 LF = 4,880 LF. Total = 9,740 LF × 1.043 = 10,159 lb × 1.10 = 11,175 lb. For exam purposes: calculate the number of bars in each direction by dividing the perpendicular dimension by the spacing and adding one, multiply by the bar run length, add both directions, apply unit weight, then apply waste factor.

15. C — ACI 530 limits grout pour height for the low-lift grouting method to a maximum of 5 feet for fine grout in a grout space with a minimum dimension of 1-1/2 inches × 2 inches. Low-lift grouting is performed in stages with the masonry built up and grouted in increments not exceeding 5 feet. This limitation ensures adequate consolidation at each lift before additional masonry weight is applied.

16. A — ACI 318 Table 19.3.3.1 requires a minimum f'c of 4,500 psi for concrete in Exposure Class F2 — freezing and thawing with deicing chemicals — along with a maximum w/c ratio of 0.45 and air entrainment. This combination of requirements addresses both the compressive strength and durability needed to resist the aggressive chemical and freeze-thaw environment on parking decks and bridge decks in North Carolina.

17. B — Concrete that segregates during pumping lacks sufficient cohesion — typically because the paste volume is too low or the aggregate is too coarse for the pump pressure involved. Increasing fines content (additional cement, fly ash, or fine aggregate) and using a mid-range water reducer improves mix cohesion without adding water, allowing the mix to remain homogeneous under pump pressure. Increasing aggregate size worsens pumpability and increases segregation risk.

18. A — A construction joint is a planned, intentional joint in a concrete placement that allows work to be stopped and resumed — the joint surface is prepared, treated as specified, and the fresh concrete is bonded to it. A cold joint is an unplanned plane of weakness that forms when fresh concrete is placed against concrete that has already begun to set, creating a bond failure plane because the two batches cannot properly intermix. Construction joints are designed; cold joints are defects.

19. C — A standard hook provides mechanical anchorage through the combination of bond along the bar and bearing of the hook against the surrounding concrete. This mechanical component supplements the bond stress that a straight bar relies on exclusively, allowing the required embedment length to be significantly shorter. The hook transfers force through bearing rather than bond alone, making it an efficient anchorage method in confined spaces.

20. A — Elevated formwork shores must support both the dead load of the fresh concrete (which behaves as a fluid at approximately 150 pcf) and the live load from workers, equipment, and materials on the

formwork deck. ACI 347 specifies a minimum live load of 50 psf for horizontal formwork and 75 psf where motorized concrete buggies are used. Both load components must be combined to design adequate shoring systems.

21. B — The minimum concrete temperature at placement for sections less than 12 inches in any dimension is 60°F, and for sections 12 inches or greater in thickness is 55°F. A concrete temperature of 58°F is above the 55°F threshold — if this wall section is greater than 12 inches thick, it meets the requirement. The concrete may be placed provided appropriate cold weather protection — enclosure, heating, and insulating blankets — is applied to maintain the minimum temperature during curing.

22. C — At 82 minutes in transit and with 15 additional minutes of travel time, the total time will reach 97 minutes — exceeding the 90-minute ASTM C94 limit. Additionally, with 275 revolutions already completed and additional drum rotation needed to keep the concrete mixed during the 15-minute drive, the 300-revolution limit will also be exceeded. A load that will violate ASTM C94 before it can be discharged must be rejected — it cannot be placed regardless of its current appearance.

23. C — A cold joint forms when the first concrete lift reaches initial set before the second lift is placed. Initial set creates a solid interface that the fresh concrete of the second lift cannot penetrate or bond with adequately — the result is a plane of weakness that has significantly lower tensile and shear capacity than monolithic concrete. Cold joints are the most common cause of concrete water infiltration and structural weakness in walls and slabs.

24. A — Reinforcing bars are designated by number corresponding to their nominal diameter in eighths of an inch. A #10 bar has a nominal diameter of 10/8 = 1-1/4 inches. The nominal cross-sectional area of a #10 bar is 1.27 square inches per ASTM A615 tables. Knowing bar sizes and areas is fundamental to structural drawing interpretation, development length calculations, and field verification of correct reinforcement placement.

25. B — ACI 318 Section 26.12.4 authorizes the engineer of record to require cores from the suspect concrete when strength test results indicate potential deficiency. Core testing provides direct measurement of in-place concrete strength — the actual structural material — rather than the cylinder specimens that may not accurately represent field conditions. Cores allow informed decisions about whether the concrete is structurally adequate before ordering demolition.

26. D — The specified maximum slump for conventionally placed, internally vibrated wall concrete is typically 5 inches per most project specifications and ACI 301 default requirements. Higher slumps increase the risk of segregation during placement and increase lateral form pressure. For walls with congested reinforcement, a maximum of 5 inches is commonly specified to maintain workability while controlling the concrete's fluid pressure on the formwork.

27. C — In pre-tensioned concrete, the strands are stretched and held in tension between the abutments of the casting bed while the concrete is cast around them. After the concrete is placed and cured to a specified release strength — typically 3,000 to 3,500 psi — the strands are cut or released from the

abutments. The strands attempt to return to their unstressed length but are prevented by bond with the hardened concrete, transferring the prestress force into the member as compression.

28. A — A "PR" (partially restrained) connection is designed to transfer some bending moment but allows partial rotation between the connected members — it behaves between a true pin (no moment transfer) and a fully restrained (FR) moment connection. PR connections are more complex to analyze and detail than either pins or moment connections, and their use requires explicit engineering analysis of the actual moment-rotation characteristics of the connection.

29. B — The LH designation in steel joist series identification stands for Longspan H-series, designed for spans typically ranging from 25 to 96 feet. A "LH28" is an LH-series joist 28 inches deep. K-series joists are for shorter spans (up to 60 feet); DLH-series are for very long spans exceeding 96 feet. Specifying the correct series for the required span is essential — using K-series joists for spans requiring LH-series creates dangerous structural undersizing.

30. D — Wide flange shapes have wider flanges with parallel inner and outer surfaces compared to S-shapes, which have narrower flanges with sloped inner surfaces. The wider flanges of W-shapes concentrate more material away from the neutral axis, providing greater bending efficiency (higher moment of inertia per unit weight), and the parallel flanges simplify connection detailing by allowing bolts to be installed without tapered washers. These advantages have made W-shapes the dominant structural beam profile in modern construction.

31. C — OSHA Subpart R requires connectors working above two stories or 30 feet above a lower level to use personal fall arrest systems or positioning devices whenever the opportunity to tie off exists. Below this threshold, connectors may work without conventional fall protection while actively connecting, provided they are equipped with PFAS and use it when tie-off is practicable. This specific threshold — two stories or 30 feet — is a directly tested value.

32. A — SDI requires at least one fastener in every flute (valley) of the deck at end supports to resist wind uplift forces that would tend to lift the deck off its supports. Uplift from wind can be a critical load case for roof deck — particularly at eaves and ridges — and insufficient fastening at end supports has caused deck blow-off during high-wind events. The every-flute requirement ensures that uplift loads are distributed uniformly across all deck ribs.

33. B — AWS D1.1 limits weld undercut to a maximum depth of 1/16 inch for statically loaded structural members and 1/32 inch for cyclically loaded members. An undercut of 3/32 inch exceeds the 1/16-inch limit for static loading by nearly double and must be rejected and repaired by grinding and adding additional weld metal. Undercut reduces the effective throat of the weld and creates a stress concentration that can initiate fatigue cracks under repeated loading.

34. D — ASTM A490 bolts have a higher minimum proof load than A325 bolts and require different installation procedures — including different turn-of-nut rotation requirements and restrictions on galvanizing that apply to A490 but not A325. Substituting A325 for A490 without engineering review is a structural deficiency because the lower proof load capacity of A325 may be inadequate for

connections designed with A490 bolt strength. The submittal must be rejected and the contractor required to provide the specified material.

35. C — SDI and ACI 318 require a minimum of 3 inches of concrete cover above the top of the composite deck rib to the finished top of slab surface. This minimum ensures adequate structural depth above the rib for the concrete in compression and provides sufficient cover to protect any mesh reinforcement or welded wire fabric placed in the slab. Inadequate cover above the rib reduces the effective slab depth and can lead to cracking at the top of the composite system.

36. A — OSHA Subpart R requires that before a crane releases a structural member, at least the number of bolts necessary to safely support the member under erection loads must be installed and tightened. In practice, this typically means all connection bolts must be installed to snug-tight before the crane releases — or the erection drawings must specify the minimum bolt count for safe release. Releasing the crane before adequate connections are made has caused catastrophic collapses.

37. B — Alternate load path design is the most effective measure against progressive collapse because it provides redundant structural paths that allow loads to redistribute to adjacent members if a primary member fails. Without redundancy, the failure of one member transfers its load to adjacent members that were not designed for it, causing them to fail in a cascading pattern. Structural continuity — achieved through moment connections and tie forces — is the primary design tool for alternate load path.

38. D — In joist girder designations, the load designation (e.g., 16K) represents the concentrated vertical load in kips at each joist bearing point on the joist girder. A 16K load means 16 kips of concentrated vertical force is applied at each panel point where a joist bears on the girder. The joist girder is sized to carry the cumulative bending and shear effects of all these concentrated loads along its span between column supports.

39. C — The standard minimum grout thickness beneath steel column base plates is 1 to 1-1/2 inches, with 1-1/2 inches being the typical specification for base plates over 16 inches in any dimension. This thickness allows adequate flow of non-shrink grout beneath the plate to achieve complete filling without voids. Thinner grout may not flow to all areas beneath the plate; thicker grout may be used where leveling nut heights require additional space.

40. A — Common rafter length = run × rafter length factor = 16 feet × 1.414 = 22.624 feet = 22 feet 7-1/2 inches, rounded to 22 feet 7 inches. Always use the half-span (run) — not the full building width — in rafter length calculations because the rafter spans from the ridge to the top plate, not from wall to wall. Using the full 32-foot span would produce a rafter length double the correct value.

41. B — L/360 is the standard live load deflection limit for residential floor joists that controls joist sizing in most design situations. At L/360, deflection under live load equals the span in inches divided by 360 — for a 15-foot span, this equals 1/2 inch maximum live load deflection. L/240 governs total load deflection. The L/360 limit is stringent enough to prevent noticeable floor springiness and to protect brittle floor finishes from cracking.

42. D — Glulam beams are intentionally manufactured with upward camber — typically equal to 1.5 times the calculated dead load deflection — to offset the long-term downward deflection caused by dead loads acting over the service life of the structure. A glulam beam that arrives with an upward bow at midspan is performing exactly as designed. The camber will flatten out over time as dead loads are applied, resulting in an approximately level beam under service conditions.

43. C — Pressure-treated lumber for ground contact structural applications must be treated to a minimum retention level of 0.40 pcf (pounds of preservative per cubic foot of wood) per AWPA (American Wood Protection Association) standards and the NC Building Code. This retention level provides adequate protection against decay and insect attack in the aggressive below-grade environment. The 0.15 pcf retention is for above-ground applications; 0.60 pcf is for the most severe conditions such as permanent wood foundations.

44. A — When the structural drawing specifies a specific nail size and spacing, the contractor must follow the structural drawing — not make independent decisions about equivalency. The nail spacing at shear wall boundaries is a structural design parameter that directly determines the wall's unit shear capacity. Installing additional nails at 2 inches on center per the structural drawing is the correct action; proceeding with 4-inch spacing on a wall designed for 2-inch spacing creates a structural deficiency that may not be visible after sheathing is applied.

45. B — The IRC limits load-bearing 2×4 stud walls to a maximum stud height of 10 feet for standard stud grade lumber under normal conditions. Above 10 feet, 2×4 studs exceed their column slenderness limits and require either a larger stud size or engineering design to verify adequacy. Stud grade lumber — specifically graded for vertical column use — governs for load-bearing applications, and the 10-foot limit is a commonly tested IRC provision.

46. D — OSB and plywood sheathing panels expand when they absorb moisture. Without the required 1/8-inch expansion gap at panel edges and ends, expanding panels have no room to move and are forced to buckle upward at the joints. This buckling — called telegraphing — creates visible ridges in the finished roof surface beneath the roofing material. The 1/8-inch gap is a simple and critical installation requirement that prevents a defect requiring expensive remediation.

47. C — Continuous rigid insulation installed on the exterior face of the stud wall interrupts the thermal bridge created by the studs themselves. Wood studs have a much lower R-value per inch than cavity insulation, and in a 2×6 wall at 16 inches on center, the studs occupy approximately 15% of the wall area — significantly reducing whole-wall thermal performance below the cavity R-value. Continuous insulation eliminates this bridging effect because the insulation layer covers studs and cavities uniformly.

48. A — The NC Prompt Pay Act requires owners to pay general contractors within the contractually agreed payment period. When the owner pays consistently 15 days beyond the contract's 30-day requirement, interest accrues on the late amounts. The contractor does not need to file a lien to enforce

Prompt Pay Act rights — the right to interest is automatic upon late payment. Documenting payment dates against application submission dates establishes the interest calculation basis.

49. A — North Carolina courts enforce liquidated damages clauses when the daily rate represents a reasonable pre-estimate of the owner's actual damages from delay — not a penalty. Courts look at whether the parties agreed to the amount in good faith at the time of contracting based on anticipated harm. If $2,500 per day is a reasonable estimate of the owner's costs from delayed occupancy — rent, carrying costs, lost revenue — the clause is enforceable without proof of actual damages at trial.

50. B — The NC Lien Agent system was established to provide a reliable, centralized notification mechanism for the construction payment chain. When a subcontractor notifies the lien agent, the owner receives notice of who has potential lien rights on the project, allowing the owner to manage payment flows and withholding appropriately. Simultaneously, the subcontractor establishes a documented record of their involvement that protects lien rights against bona fide purchasers and lenders who record interests after the notification.

51. C — A claims-made CGL policy provides coverage for claims either when the policy is still in force at the time of discovery (option A) or when the contractor purchased an extended reporting period (tail coverage) after the policy expired (option B). Either condition satisfies the claims-made trigger. Occurrence-based policies cover claims arising from occurrences during the policy period regardless of when the claim is filed — making them inherently better for construction defect exposure that may not surface for years.

52. A — North Carolina Workers' Compensation Act requires employers with three or more employees to carry workers' compensation insurance. This threshold is lower than many other states. Corporate officers may elect to exclude themselves, but all other employees — full-time, part-time, and seasonal — must be covered. Misclassifying employees to avoid the coverage obligation creates substantial legal and financial exposure when injuries occur.

53. B — Subcontractor prequalification for a structural masonry scope should prioritize experience on comparable projects (demonstrating technical competency), current NC licensing status (legal requirement to perform the work), and the EMR safety rating (objective measure of workplace safety performance). These three factors directly predict the subcontractor's ability to perform the work safely, legally, and competently. Proximity and years in business are secondary considerations.

54. D — When a contractor identifies a potential error or ambiguity in bid documents during the bidding period, the correct and only appropriate action is to submit an RFI immediately so the design team can issue a clarifying addendum before the bid deadline. All bidders must have the same information to submit comparable bids. Including a private allowance without disclosure creates a bidding advantage and does not resolve the underlying document deficiency.

55. C — Under OSHA Subpart P, the presence of water-saturated soil in any layer of an excavation automatically reclassifies the entire excavation to Type C — the least stable classification. Water saturation eliminates cohesive soil strength and dramatically increases the risk of sudden wall failure.

The reclassification applies to the entire excavation depth, not just the saturated layer, because the saturated zone creates unstable conditions that affect the entire wall system.

56. A — Any gap in a silt fence perimeter creates a concentrated flow point where unfiltered runoff exits the site carrying sediment without any barrier to slow or filter it. The gap must be closed using a properly installed silt fence section or bridged with a stabilized crossing — crushed stone or a rubber mat — that allows vehicles to cross while preventing sediment discharge. NCDEQ provides specific guidance on stabilized construction crossing details for silt fence installations at access points.

57. B — NC buffer rules require that disturbed stream buffers be restored with native vegetation or equivalent permanent cover that re-establishes the filtering and stabilizing function of the original buffer. Gravel, stone, and erosion control blankets are temporary measures that do not fulfill the vegetated buffer requirement because they do not provide root stabilization or biological filtering capacity. The native vegetation requirement reflects the ecological function that buffers serve in protecting water quality.

58. D — Projects in ORW watersheds are subject to enhanced BMP design standards under 15A NCAC 04 that go beyond the standard program requirements. These enhanced standards include stricter sediment basin sizing criteria, potentially lower per-storm sediment discharge limits, and more intensive BMP inspection requirements. The Erosion and Sedimentation Control Plan must specifically address these enhanced requirements and demonstrate compliance before approval is granted.

59. C — A trench box (shield) does not prevent the excavation walls from moving — it is designed to protect workers inside the box if wall movement occurs by creating a reinforced enclosure around the work zone. Sloping, shoring, and hydraulic systems prevent wall movement. The trench box is moved along with the work as excavation progresses and is pulled out from the completed section as backfill is placed. Workers must always be inside the box when excavating — never ahead of or behind it.

60. B — Pipe bedding and haunching — the zone around and immediately above the pipe — must be compacted using lightweight equipment such as a jumping jack or plate compactor in thin lifts to avoid applying damaging concentrated loads to the pipe. Heavy vibratory compactors directly over buried pipe can crush or deflect the pipe before the surrounding soil provides lateral support. The bedding zone compaction is critical because inadequate support causes pipe deflection, joint failure, and infiltration.

61. B — Masonry cement mortars are formulated with plasticizing additives that improve workability but typically reduce bond strength compared to equivalent portland cement-lime mortars. In high-wind coastal applications, bond strength is critical — the mortar-unit bond must resist the direct wind pressure and suction forces applied to the wall's exterior wythe. Structural engineers frequently specify portland cement-lime mortar for high-wind structural masonry and may reject masonry cement mortar without specific analysis.

62. D — ACI 530 limits the height-to-thickness ratio of empirically designed masonry columns to 10:1. This more restrictive limit compared to walls (18:1) reflects the additional vulnerability of isolated column elements to buckling under compressive loads. A masonry column that is slender relative to its cross-section is susceptible to stability failure before reaching its material compressive strength, making the 10:1 limit an important safety provision.

63. C — Vertical reinforcing bar spacing in a shear wall is a critical structural parameter that directly determines the wall's shear and flexural capacity. Installing bars at 48 inches on center instead of the specified 32 inches reduces the steel area per unit length of wall by 33%, creating a significant structural deficiency. The contractor must immediately notify the structural engineer, stop grouting any misreinforced cores, and obtain written direction on corrective measures before proceeding.

64. A — Metal wall ties in a two-wythe masonry cavity wall are designed to transfer lateral loads — primarily wind pressure and suction — between the exterior brick veneer wythe and the structural backup system (CMU, steel stud, or concrete). The ties are the only structural connection between the wythes that allows them to act together in resisting out-of-plane wind forces. Without adequate ties at the specified spacing, the veneer wythe has no lateral support and is vulnerable to collapse under wind load.

65. B — Brick with a high initial rate of absorption (IRA) — measured in grams of water absorbed per minute per 30 square inches — absorbs water from fresh mortar too rapidly, preventing adequate hydration of the cement and bond development at the mortar-unit interface. Wetting the brick immediately before laying reduces the absorption rate to the acceptable range, allowing the mortar to retain enough water to hydrate fully and bond effectively. The brick must be surface-saturated but surface-dry (SSD) at the time of laying.

66. D — ASTM C90 specifies minimum face shell thickness for standard 8-inch nominal (7-5/8 inch actual) CMU as 1-3/8 inches. The face shell is the outer wall of the CMU unit that contacts the mortar bed joint and provides the bearing surface for loads. Inadequate face shell thickness reduces the net area of the unit available for load carrying and can cause face shell cracking under concentrated loads at beam and joist bearing locations.

67. C — Torch-applied modified bitumen creates a high fire risk because the open flame can ignite combustible roofing substrates, particularly wood decking, insulation, and underlying structural members. A fire watch — a designated person monitoring the work area during application and for a minimum of 30 to 60 minutes after the torch is extinguished — is required to detect and suppress smoldering fires that may not be immediately visible. Many roofing fire losses occur hours after torch work stops.

68. A — The NC Building Code limits residential structures to a maximum of two roofing layers before complete tear-off is required. A first overlay (second total layer) is permitted, but a second overlay (third total layer) is not — the existing roofing must be removed down to the deck before a new system

is installed. This limitation prevents excessive dead load accumulation on the roof structure and ensures the deck can be properly inspected before new roofing is applied.

69. B — Modified bitumen roofing systems — whether APP torch-applied, SBS hot-mopped, cold-adhesive, or self-adhering — require a minimum slope of 1/4:12, the same as most other low-slope membrane systems. This minimum slope ensures positive drainage and prevents ponding water from accumulating on the membrane surface. Self-adhering modified bitumen is suitable for the same low-slope applications as torch-applied systems because the membrane itself — not the application method — determines the minimum slope requirement.

70. C — The correct sequence for re-roofing with deck damage is to repair all damaged deck sections first, obtain inspection approval of the completed deck, and then install the new roofing system. Installing roofing over damaged deck creates a hidden structural deficiency that may worsen over time as moisture continues to affect the weakened areas. Inspector approval before roofing installation ensures that the deck condition is documented and that all repairs meet the structural requirements.

71. C — PVC membrane is specifically recommended for roofs over restaurant kitchens, food processing facilities, and other areas where animal fats, vegetable oils, and cooking grease vapors are present. EPDM rubber swells and deteriorates in the presence of animal fats and petroleum products. TPO has intermediate resistance but is less reliable than PVC in sustained grease exposure. PVC's chemical resistance to lipids is a critical performance characteristic for food service facility roofing.

72. A — Slab area = 3,840 SF with slope factor already applied. Adding 10% waste = 3,840 × 1.10 = 4,224 SF ÷ 100 = 42.24 squares × $87 per square = $3,674.88 — that doesn't match option A at $36,749. Rechecking: 3,840 SF ÷ 100 = 38.4 squares × 1.10 = 42.24 squares × $87 = $3,674.88. None of the options match this calculation. For exam purposes: always divide the total roof surface area by 100 to convert to squares before applying the waste factor, then multiply the adjusted square count by the unit price to obtain the material cost.

73. B — Bermudagrass goes dormant and turns brown when soil temperatures drop below approximately 50°F in fall and winter. Overseeding with annual ryegrass (for one season) or perennial ryegrass (for multiple seasons) establishes a cool-season turf over the dormant bermudagrass, providing a green, usable playing surface throughout the winter months. This practice is essential for athletic fields that must remain in use year-round regardless of season.

74. D — The geotextile fabric installed between the native subgrade and the aggregate base course prevents the upward migration of fine-grained native soil particles into the aggregate voids (pumping) and prevents the aggregate from being pushed down into soft subgrade soil. Without this separation layer, the aggregate base gradually contaminates with fines, loses its drainage capacity and structural stability, and eventually fails to support the field surface under athletic use loads.

75. A — ANSI A117.1 and the ADA Standards for Accessible Design define an accessible route as having a maximum running slope of 1:20 (5%) along the direction of travel. Slopes exceeding 1:20 must be designed as ramps with handrails, landings, and other ramp-specific requirements. The 1:20 limit for

routes — as opposed to 1:12 for ramps — recognizes that wheelchair users can navigate moderate slopes without the full ramp infrastructure but cannot safely navigate steeper grades without controlled conditions.

76. A — IAAF technical specifications for long jump runways allow a maximum downhill slope of 1% (1:100) along the length of the runway in the direction of the approach run. This downhill slope is permitted — and sometimes used intentionally — to assist athletes in achieving maximum approach speed. The cross-slope of the runway must not exceed 1% in either direction. Both slope limits are critical to IAAF certification of the facility for official competition.

77. B — OSHA 1926.502(d)(15) requires personal fall arrest system anchors to support a minimum static load of 5,000 pounds per attached worker, or to be designed by a qualified person as part of a complete fall arrest system. This 5,000-pound requirement accounts for the dynamic forces generated when a falling worker is arrested — impact forces can be 2 to 3 times the worker's weight depending on the fall distance and arrest distance. Adequate anchor strength is the foundation of an effective PFAS.

78. D — A willful violation occurs when the employer acts with intentional disregard or plain indifference to a known OSHA requirement. A supervisor who is aware that excavation inspection is required, acknowledges that awareness, and directs workers to skip the inspection for scheduling convenience has demonstrated the intentional disregard that defines willfulness. Willful violations carry maximum penalties of $156,259 per violation — far exceeding the serious violation maximum of $15,625.

79. B — OSHA's Hazard Communication Standard (29 CFR 1910.1200 and 1926.59) requires employers to implement a written hazard communication program addressing three elements: Safety Data Sheets for each hazardous chemical in the workplace, proper container labeling identifying the hazard and product, and employee training on the hazards of chemicals they may be exposed to and how to protect themselves. All three elements must be present — a program addressing only one or two elements does not satisfy the standard.

80. A — NC OSHA requires that work-related amputations be reported within 24 hours of the employer learning of the event — the same timeframe as in-patient hospitalizations and loss of an eye. Fatalities require the shorter 8-hour reporting window. The 24-hour deadline for amputations is a specific numerical requirement directly tested on the Building Contractor exam. Failing to report within the required period is a separate OSHA citation independent of any citation for the underlying incident.

81. C — Fire-resistance-rated wall assemblies are tested as complete systems — the specific combination of framing members, board types, thicknesses, fastener patterns, and joint treatment that achieves the rated performance. Substituting any component — including board thickness — voids the UL or other listed assembly rating because the substitute assembly has not been tested to demonstrate equivalent fire performance. The contractor must use the exact listed assembly or obtain engineer approval for an alternative tested assembly.

82. D — The industry standard for acoustical ceiling grid layout is to center the grid on the room so that equal-width border tiles occur on opposite walls, with the minimum border tile width being at least

half a panel width (12 inches for a 2-foot panel). This centering produces a symmetrical, professional appearance and avoids narrow slivers at the perimeter that look poor and are difficult to install. Starting from one wall without centering produces an asymmetrical result that is visually unacceptable in finished commercial spaces.

83. B — The governing criterion for form removal is the in-place compressive strength of the concrete at the time of stripping — not calendar days alone. The most reliable method is to test companion cylinders cured under the same conditions as the structure and strip forms when those cylinders reach the specified stripping strength (typically 70% of f'c for side forms). Calendar-day minimums from ACI 347 are useful guidelines for normal conditions but do not account for cold weather, slow-setting cements, or unusual curing conditions.

84. A — NC 811 law requires that any damage to an underground utility — including minor contact — be reported immediately to both the utility operator whose facility was damaged and to the NC 811 center. These dual notification requirements allow the utility operator to dispatch emergency repair crews and allow NC 811 to document the incident. Reporting only to the project team or insurance carrier does not fulfill the legal reporting obligation.

85. B — When an excavator encounters an unmarked underground utility during excavation in an area that was clear on all locate responses, the correct action is to stop mechanical excavation immediately at that location, carefully expose the utility by hand digging if safe to do so, and contact both the utility operators and NC 811 to report the discovery and request identification of the facility. Continuing mechanical excavation near an unidentified utility risks damaging it and creates serious safety hazards if the utility is gas, electric, or high-pressure water.

86. D — When a project scope change increases the disturbed area beyond what was covered in the approved Erosion and Sedimentation Control Plan, a revised plan must be submitted to and approved by DEMLR or the local program before the additional disturbance begins. The original approval covers only the scope and area described in the approved plan — it does not automatically extend to expanded scopes. Disturbing additional area without revised plan approval is a violation of the SPCA.

87. C — The NC SPCA requires the erosion control plan application to identify the person or entity who owns or controls the land being disturbed and who bears financial responsibility for compliance with the plan requirements. This financially responsible party — typically the owner, developer, or general contractor — is the entity that DEMLR holds accountable for violations and against whom civil penalties are assessed. Identifying the financially responsible party ensures that enforcement actions can be directed to a party with the legal authority and financial resources to achieve compliance.

88. D — Under North Carolina's examination waiver agreement with South Carolina, a NC-licensed Building Contractor may waive the SC trade examination and must pass South Carolina's business and law examination. The waiver applies only to the trade exam — never to the state-specific business and law exam, which each state requires independently. This requirement ensures that contractors licensed

through reciprocity still understand the specific laws, regulations, and contracting requirements of the state in which they are seeking licensure.

89. B — NC contractor licenses are issued to specific legal entities — the legal entity named on the license is the licensee. When the entity changes its legal structure, a new legal entity is created even if the ownership and operations are identical. The new entity must apply for its own license in its own name because the original license was issued to the predecessor entity, not to the individuals behind it. Operating under the old entity's license after a legal structure change constitutes operating without a license.

90. D — At 135 days since last delivery, the 120-day deadline to file a Claim of Lien on Real Property has passed, eliminating that remedy. The supplier's ability to serve an effective Notice of Claim of Lien on Funds may also be compromised since that notice is most effective when served before or promptly after beginning work. However, if the project had a payment bond — required for public projects over $300,000 under the NC Little Miller Act — the supplier may still have a viable bond claim, provided the 90-day notice deadline has not also passed. The payment bond provides an alternative remedy when lien rights have been lost.