Continuing Education Course #328
Pile Supported Foundation Design

1. When the area required supporting the load using a shallow foundation is found to be inadequate an alternative which is frequently used is a deep foundation or pile supported foundation.
   - a. True
   - b. False

2. A pile supported foundation is designed with the presumption that the bottom surface of the pile cap assist in supporting the load imposed on the pile cap.
   - a. True
   - b. False

3. Pilings can provide resistance to downward vertical loads through
   - a. bearing pressure at the base
   - b. "skin" friction along the perimeter of the length
   - c. both a & b
   - d. none of the above

4. Some of the types of piling are:
   - a. Steel H-Section
   - b. Cased or Uncased Concrete
   - c. Helical Screw Piles
   - d. Timber
   - e. All of the above

5. Allowable soil pressures for sandy gravel and/or gravel typically are in the range of:
   - a. 1,500 ± pounds per sq. ft.
   - b. 3,000 ± pounds per sq. ft.
   - c. 6,500 ± pounds per sq. ft.
   - d. None of the above

6. If the spacing is less than ___ times the pile diameter, pile group settlement and bearing capacity should be checked.
   - a. 2
   - b. 5
   - c. 3
   - d. none of the above

7. Symmetry is an important consideration when placing piles with respect to the location of the load and the shape of the pile cap so as to transfer the load as evenly as possible onto each pile.
   - a. True
   - b. False

8. The edge distance between the corner piles and the edge of the pile cap is normally governed by?
   - a. The type of piling
   - b. The strength of the concrete
   - c. punching shear capacity
   - d. The amount of flexural reinforcement
   - e. none of the above

9. The overall depth of pile cap shall be selected such that the effective depth of bottom reinforcement is at least 12 in.
   - a. True
   - b. False

10. To determine the shear capacity the unfactored column loads are required.
    - a. True
    - b. False

11. The equation for Temperature and Shrinkage reinforcement steel with an $f_y = 60,000$ psi is:
    - a. $A_{s,min} = 0.0018 \times b \times h$
b. $A_{s,\text{min}} = 0.0020 \times b \times h$

c. $A_{s,\text{min}} = 0.0014 \times b \times h$

12. If the development length, $l_d$, is not adequate to provide the full tension capacity of the flexural steel
   a. The strength of the concrete could be increased
   b. The use of 90° hooks could be used
   c. The use of 180° hooks could be used
   d. All of the above

13. If the punching shear on a column or pedestal results from axial forces without lateral forces and/or moment(s), the calculation is based on the length of the perimeter at a distance of $d/2$ from the column
   a. True
   b. False

14. Section 22.6.5.3 states that "$a_s$ is equal to ___ for interior columns, ___ for edge columns and ___ for corner columns"
   a. 20, 30 & 40
   b. 40, 30 & 20
   c. 10, 15 & 20
   d. none of the above

15. From Table 22.6.5.2 - Calculation of $V_c$ for two-way shear, the correct equation to use for calculating the punching shear for a corner pile is:
   a. The one with the least value
   b. The one with the greatest value
   c. Equation (a)
   d. None of the above

16. If there is no reinforcement in the top of the pile cap, then for the consideration of pile punching the slab is considered unreinforced. The value for $\phi$ from Table 21.2.1 for Strength Reduction Factors for "plain concrete elements" is __.
   a. 0.60
   b. 0.75
   c. 0.90
   d. 0.65

17. The direct shear at the critical section adjacent to the column is located at the distance $d$ from the column face.
   a. True
   b. False

18. The direct shear at the critical section adjacent to the corner pile is located at the distance $d/2$ from the corner pile.
   a. True
   b. False

19. Deep beam shear is evaluated at the face of column when
   a. $\omega < d$
   b. $\frac{V_{ud}}{M_u} \geq 1$
   c. both of the two criteria must be meet for deep beam shear evaluation.
   d. All of the above

20. The value of $\phi$ from Table 21.2.1 for Bearing Capacity of Column or Pedestal on Pile Cap is:
   a. 0.60
   b. 0.75
   c. 0.90
   d. 0.65

21. Section 16.3.4.1 states "For connections between a cast-in-place column or pedestal and foundation, $A_s$ crossing the interface shall be at least ____ x $A_g$, where $A_g$ is the gross area of the supported member."
   a. 0.002
   b. 0.0018
   c. 0.0033
   d. None of the above

22. The minimum development length of the dowels in both the column or pedestal and the pile cap per Section 25.4.9.1 is:
   a. 16 in
   b. 4 in
   c. 8 in
   d. None of the above
23. Section 13.4.3.1 states that "Portions of deep foundation members in air, water, or soils not capable of providing adequate restraint throughout the member length to prevent lateral buckling shall be designed as columns in accordance with the applicable provisions of Chapter 10."
   ☐ a. True
   ☐ b. False

24. Section 13.4.2.5 states that "the portion of the pile reaction to be considered as producing shear on the section shall be based on a linear interpolation between full value at \( d_{pile}/2 \) outside the section and zero value at \( d_{pile}/2 \) inside the section."
   ☐ a. True
   ☐ b. False

25. The efficiency of the pile to resist vertical loads is proportional to \( \cos \theta \), and the values of \( \) and \( \) must be adjusted to reflect the loss of efficiency due to the batter.
   ☐ a. n (is total number of piles)
   ☐ b. \( I_X \) & \( I_Y \) (moment of inertia of pile group in x and y directions)
   ☐ c. All of the above