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COURSE 962798

Residential Rehabilitation Part 4 - Structural System

Exam Material

Uscontractorlicense LLC

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Summary Of This Course

RESIDENTIAL REHABILITATION - PART 4 STRUCTURAL SYSTEM

Approved by the

Wisconsin Department of Safety and Professional Services Safety and Buildings Division

Course Identification Number 962798

Educational Credit Hours: 4 Hours

Course Provider:

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This Blueprint Plans and Drawings course will provide the basis for using a set of architectural plans. You will explore the various views of plan drawings and how to visualize and interpret those drawings.

This Course is approved for the following electrical Registrations/Certifications or Licenses:

Dwelling Contractor Qualifier	4 Hours of Continuing Education	

This course is a distance learning or e-learning course, which allows the attendee to complete the course on their time schedule.

Course Outline

This course is a distance learning or e-learning course, which allows the attendee to complete the course on their time schedule.

Structural System

Seismic Resistance

Wind Resistance

Masonry, General

Masonry, Foundations and Piers

Above-Ground Masonry Walls

Chimneys

Wood Structural Components

Iron and Steel Structural Components

Concrete Structural Components

Exam

120 questions related to the reference materials are used to test the attendee on their comprehension of the materials. A 70% score will need to be attained in order to pass this course.

Answer Sheet(s)

1 bubble style answer sheets are included. When you are finished with the exam, you may return the answer sheets for grading to:

By Mail: Uscontractorlicense LLC
PO Box 268
Platteville, Wisconsin 53818

By Email: michael@uscontractorlicense.com

By Fax: 608-571-0096

Once we get the answer sheets back, we will graded them, enter your hours into the attendance portal and email or mail you back your certificate of completion(s). You will be responsible for renewing your license with the DSPS at www.license.wi.gov website.

Any questions, please contact us at 608.348.6688

Questions 1 thru 15 are based on Section 4.1 – Seismic Resistance from Residential Inspection, Structural System

1. Buildings in which seismic zones should be evaluated for structural vulnerability by a structural engineer?
A. Zones 1 and 2A
B. Zones 2A and 3
C. Zones 2B, 3, and 4
D. Zones 1 and 2B

2. Wood frame buildings with brick or stone veneer are considered:
A. Masonry buildings
B. Mixed construction
C. Reinforced masonry
D. Wood frame buildings

3. Wood frame buildings that are not physically anchored to their foundations may be vulnerable to:
A. Fire damage
B. Termite infestation
C. Shifting or sliding
D. Wind uplift only

4. Wood frame buildings supported above ground on short cripple walls or piers may be vulnerable to:
A. Corrosion
B. Fire spread
C. Settlement only
D. Tilting or falling over

5. Unreinforced masonry buildings in seismic zones may be vulnerable to:
A. Insect attack
B. Roof leakage
C. Total or partial collapse
D. Wood decay

6. Buildings of any type that have irregular shapes may be vulnerable to:
A. Moisture intrusion
B. Partial collapse
C. Wind erosion
D. Foundation frost heave

7. Wood frame or masonry buildings with more than one story and a large unobstructed open space at grade (such as a garage) may be vulnerable to:
A. Roof sagging
B. Foundation settlement
C. Collapse of the story at grade
D. Chimney failure

8. Buildings constructed on sloping hillsides in seismic zones 2B, 3, and 4 may be vulnerable to:
A. Fire spread
B. Differential thermal cracking
C. Sliding
D. Overloading

9. In seismic zone 2A, buildings with more than two stories above grade should be checked particularly for:
A. Termite infestation
B. Roof ventilation
C. Large open spaces at grade and sloped sites
D. Window flashing defects

10. Masonry bearing wall buildings in seismic zones 2B, 3, and 4 should be investigated for:
A. Moisture content
B. Lintels only
C. Presence of reinforcing steel
D. Wood framing defects

11. Buildings not of wood frame or masonry construction (such as adobe or log structures) in any seismic zone should:
A. Be demolished
B. Be ignored
C. Be investigated by a structural engineer for seismic vulnerability
D. Be reinforced automatically

12. A structural engineer should check the anchorage of wood-framed structures to their foundations in seismic zones:
A. 1 only
B. 2A only
C. 2, 3, and 4
D. 1 and 2A only

13. In all seismic zones, buildings with more than one story above grade and a large unobstructed open space at grade should:
A. Be inspected only visually
B. Be reinforced with steel automatically
C. Be investigated by a structural engineer
D. Have additional drywall installed

14. Buildings constructed on steep slopes of 20 degrees or more are particularly vulnerable to:
A. Moisture expansion
B. Insect infestation
C. Sliding
D. Roof uplift

15. Which of the following conditions increases seismic vulnerability in wood frame buildings?
A. Brick veneer finish
B. Proper anchorage to foundation
C. Reinforced cripple walls
D. Lack of anchorage to the foundation

Questions 16 thru 20 are based on Section 4.2 – Wind Resistance from Residential Inspection, Structural System

16. Hurricanes are characterized by which of the following conditions?
A. Short-duration straight-line winds only
B. Gusting winds from different directions, rain, flooding, high waves, and storm surges
C. Snow accumulation and ice dams
D. Earth movement and aftershocks

17. In hurricane or high-wind regions, a structural engineer should check the building's structural system for:
A. Termite infestation
B. Foundation settlement only
C. Continuity of load path, including resistance to uplift forces
D. Interior wall cracking

18. When inspecting an attic in a high-wind region, what roof condition should be checked?
A. Presence of ridge vents only
B. Insulation thickness
C. Improper attachment of roof sheathing, such as unengaged or partially engaged nails
D. Color of roof decking

19. Hurricane hold-down clips should be present at:
A. Interior partition walls only
B. Basement floor joists only
C. Window headers only
D. Joists, rafters, and trusses at the exterior wall

20. If airborne debris breaches a building's exterior envelope during a severe wind event, the building may:
A. Become insulated
B. Experience foundation settlement
C. Become pressurized, increasing damaging wind pressures on walls and roof
D. Reduce internal air pressure automatically

Questions 21 thru 40 are based on Section 4.3 – Masonry, General from Residential Inspection, Structural System

21. Before beginning a detailed masonry inspection, the inspector should first determine:
A. The age of the roof
B. The paint type used
C. Which walls are load-bearing and which are not
D. The type of floor covering

22. Load-bearing walls can often be identified by examining:
A. The exterior siding
B. Beams and joists in the basement, crawl space, or attic
C. Window trim details
D. Interior paint color

23. Exposed masonry should be inspected for all of the following EXCEPT:
A. Cracking
B. Spalling
C. Bowing
D. Electrical grounding

24. Sweeping in masonry refers to:
A. Vertical bulging
B. Horizontal bulging
C. Leaning inward
D. Surface dusting

25. Compared to older masonry walls, walls built in the last 40–50 years tend to be:
A. Thicker and more flexible
B. Thinner and more flexible
C. Thinner and more brittle
D. Solid stone construction only

26. A probe hole drilled through mortar joints can help determine:
A. Roof pitch
B. Wall thickness and adequacy of mortar
C. Foundation depth
D. Brick color consistency

27. The hammer test is used to determine:
A. Soil compaction
B. Roof sheathing attachment
C. Structural soundness of masonry units and bond to mortar
D. Thermal movement

28. Masonry cracking can result from:
A. Differential settlement
B. Thermal expansion and contraction
C. Freeze-thaw cycles
D. All of the above

29. A clean masonry crack generally indicates:
A. Long-term inactivity
B. Previous repair
C. Recent movement
D. Freeze damage

30. A dirty or previously filled crack may indicate:
A. Active structural failure
B. Inactive movement
C. Immediate collapse
D. Termite damage

31. Crack movement can be measured using:
A. A moisture meter
B. A plumb bob
C. A commercially available joint movement indicator
D. A stud finder

32. Cyclical cracks associated with thermal expansion should be repaired using:
A. High-strength mortar
B. Portland cement only
C. Epoxy injection
D. Flexible sealant

33. Remortaring cyclical cracks may:
A. Stop all movement permanently
B. Strengthen the wall
C. Hold the crack open and cause further cracking
D. Prevent thermal expansion

34. Mortar deterioration is most commonly found in areas of:
A. Direct sunlight only
B. Heavy foot traffic
C. Excessive moisture
D. Dry interior walls

35. Using high-strength mortar to point older, lower-strength mortar can:
A. Improve flexibility
B. Prevent moisture intrusion
C. Cause serious damage because it cannot flex like the original mortar
D. Increase drainage

36. Mortar acts as a drainage system by:
A. Blocking all moisture
B. Increasing hydrostatic pressure
C. Equalizing hydrostatic pressure within the masonry
D. Preventing evaporation

37. Mechanical spalling of brick is primarily caused by:
A. Insect infestation
B. Excessive heat
C. Moisture entering the brick and freezing
D. Overloading

38. Chemical deterioration of brick is often due to:
A. UV radiation
B. Wind erosion
C. Leaching of chemicals from the ground into the brick
D. Improper painting

39. Surface sealants (damp proofing coatings) are rarely effective because they may:
A. Increase brick strength
B. Prevent all moisture movement
C. Trap moisture or soluble salts and hasten deterioration
D. Improve drainage

40. Chemical deterioration of brick can sometimes be slowed by:
A. Painting the surface
B. Installing additional lintels
C. Increasing wall thickness
D. Adding a damp proof course or injecting damp proofing material above ground line

Questions 41 thru 60 are based on Section 4.4 – Masonry Foundations and Piers from Residential Inspection, Structural System

41. Differential settlement in small residential buildings is generally:
A. Extremely common and always severe
B. Relatively uncommon but potentially a major structural problem
C. Always caused by termites
D. Only cosmetic

42. Uneven settlement of masonry foundations is also called:
A. Frost heaving
B. Soil shrinkage
C. Differential settlement
D. Spalling

43. Vertical distortion, sloped floors, and sticking doors are signs of:
A. Thermal expansion
B. Wind uplift
C. Differential settlement
D. Roof failure

44. Settlement most often occurs:
A. After 50 years of occupancy
B. Early in the life of a building or after major underground changes
C. Only during winter
D. Only in wood-frame buildings

45. Soil shrinkage that contributes to settlement can be caused by:
A. Heavy snowfall
B. Loss of moisture to nearby trees or large plants
C. Interior plumbing leaks only
D. Increased attic ventilation

46. Soil swelling beneath footings may result from:
A. Dry conditions
B. Inadequate or blocked surface or house drainage
C. Proper grading
D. Reinforced masonry

47. Soil heaving may be caused by:
A. Sun exposure
B. Wind pressure
C. Frost or excessive root growth
D. Excess insulation

48. Underground water may cause foundation problems by:
A. Increasing insulation value
B. Scouring earth along one side of a footer, causing rotation
C. Drying out the soil
D. Strengthening footings

49. Soil compaction or movement due to vibration can result from:
A. Interior painting
B. Lawn irrigation
C. Heavy equipment, traffic, blasting, or earthquakes
D. Roof shingle replacement

50. Gradual settlement over a long period may:
A. Always produce wide cracks
B. Produce little or no cracking in softer masonry walls
C. Collapse the building immediately
D. Prevent door operation only

51. Rapid settlement typically produces cracks that:
A. Are perfectly horizontal
B. Taper, being widest at one end and narrowing at the other
C. Are circular
D. Appear only in plaster

52. Settlement cracks often occur:
A. Only in floor slabs
B. At corners and adjacent to openings, often diagonally along mortar joints
C. In roof shingles
D. In attic insulation

53. Large differential settlement between foundation walls and interior columns may cause:
A. Improved load distribution
B. Loss of bearing and fracture of structural members
C. Better roof alignment
D. Only cosmetic issues

54. Strengthening a foundation may involve:
A. Painting the wall
B. Adding pilasters or pressure-injecting concrete epoxy grout
C. Increasing attic insulation
D. Replacing windows

55. If movement continues and cracking is extensive, the problem may require:
A. Repointing only
B. Caulking
C. Underpinning
D. New gutters

56. Masonry piers are commonly used to:
A. Support roof shingles
B. Support internal loads or projecting elements like porches and bay windows
C. Ventilate crawl spaces
D. Anchor siding

57. Settlement or rotation of a pier footing can cause:
A. Stronger floor framing
B. Loss of bearing capacity and sagging of wood framing above
C. Reduced moisture intrusion
D. Roof uplift

58. Frost heaving of a pier is usually caused by:
A. Properly installed deep footings
B. Interior heating
C. Inadequate footing depth
D. Steel reinforcement

59. A sign of overstressing in masonry piers is:
A. Horizontal hairline cracks only
B. Surface dusting
C. Vertical cracking or bulging
D. Efflorescence

60. The width-to-height ratio of masonry piers should not exceed:
A. 1:5
B. 1:8
C. 1:10
D. 1:15

Questions 61 thru 80 are based on Section 4.5 – Above-Ground Masonry Walls from Residential Inspection, Structural System

61. Above-ground brick walls expand primarily during:
A. Cold weather
B. Rainstorms
C. Warm weather, especially on south- or west-facing walls
D. Nighttime only

62. Thermal cracks in masonry walls are typically:
A. Permanent and non-moving
B. Vertical only
C. Cyclical, opening and closing with seasonal temperature changes
D. Always structural failures

63. Cracking at corners of long walls is often caused by:
A. Wind uplift
B. Thermal movement stress concentrations
C. Termite infestation
D. Roof sagging

64. Horizontal or diagonal cracks near the ground at piers in long walls are usually due to:
A. Overloading
B. Horizontal shearing stresses from thermal expansion
C. Fire damage
D. Insect attack

65. Vertical cracks near end walls may occur because:
A. Masonry absorbs too much water
B. A contracting wall cannot pull its end walls inward due to insufficient tensile strength
C. Roof loads increase
D. Footings are too deep

66. Cracks around stone sills or lintels are commonly caused by:
A. Excessive insulation
B. Expansion of surrounding masonry against tight-fitting stone pieces
C. Improper painting
D. Floor settlement

67. Thermal and moisture-related cracks should generally be repaired with:
A. High-strength mortar
B. Portland cement only
C. Epoxy grout
D. Flexible sealant

68. Severe thermal cracking may require installation of:
A. Additional insulation
B. Expansion joints
C. Steel beams
D. Roof ties

69. Freeze-thaw distress in brick walls commonly appears around:
A. Floor joists
B. Interior partitions
C. Sills, cornices, chimneys, parapets, and eaves
D. Basement slabs

70. Rusting of embedded iron or steel in masonry causes:
A. Shrinkage
B. Expansion that exerts pressure on surrounding masonry
C. Improved bonding
D. Increased flexibility

71. A rust stain on masonry is often an indication of:
A. Mold growth
B. Corrosion of embedded metal
C. Thermal expansion
D. Excess lime

72. If the joint between masonry and a steel lintel has been sealed, it should be:
A. Painted
B. Reinforced
C. Cleared of sealant or mortar
D. Covered with flashing

73. Step cracks forming in an inverted "V" above an opening usually indicate:
A. Foundation settlement only
B. Failure or deflection of lintels or arches
C. Proper load transfer
D. Insect damage

74. Roof spreading due to inadequate horizontal ties may cause masonry to:
A. Contract
B. Strengthen
C. Crack horizontally below the eaves or move outward
D. Dry out

75. Masonry arches may fail if:
A. They are painted
B. Mortar is too flexible
C. Surrounding walls cannot provide adequate counterthrust
D. Insulation is missing

76. Bulging of an entire masonry wall is often due to:
A. Interior painting
B. Thermal or moisture expansion of the outer surface or contraction of the inner withe
C. Proper drainage
D. Termite activity

77. Small bulges in the outer masonry course can sometimes be corrected by:
A. Removing insulation
B. Adding paint
C. Pinning to the inner course or dismantling and rebuilding
D. Ignoring the issue

78. The "V3 rule" considers a wall unsafe when:
A. Cracks exceed 1/8 inch
B. The wall bulges outward 1 inch
C. A plumb line through the center of gravity falls outside the middle one-third of the base
D. The mortar color changes

79. Leaning masonry walls are usually caused by:
A. Excessive ventilation
B. Poor design, inadequate structural tying, or poor foundation work
C. Thermal cycling only
D. Roof insulation

80. Parapet walls often deteriorate due to:
A. Interior humidity
B. Full exposure to weather, lack of restraint, and inadequate expansion joints
C. Carpet installation
D. Window replacement

Questions 81 thru 85 are based on Section 4.6 – Chimneys from Residential Inspection, Structural System

81. Differential settlement of a chimney is most commonly caused by:
A. Wind uplift
B. An inadequate foundation
C. Thermal expansion
D. Interior remodeling

82. When a chimney is part of an exterior wall and settles differentially, it will tend to:
A. Lean toward the building
B. Remain unaffected
C. Lean away from the wall and crack at the joint with other masonry
D. Collapse immediately

83. Deterioration of masonry near the top of a chimney is often caused by:
A. Excess insulation
B. A deteriorated cap allowing water penetration and freeze-thaw damage
C. Termite infestation
D. Interior humidity

84. If a chimney cap is made of mortar and there is no hood, the recommended correction is to:
A. Paint the mortar
B. Add more mortar
C. Replace it with a stone or concrete cap
D. Install additional flashing only

85. Leaning of a chimney above the roofline may be caused by:
A. Proper ventilation
B. Deteriorated mortar joints from wind-induced sway or sulfate attack
C. Excess attic insulation
D. Interior plaster cracks

Questions 86 thru 100 are based on Section 4.7 – Wood Structural Components from Residential Inspection, Structural System

86. Wood structural components in small residential buildings are most often directly observable in:
A. Finished living rooms
B. Kitchens
C. Attics, crawl spaces, and basements
D. Exterior siding

87. Common signs of wood structural problems include:
A. Peeling paint
B. Wallpaper bubbles
C. Sloping or springy floors and sticking doors/windows
D. Brick efflorescence

88. When wood structural failures occur, they usually:
A. Cause total building collapse
B. Involve individual members with stress redistributed to others
C. Immediately fail the entire roof system
D. Affect only exterior walls

89. Once a wood structural member has permanently deflected, it:
A. Can be straightened completely
B. Will regain its original shape naturally
C. Cannot be straightened
D. Becomes stronger

90. Loss of bearing in beams and joists may result from:
A. Proper installation
B. Excessive ventilation
C. Long-term deflection, differential movement, crushing, or decay
D. Painting

91. Sagging or sloping floors may be caused by:
A. Proper span design
B. Foundation settlement or excessive spans
C. Carpet installation
D. Wall painting

92. Inappropriate holes cut near the top or bottom of joists may:
A. Improve airflow
B. Increase strength
C. Weaken structural elements
D. Prevent decay

93. A marble rolled across a floor is used to:
A. Measure moisture
B. Check for termite damage
C. Determine direction and degree of floor slope
D. Test insulation

94. Sagging near stairway openings in older homes is:
A. Always a major structural failure
B. Caused by termite infestation
C. Common and usually not structurally serious
D. Always due to foundation collapse

95. Sagging in sloped roofs may result from:
A. Proper bracing
B. Too many layers of roofing material increasing dead load
C. Excess ventilation
D. Short rafters

96. Fire Retardant Plywood (FRP) may prematurely fail due to:
A. Excess humidity only
B. Termite attack
C. Excessive heat in attic spaces
D. Overpainting

97. Roof spreading downward and outward is often caused by:
A. Strong collar ties
B. Adequate tying of rafters
C. Inadequate tying or missing collar beams
D. Proper bracing

98. Wood will generally not decay if its moisture content remains below:
A. 30–35%
B. 20–25%
C. 25–30% required for decay; properly protected wood is usually 10–15%
D. 5%

99. Wood with a moisture meter reading above 20–25% should be:
A. Ignored
B. Painted
C. Thoroughly examined for rot or infestation
D. Sanded only

100. When exposed to fire, wood first:
A. Melts
B. Immediately disintegrates
C. Browns, then blackens, then ignites and chars
D. Expands like steel

Questions 101 thru 111 are based on Section 4.8 – Iron and Steel Structural Components from Residential Inspection, Structural System

101. In small residential buildings, metal structural components are most commonly used as:
A. Roof shingles
B. Exterior siding
C. Beams, pipe columns, and lintels over openings
D. Floor finishes

102. In buildings erected before 1890–1900, structural metal components may be made of:
A. Aluminum
B. Copper
C. Cast or wrought iron
D. Stainless steel

103. Cast iron differs from steel primarily because it is:
A. Stronger in tension
B. More flexible
C. Weaker in tension
D. Immune to corrosion

104. The most common problem associated with iron and steel structural components is:
A. Termite damage
B. Thermal expansion
C. Corrosion
D. Moisture absorption

105. Rain and snow can accelerate corrosion of embedded metal because they may contain:
A. Lime
B. Sand particles
C. Carbonic, sulfuric, nitric, or hydrochloric acids
D. Oil residues

106. When inspecting steel lintels, the inspector should ensure they have:
A. Decorative paint
B. Insulation
C. Adequate bearing and no severe corrosion
D. Wood backing

107. Corrosion of embedded steel can cause surrounding masonry to:
A. Shrink
B. Strengthen
C. Crack and become displaced
D. Insulate better

108. Columns should be checked for:
A. Wallpaper adhesion
B. Proper attic ventilation
C. Adequate connections at top and bottom and corrosion at the base
D. Paint thickness

109. If a steel beam shows deflection in a small residential building, the inspector should:
A. Ignore it
B. Paint it
C. Determine the cause and add supplemental supports or plates if necessary
D. Remove it immediately

110. After fire exposure, an iron or steel member that remains in place with only minor distortion is generally considered:
A. Unsafe and unusable
B. Completely failed
C. Serviceable
D. Structurally stronger

Questions 111 thru 120 are based on Section 4.9 – Concrete Structural Components from Residential Inspection, Structural System

111. In small residential buildings, concrete is most commonly used for:
A. Roof framing
B. Interior wall studs
C. Footings and grade or below-grade floors
D. Window trim

112. Concrete structural components are typically reinforced with:
A. Wood dowels
B. Plastic mesh
C. Steel bars or welded steel wire mesh
D. Fiberglass insulation

113. Welded steel wire mesh is most commonly used in:
A. Structural beams
B. Tall retaining walls
C. Floors at or below grade, patios, and light-load lintels
D. Chimney caps

114. Cracking at corners or openings in concrete foundations below masonry walls is often caused by:
A. Fire exposure
B. Drying shrinkage of concrete restrained by masonry above
C. Insect activity
D. Overpainting

115. Interior slab-on-grade cracking is usually caused by:
A. Excess attic heat
B. Shrinkage or minor settlement beneath the slab
C. Roof leaks
D. Steel corrosion only

116. Cracking in exterior concrete elements such as porches and stairs is often due to:
A. Proper drainage
B. Insufficient paint
C. Frost heaving, settlement, or freeze-thaw cycles
D. Excessive ventilation

117. Deicing salts can:
A. Strengthen concrete
B. Prevent cracking
C. Compound cracking and deterioration of exterior concrete
D. Improve drainage

118. Concrete exposed to fire will generally lose compressive strength, but if temperatures do not exceed approximately:
A. 212°F (100°C)
B. 400°F (204°C)
C. 550°F (290°C)
D. 1000°F (538°C)
Most of its strength may eventually be recovered.

119. Major structural cracks in fire-damaged concrete should be:
A. Ignored
B. Painted
C. Evaluated on a case-by-case basis and possibly sealed with epoxy grout
D. Covered with carpet

120. The Windsor Probe and Schmidt Hammer tests are used to estimate:
A. Soil moisture content
B. Reinforcement spacing
C. Quality, uniformity, and compressive strength of in-situ concrete
D. Paint adhesion

End of Test