Visit Suncam.com for more courses

Continuing Education Course #347
Tiny Houses Part 2
Structural Design

1. What is a common characteristic of trailers specifically designed for THOW construction?
- a. Wheels with larger diameters
- b. Larger perimeter and smaller interior structural members compared to flatbed trailers
- c. Aluminum construction for lighter weight
- d. Built-in entry door steps like RVs

2. What is not a benefit of using wood framing for a THOW?
- a. Wood is cheaper than steel
- b. There is less thermal bridging in wood framing compared to steel framing
- c. Structural members made of wood are often left exposed without a separate finish material covering them. Light gauge steel members are rarely left exposed.
- d. Comparably sized wood studs are lighter than light gauge steel studs

3. What is not a benefit of using light gauge steel framing for a THOW?
- a. Steel framing members don't have imperfections common to wood
- b. Steel framing is resistant to insects
- c. Steel framing is less expensive than wood framing
- d. Steel framing members are much lighter than wood

4. All sawn lumber in the United States is graded by the same set of rules.
- a. True
- b. False

5. The grade stamp on a piece of plywood shows a span rating of 48/24. What does the 24 mean?
- a. 24 inches is the maximum allowable on-center support spacing when used as structural floor sheathing
- b. 24 inches is the maximum allowable on-center support spacing when used as structural roof sheathing
- c. 24 inches is the shortest length the plywood can be cut and still used for structural applications
- d. 24 hours is the longest the plywood can remain unprotected and exposed to rain

6. What is the difference between the "Exterior" and "Exposure 1" APA bond classifications?
- a. Exposure 1 panels are for interior, exposed applications because they have a higher quality visual appearance (including less knots and plugs).
- b. Exposure 1 panels are rated to withstand an ASTM defined projectile launched at Category 1 hurricane wind speeds. Exterior panels are weaker and not designed to withstand this type of projectile.
- c. Exterior panels are for long-term exposure to weather and repeated cycles of wetting and drying. Exposure 1 panels are made for limited exposure and wetting during construction.
- d. There is no difference. Exposure 1 is the term used by the grading agency in western states. Exterior is the term used by the grading agency in eastern states.

7. On a sawn lumber grade stamp what does the acronym "KD" stand for?

- a. The seasoning condition, Kiln-Dried
- b. The tree species, Kentucky Douglas fir
- c. The grading agency, Keys-Draper
- d. The mill that cut the lumber, Kramer-Darby Lumber

8. The International Residential Code (IRC) requires a bedroom floor assembly to support a minimum floor live load of ____ pounds per square foot.

- a. 20
- b. 30
- c. 40
- d. 50

9. Typically, engineered wood I-joists consist of _____ flanges and _____ webs. Engineered wood I-joists are _____ than solid sawn lumber. The IRC _____ include tables for sizing engineered I-joists.

- a. plywood or OSB, LVL or solid sawn lumber, lighter, does
- b. plywood or OSB, LVL or solid sawn lumber, heavier, does
- c. LVL or solid sawn lumber, plywood or OSB, lighter, does
- d. LVL or solid sawn lumber, plywood or OSB, lighter, does not

10. A floor joist's tributary area is 40 $ft^2$. The total floor loading (live plus dead loading) is 50 pounds per square foot (psf). The joist is simply supported. What are the vertical reaction values at each end of the joist?

- a. 500 lbs at one end and 1,500 lbs at the other end
- b. 1,000 lbs at both ends
- c. 1,000 lbs at one end and 2,000 lbs at the other end
- d. 2,000 lbs at both ends

11. A 2x6 floor joist exerts a downward force on its joist hangers. At one end the magnitude of the force is 1,100 pounds. At the other end the magnitude of the force is 900 pounds. What 2x6 joist hanger(s) from Figure 3 in the course material should be used? Assume the joist wood species is appropriate for Figure 3.

- a. LUS26 at both ends
- b. LUC26Z at both ends
- c. HUS26 at both ends
- d. LUS26 at one end and HUS26 at the other end

12. How can you determine the strength axis direction for a structural panel?

- a. Modern structural panels are equal in strength in both directions. Strength axis is an obsolete term.
- b. For plywood look at the grain direction of the exterior plys or look for a stamp indicating the direction. With OSB look for a stamp indicating the direction.
- c. The direction is indicated on the bar code sticker for both plywood and OSB.
- d. Each manufacturer is different, so you must obtain their product guide.

13. What is the actual bending stress, $f_b$ for a 2x12 joist with a maximum moment, M of 1,800 ft-lbs?

- a. 450 psi
- b. 512 psi
- c. 600 psi
- d. 683 psi

14. What is the difference in tabulated bending stress, $F_b$ between Douglas fir-South select structural grade and stud grade?

- a. 375 psi
- b. 675 psi

- ○ c. 850 psi
- ○ d. 1,350 psi

15. When designing for a wind or earthquake load, what is the load duration factor, $C_D$ that the National Design Specification (NDS) for Wood Construction requires?

- ○ a. 0.9
- ○ b. 1.0
- ○ c. 1.6
- ○ d. 2.0

16. What is the actual shear stress, $f_v$ for a 2x6 joist with a maximum shear, $V$ of 600 lbs?

- ○ a. 75 psi
- ○ b. 100 psi
- ○ c. 109 psi
- ○ d. 171 psi

17. According to the course text, what is recommended for a THOW trailer-to-wall connection assigned to the $D_1$ seismic design category?

- ○ a. Galvanized steel plate washers 2" square and 3/16" thick
- ○ b. Galvanized steel plate washers 3" square and 0.229 inch thick
- ○ c. Holdowns
- ○ d. Either b or c

18. According to the IRC and course text, is a 1.625 inch diameter hole allowed to be drilled in the middle of a single 2x4 load bearing stud?

- ○ a. Yes, because the hole is less than or equal to 60% of the stud width
- ○ b. Yes, because the hole is less than or equal to 50% of the stud width
- ○ c. No, because the hole is more than 40% of the stud width
- ○ d. No, because only notches are allowed. Holes are prohibited.

19. What advanced framing technique is <u>not</u> recommended for weight saving purposes in a THOW?

- ○ a. Use 24 inch on-center stud spacing
- ○ b. Use single member headers instead of double member headers
- ○ c. Reduce or eliminate the number of jack studs
- ○ d. Eliminate headers in non-load bearing walls

20. What is the maximum span for No. 1 Spruce-pine fir 2x10 roof joists at 24" on-center spacing? Assume a dead load of 10 psf, roof live load of 20 psf (roof live load, not snow load controls), and $L / \Delta = 240$.

- ○ a. 13'-8"
- ○ b. 15'-10"
- ○ c. 18'-2"
- ○ d. 21'-0"

21. 2x8 rafters typically would use a _____ ridge board. A 4:12 pitch gable roof _____ use a ridge board.

- ○ a. 2x10, may
- ○ b. 2x10, may not
- ○ c. 2x8, may
- ○ d. 2x8, may not

22. The IRC includes tables to size cold-formed steel rafters.

- a. True
- b. False

23. Why are THOW window and door headers often oversized when using IRC Table R602.7(1)?
- a. The table has large safety factors built into it.
- b. The table's smallest building width is 12' (which is over 40% wider than most THOW).
- c. The table rounds up all spans to the nearest foot.
- d. The table is based on the weakest species of wood (since its unknown what species will be used).

24. According to the IRC, what is the maximum window opening length and number of jack studs required for a double 2x10 window header? Assume a ground snow load of 30 psf, a 24' wide building, and a single-story house.
- a. 4'-8" window opening length with 2 jack studs on each end
- b. 5'-9" window opening length with 2 jack studs on each end
- c. 6'-10" window opening length with 2 jack studs on each end
- d. 9'-0" window opening length with 1 jack stud on each end

25. Six common additional structural components builders often use to help THOW resist transport related forces and vibrations were discussed in the course text. What three did the author recommend for THOW that will only experience infrequent travelling?
- a. Coiled metal strapping, screws, framing angles
- b. Coiled metal strapping, screws, holdowns
- c. Holdowns, threaded rods, interior sheathing
- d. Holdowns, threaded rods, framing angles