Continuing Education Course #459
Cast, Lift, and Release: Tilt-Up Concrete Walls
Part 2: Design

1. (Blanks imply choosing the best answer.) Tilt-up concrete wall design for the service life of the building to meet the building code in the building's completed condition is generally performed by the _____.
- a. steel supplier
- b. wall panel supplier
- c. structural engineer of record

2. There is a separate design for lifting, placing, and bracing of the panel during construction that will need to be done and certified by the _____.
- a. steel supplier
- b. panel supplier
- c. landscape architect

3. This wall panel design that the supplier performs for the _____ phase may control over the design that the structural engineer does for the completed condition.
- a. construction
- b. post-construction
- c. demolition

4. In the building code design, because design panel bending moments occur at midheight, one loading that needs to be included is the axial load due to _____ at midheight.
- a. soil pressure
- b. foundation weight
- c. self-weight

5. Reinforcing will usually be _____ at opening jambs above and beyond what the typical non-jamb locations contain.
- a. added
- b. unchanged
- c. reduced

6. Panels with wide openings should be designed to span _____ to drive loads to critical sections at the jambs.
- a. to the foundation
- b. horizontally
- c. to the adjacent panels

7. _____ can be used at heavy concentrated loads.
- a. Less reinforcing
- b. Lower strength concrete
- c. Integral pilasters

8. Loads at top of wall are often applied at an _____ to the panel centerline, meaning a moment would need to be applied there.

- a. obtuse angle
- b. eccentricity

9. It is recommended that panels follow _____ for construction tolerances. A joint between panels and a gap below panels are used for leveling and shimming to get sufficient alignment

- a. AIA 350
- b. ACI 117
- c. NFPA 100

10. Some wall panel suppliers prefer to _____ embed plates into wet concrete during concrete pours

- a. hang by crane
- b. throw
- c. wet-set

11. Building load provisions for wall panels can be found in _____.

- a. AISI 200
- b. ASCE 7
- c. AWS D1.1

12. Load combinations (of the building loading) for tilt-up wall panels comes from from _____.

- a. AISC 341
- b. ACI 301
- c. ACI 318

13. _____ arise when a compressive axial load acts on a member that is bent and has curvature between the axial load and its opposing support.

- a. P-Delta moments
- b. Reduced moments
- c. Tension ruptures

14. ACI 318 Chapter __ addresses concrete walls (2014 and later).

- a. 2
- b. 3
- c. 11

15. Per ACI 11.8.1.1, slender wall provisions can be used only if a wall is _____-controlled for out-of-plane moment effect

- a. tension
- b. compression
- c. shear

16. Per ACI 11.8.1.1, slender wall provisions can be used only if Pu at the midheight section does not exceed _____.

- a. 0.01F’cAg
- b. 0.06f’cAg
- c. 0.02f’cAg

17. The compressive strength of concrete, _____, is not the most critical parameter in wall panel design.

- a. Fy
- b. Mu
- c. f’c

18. Per ACI 318, 11.8.2.1 (2014 and later), tilt-up walls are to be designed as _____under the slender wall provisions.

- a. mutli-spanned
- b. simply supported
- c. cantilevered

19. According to ACI 318, 11.8.2.2, concentrated loads on a wall panel may be treated as being distributed into the wall at a _____ vertical to horizontal ratio.

- a. 2:1
- b. 1:1
- c. 0.5:1

20. In ACI 551.2, it is recommended that a wall panel with a single mat of reinforcement (centered in the panel cross section), be no more slender than: Lc /h = ___, where Lc is the distance between supports and h is the thickness of the panel.

- a. 90
- b. 50

21. Wall panel joints between panels, are normally _____.

- a. 0.01” to 0.03”
- b. 1/2" to 3/4"
- c. 6” to 7”

22. The relationship between, a = depth of equivalent rectangular compressive stress block, and c = distance from extreme compression fiber to neutral axis (in), for concrete that is f’c = 4,000 psi, is,

- a. c = a/0.85
- b. c = 0.003a

23. Note that the depth to the reinforcing steel, d, must account for such things as panel _____.

- a. reveals
- b. width
- c. color

24. If a thinner choice of panel thickness leads to a _____ number of panels by increasing the length of individual panels that will work with the crane, that would be beneficial to the schedule.

- a. reduced
- b. increased
- c. doubled

25. In deflection curves for concrete walls in bending, there is a strong bilinear relationship where the line breaks when the moment reaches ¬¬¬¬¬_____.

- a. 30 degrees Celsius
- b. 2/3Mcr
- c. Mcr

26. Longitudinal (vertical) bar spacing in tilt-up panels shall not exceed the lesser of _____.

- a. 3h and 18 in
- b. 5h and 34 in

27. Walls with h >___ require reinforcing in both the interior and exterior faces.

- a. 6 inches
- b. 10 inches

○ c. 8 inches

28. Transverse ties are required if Ast exceeds _____ where Ast is the total amount of longitudinal steel, and Ag is the gross area of concrete.

○ a. 0.001Ag
○ b. 0.01Ag
○ c. 0.005Ag

29. Development lengths and splices for wall panels can be found in _____ of ACI 318 (318-14 and later)

○ a. 11.1 and 11.2
○ b. 25.4 and 25.5

30. Design of connections from load bearing elements to the tilt-up wall panels is per ACI 318, Chapter __.

○ a. 17
○ b. 1
○ c. 2