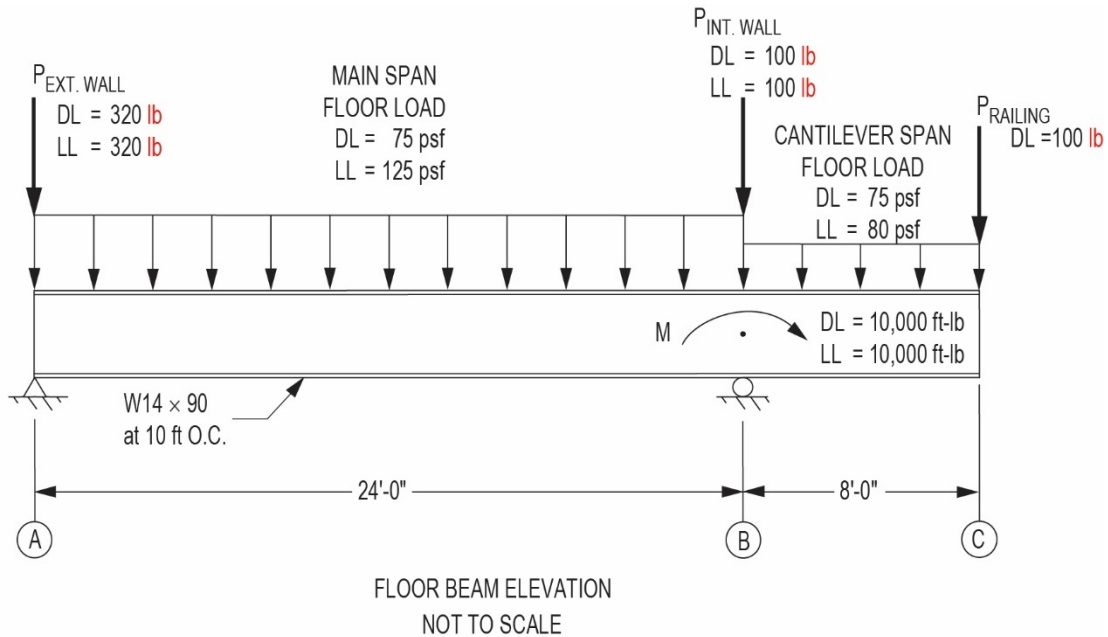


ERRATA for
PE Civil: Structural Practice Exam
 ISBN: 978-1-947801-31-8
 Copyright 2023
 Errata posted 12/01/2025

Revisions are shown in red.

Question 11:



- A. 1.96
- B. 2.13
- C. 21.7
- D. 24.8

Question 30:

- A. 75 (compression)
- B. 133 (compression)
- C. 133 (tension)
- D. 167 (compression)

Question 31:

An A992 W8×28 beam is loaded as shown. To have zero deflection at the free end of the overhanging section, the magnitude (kips) of the concentrated force, **P**, at the free end must be _____. Ignore member self-weight.

ERRATA for
PE Civil: Structural Practice Exam
ISBN: 978-1-947801-31-8
Copyright 2023
Errata posted 12/01/2025

Question 32:

An A992 W12×53 beam is loaded as shown. **Ignore beam weight.** The maximum deflection (in.) of this beam is most nearly:

Question 34:

Based on the soil classification system found in the federal OSHA excavation regulations, the soil adjacent to an existing building has been classified as Type **A**. An undisturbed perimeter strip that is 5 ft wide is to be maintained along the face of the building. The **short-term** excavation is to be 12 ft deep. To meet OSHA **Table B-1** excavation requirements, the minimum horizontal distance X (ft) from the toe of the slope to the face of the structure is most nearly:

Table B-1
Maximum Allowable Slopes

Soil or Rock Type	Maximum Allowable Slopes (H:V)^[1] for Excavations Less Than 20 Feet Deep^[3]
Stable Rock	Vertical (90°)
Type A ^[2]	3/4:1 (53°)
Type B	1:1 (45°)
Type C	1 1/2:1 (34°)

NOTES:

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53°).
3. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

OSHA: 1926 Subpart P App B - Sloping and Benching, Table B-1, Maximum Allowable Slopes

Question 36:

A contractor is planning to install a temporary structure that will support a concrete pump at a construction site. According to the construction contract, the contractor must submit design drawings and calculations for the temporary structure to the **project engineer of record** for approval. What is the purpose of this submittal requirement?

Question 37:

According to IBC 2018 and applicable quality assurance inspection requirements, which of the following inspection tasks are required for ASTM **A325** high-strength bolts **in a snug-tightened joint** used in a steel-framed structure?

ERRATA for
PE Civil: Structural Practice Exam
ISBN: 978-1-947801-31-8
Copyright 2023
Errata posted 12/01/2025

Question 44:

The question was replaced.

A department of transportation is building a reinforced concrete overpass in a cold, rainy region. To minimize disruption to traffic, the work must be completed during an 8-hour nighttime shift. Based on the information provided in the table, which mix design is best suited for the overpass deck slab?

Design	Min. f'_c (psi)	Max. w/cm Ratio	% Air Entrainment	Aggregate Size (in.)
A	3,500	0.55	4.5%	1
B	4,000	0.50	4.0%	2
C	4,500	0.45	5.5%	1 1/2
D	5,000	0.40	5.0%	2

- A. Design A
- B. Design B
- C. Design C
- D. Design D

Question 51:

Per ASCE 7-16, the estimated design lateral soil load (psf/foot of depth) for nonrigid walls is most nearly:

Question 57:

Using ACI 318-14's **simplified method of analysis**, the maximum factored negative moment in the slab (ft-kips/ft) is most nearly:

- C. 1.62

Question 61:

The maximum load $\frac{P}{\Omega}$ (ASD) or ϕP_n (LRFD) in kips that can be carried by the angle is most nearly:

ERRATA for
PE Civil: Structural Practice Exam
 ISBN: 978-1-947801-31-8
 Copyright 2023
 Errata posted 12/01/2025

Question 62:

CHARACTERISTICS

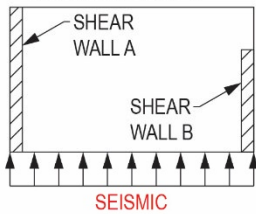
Flexible

Torsionally irregular

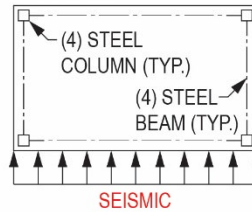
Rigid

Torsionally regular

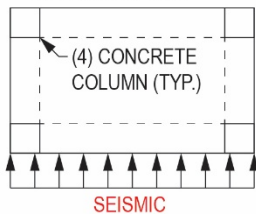
- WOOD
- DIAPHRAGM DEFLECTION CAN BE TOLERATED



- METAL DECK SUPPORTED BY STEEL BEAMS AND COLUMNS

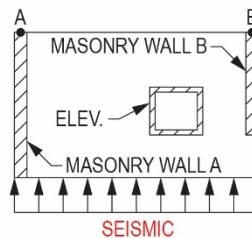


- PT CONCRETE SLAB SUPPORTED BY CONCRETE COLUMNS/BEAMS



- CONCRETE SLAB SUPPORTED BY MASONRY WALLS

$$A_{\text{STORYDRIFT}} = 1.5 \left(\frac{A_{\text{STORYDRIFT}} + B_{\text{STORYDRIFT}}}{2} \right)$$



Question 63:

The figure shows a cast-in-place reinforced concrete spread footing for an interior column that is concentrically loaded. Punching shear controls the footing thickness in the design. Neglecting the shear strength of reinforcing **and using normal weight concrete**, the design punching shear capacity of the footing (kips) per ACI 318-14, is most nearly:

Question 65:

Option B should read as follows:

- B. ASD = 21.3
LRFD = 32.1

ERRATA for
PE Civil: Structural Practice Exam
ISBN: 978-1-947801-31-8
Copyright 2023
Errata posted 12/01/2025

Question 72:

Select the **three** that apply.

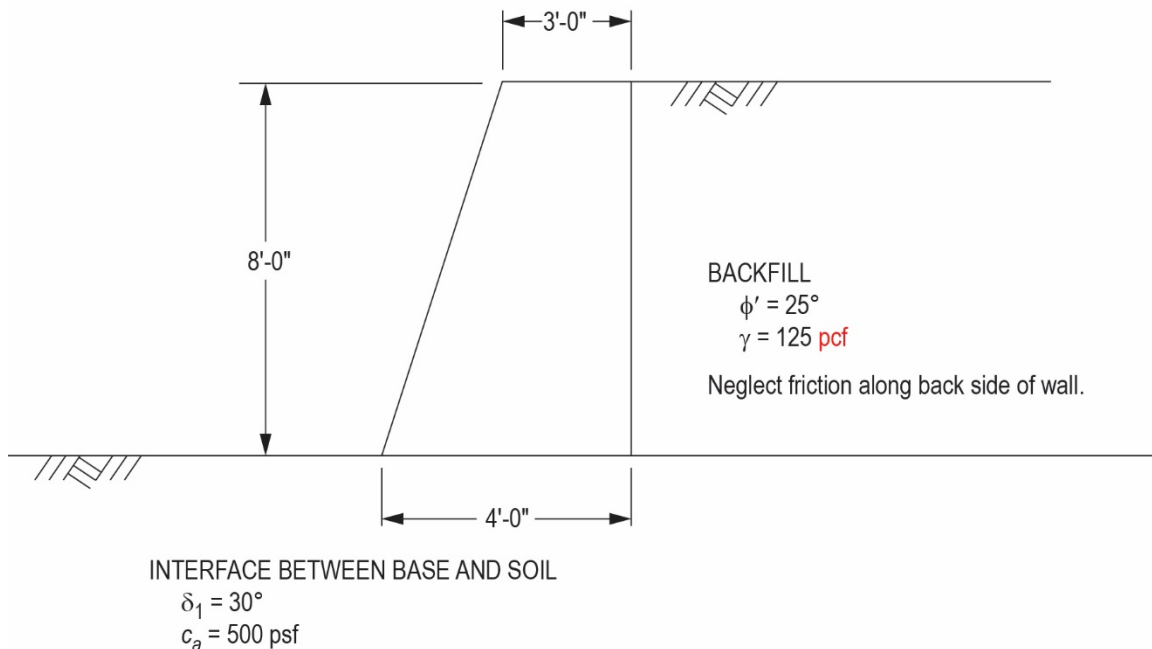
- E. Shear strength of webs without tension field action

Question 74:

For the figure shown, **unfactored** vertical reactions from the grade beam to the drilled pier are $LL = 10$ kips and $DL = 8$ kips. According to ASCE 7-16, the **minimum** horizontal design strength (lb) of the connection from the grade beam to the drilled pier is most nearly:

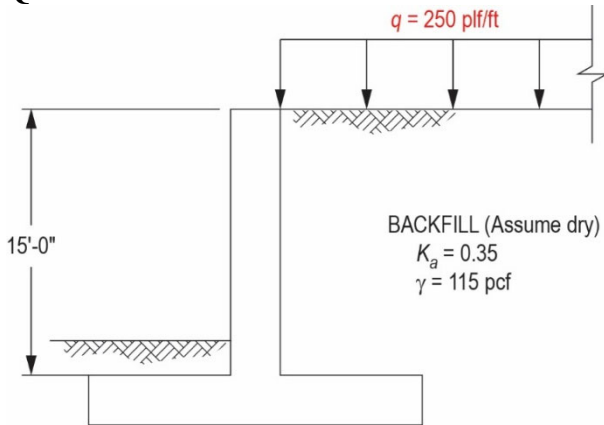
Question 79:

For the reinforced concrete gravity retaining wall shown, the factor of safety against sliding is _____. Assume **unit weight of concrete** = 150 pcf.



ERRATA for
PE Civil: Structural Practice Exam
 ISBN: 978-1-947801-31-8
 Copyright 2023
 Errata posted 12/01/2025

Question 80:



Solution 11:

$$R_a (24 \text{ ft}) - 0.640 \text{ kips} (24 \text{ ft}) - 2 \text{ klf} (24 \text{ ft})^2 / 2 + 20 \text{ ft-kips} + 1.55 \text{ klf} (8)^2 / 2 + 0.1 \text{ kips} (8 \text{ ft})$$

$$R_a (24 \text{ ft}) - 15.36 \text{ ft-kips} - 576 \text{ ft-kips} + 20 \text{ ft-kips} + 49.6 \text{ ft-kips} + 0.8 \text{ ft-kips}$$

$$R_a = \frac{-520.96 \text{ ft-kips}}{24 \text{ ft}} = -21.7 \text{ kips}$$

Solution 30:

Considering Joint A:

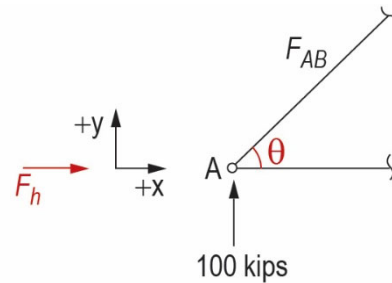
$$\sum F_y = 0$$

$$+ \frac{6}{8} F_h + 100 = 0$$

$$F_h = -\frac{8}{6} (100)$$

$$= -133 \text{ kips (compression)}$$

$$F_{AB} = \sqrt{100^2 + 133^2} = 167 \text{ kips (compression)}$$



Alternative solution:

$$\tan \theta = \frac{6'}{8'}$$

$$\theta = 36.87^\circ$$

$$\sin 36.87^\circ = \frac{100 \text{ kips}}{F_{AB}}$$

$$F_{AB} = 167 \text{ kips (compression due to reaction to loads on truss)}$$

ERRATA for
PE Civil: Structural Practice Exam
ISBN: 978-1-947801-31-8
Copyright 2023
Errata posted 12/01/2025

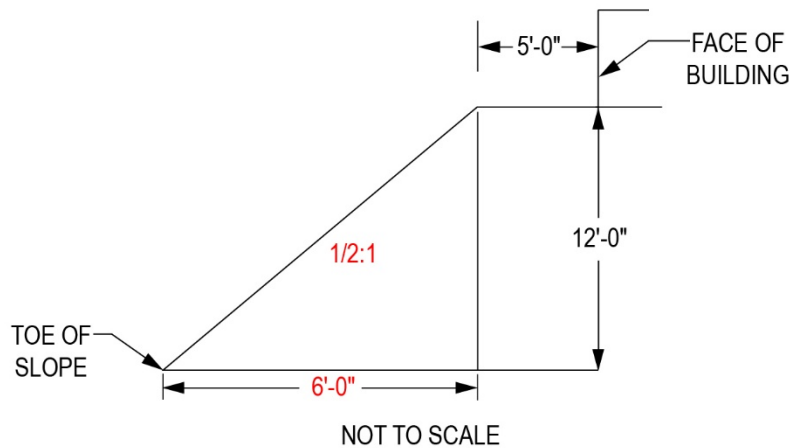
Solution 32:

$$\Delta_{\max} = \frac{5(1.2 \text{ kips/ft}/12 \text{ in./ft})(24 \text{ ft} \times 12 \text{ in./ft})^4}{384(29,000 \text{ ksi})(425 \text{ in}^4)} + \frac{23(2 \text{ kips})(24 \text{ ft} \times 12 \text{ in./ft})^3}{648(29,000 \text{ ksi})(425 \text{ in}^4)}$$

Solution 34:

Type **A** soil has a maximum permissible slope of 3/4:1. However, for a short-term excavation, a maximum slope of 1/2H:1V is allowed.

Therefore, a 12-ft depth requires a 12-ft distance.



Because there is a 5-ft perimeter strip, the minimum distance from the toe of the slope to the face of the structure = 6 ft + 5 ft = 11 ft.

THE CORRECT ANSWER IS: A

Solution 44:

Per ACI 318-14, Table 19.3.1.1: Exposure F3 is for concrete exposed to freezing and thawing cycles with frequent exposure to water and to deicing salts.

Per Table 19.3.2.1: F3 has f'_c min. = 5,000 and max. w/cm = 0.4

Per Table 19.3.3.1: F3 % air entrainment = 5% for 2-in. aggregate

THE CORRECT ANSWER IS: D

ERRATA for
PE Civil: Structural Practice Exam
ISBN: 978-1-947801-31-8
Copyright 2023
Errata posted 12/01/2025

Solution 57:

$$l_n = 10 \text{ ft} - 1 \text{ ft} = 9 \text{ ft per Sec. 6.5}$$

$$W_u = 1.2 \times 100 + 1.6 \times 50 = 200 \text{ plf}$$

Use $W_u l_n^2 / 10$ (max of all applicable support conditions)

Note: Beam/column stiffness not applicable to slabs

$$M_u = W_u l_n^2 / 10 = 1.62 \text{ ft-kips/ft}$$

THE CORRECT ANSWER IS: C

Solution 61:

By inspection P controls. P is limited by the yielding of the horizontal leg of the angle. Use plate yielding limit state, per section F11.1.

AISC ASD:

$$P_{\text{allow}} = \frac{10.125}{\left[4 - (3/8)\right]} = 2.793 \text{ kips}$$

$$\frac{P}{\Omega} = \frac{2.793}{1.67} = 1.67 \sim 1.7 \text{ kips}$$

AISC LRFD:

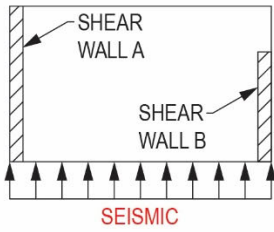
$$P_n = \frac{10.125}{\left[4 - (3/8)\right]} = 2.793 \text{ kips}$$

$$\phi P_n = 0.9(2.793) = 2.51 \sim 2.5 \text{ kips}$$

ERRATA for
PE Civil: Structural Practice Exam
 ISBN: 978-1-947801-31-8
 Copyright 2023
 Errata posted 12/01/2025

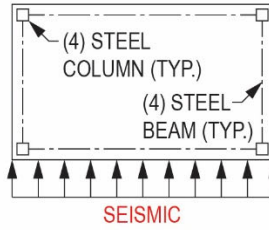
Solution 62:

- WOOD
- DIAPHRAGM DEFLECTION CAN BE TOLERATED



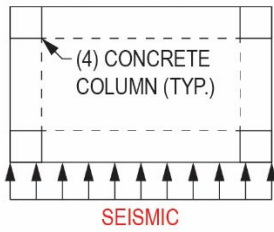
Flexible
 Torsionally regular

- METAL DECK SUPPORTED BY STEEL BEAMS AND COLUMNS



Flexible
 Torsionally regular

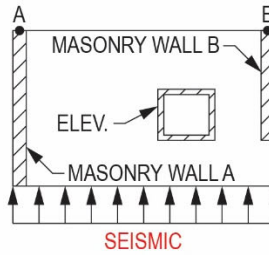
- PT CONCRETE SLAB SUPPORTED BY CONCRETE COLUMNS/BEAMS



Rigid
 Torsionally regular

- CONCRETE SLAB SUPPORTED BY MASONRY WALLS

$$A_{\text{STORYDRIFT}} = 1.5 \left(\frac{A_{\text{STORYDRIFT}} + B_{\text{STORYDRIFT}}}{2} \right)$$



Torsionally irregular
 Rigid

ERRATA for
PE Civil: Structural Practice Exam
ISBN: 978-1-947801-31-8
Copyright 2023
Errata posted 12/01/2025

Solution 63:

Per ACI 318-14, Section 8.5.3.1.2, two-way shear, v_n , shall be calculated in accordance with Section 22.6.

Per Section 22.6.1.2, $v_n = v_c + v_s$ (disregard v_s per problem statement).

Per Section 22.6.5.2, Table 22.6.5.2, Section 22.6.5.3, use smallest of the following to calculate v_c :

- a. $\left(2 + \frac{4}{1/1}\right) = 6\lambda\sqrt{f'_c}$
- b. $\left[\frac{(40)(20 \text{ in.})}{128 \text{ in.}} + 2\right] = 8.3\lambda\sqrt{f'_c}$
- c. $4\lambda\sqrt{f'_c}$ Controls

For ϕ values, see Table 21.2.1.

For λ , see Section 19.2.4.

$$\begin{aligned}\phi v_n &= 0.75(4)(1)(\sqrt{3,000})(128 \text{ in.})(20 \text{ in.}) \\ &= 420.6 \text{ kips}\end{aligned}$$

Solution 65:

Reference: AISC, 15th ed.

$$R_n = F_n A_b$$

$$\phi = 0.75, \Omega = 2.00$$

Equation J3-1

ASD:

$$F_{nv} = 27 \text{ ksi}$$

$$F_{nv}/\Omega = 13.5 \text{ ksi}$$

Table J3.2

$$\text{Allowable load} = 2(13.5)(0.79) = 21.33 \text{ kips}$$

LRFD:

$$\phi R_n = \phi F_{nv} A_b$$

$$\phi F_{nv} = 20.3 \text{ ksi (A307 bolts)}$$

$$\phi R_n = (20.3)(0.79)(2) = 32.07 \text{ kips}$$

Alternate solution, use Table 7-1

ERRATA for
PE Civil: Structural Practice Exam
ISBN: 978-1-947801-31-8
Copyright 2023
Errata posted 12/01/2025

Solution 72:

Per G2.1 (a): For webs of rolled I-shaped members with $\frac{h}{t_w} \leq 2.24 \sqrt{\frac{E}{F_y}}$

$$\phi_v = 1.00 \text{ (LRFD)} \quad \Omega_v = 1.50 \text{ (ASD)}$$

THE CORRECT ANSWERS ARE: A, C, D

Solution 74:

Reference: ASCE 7-16, Section 12.1.4, p. 89 and Section 1.4.3, p. 4

Unfactored reactions from grade beam to drilled pier:

$$LL = 10 \text{ kips}$$

$$DL = 8 \text{ kips}$$

Solution 75:

J 3.5 max edge distance $12(t) = 12(3/4) = 9 \text{ in.}$, 6 in. maximum governs.

THE CORRECT ANSWERS ARE: A, D, F

Solution 79:

$$P_h = \frac{K_a \gamma z^2}{2}$$
$$= \frac{0.40586(125 \text{ psf})(8 \text{ ft})^2}{2}$$
$$= 1,623 \text{ lb/ft}$$