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PE Civil Exam Review Guide: Construction Depth
Preview Edition

Errata

(updated 4/5/2021)

This document will be updated regularly.

Chapter 1: Earthwork Construction and Layout

(1) pp. 1-3 – 1-4: There were some errors in Example 1.1, which are corrected below.

Example 1.1: Single-Step Conversion Between Soil States

A project site requires bulk volume of 14,000 ft^3 soil from a borrow pit located five miles away from the project site. The unit weight of soil at the pit is 115 lb/ft^3. The load factor of soil is 0.8. A dump truck can carry five tons of soil and it costs $125 per truck for transportation. How much does it cost to procure the filling material for the site?

A. $16,100
B. $16,125
C. $20,125
D. $25,156

Solution

Given load factor of soil = 0.80

Bulk volume = 14,000 ft^3

Required volume from pit = load factor × bulk volume
= 0.8 × 14,000 = 11,200 ft^3

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Unit weight of soil at pit = 115 lb/ft^3

Weight of soil required from borrow pit = 115 lb/ft^3 × 11,200 ft^3
= 1,288,000 lb = 644 tons

Number of trucks = $\frac{644}{5}$ = 128.8 [nearly 129 trucks]

Transportation cost = 129 × $125 = $16,125

Answer: B

(2) p. 1-9: There are two typographical errors in the solution to Example 1.5 (correction below). The answer is correct as is.

Calculate the dry density of the soil from the project site:

$$\gamma_{project} = \frac{\gamma_{pit}}{1 + wc} = \frac{118 \text{ lbm/ft}^3}{1 + 0.17} = 100.85 \text{ lb/ft}^3$$

(3) p. 1-10: In the last part of the solution to Example 1.6, there are two typographical errors (corrections below). The correct answer is A (not B).

$$D_{avg} = \frac{h_A \times 1 + h_B \times 2 + h_c \times 1 + h_D \times 2 + h_H \times 1 + h_G \times 1 + h_E \times 3 + h_F \times 1}{4 \times 3}$$

$$= \frac{9 \times 1 + 6 \times 2 + 1 \times 1 + (-1) \times 2 + (-7) \times 1 + (-2) \times 1 + 2 \times 3 + 7 \times 1}{12} = 2.0 \text{ ft}$$

Answer: A

(3) pp. 1-19 – 1-20: There are errors in the answer choices and solution to Example 1.12.

Example 1.12: Horizontal Curve Application

A highway curve has a mid-ordinate of 300 ft. Given PC – sta.10 + 22, what is the nearest length (ft) of the centerline? Refer to Figure 1.8.

T = N 50°25′23" E
R = 500 ft

A. 580 ft
B. 870 ft
C. 1,159 ft
D. 3,142 ft

Solution

$$M = R(1 - \cos(\frac{I}{2}))$$

$$I = 2 \arccos\left(1 - \frac{M}{R}\right)$$

$$I = 2 \arccos\left(1 - \frac{300 \text{ ft}}{500 \text{ ft}}\right) = 132.8°$$

Find the length of the centerline:

$$L = 2\pi R \frac{I}{360°}$$

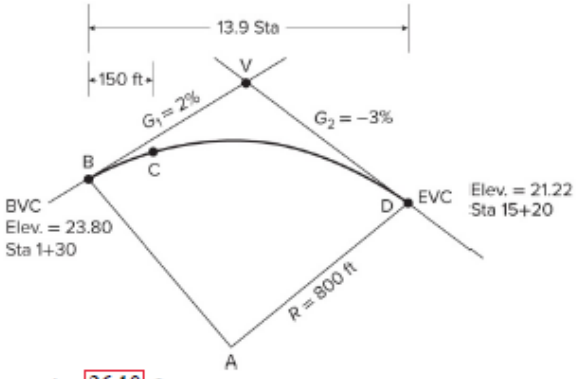
$$L = 2\pi(500 \text{ ft}) \frac{132.8°}{360°} = 1{,}158.90 \text{ ft}$$

Answer: C

(4) pp. 1-21 – 1-22: There are errors in the answer choices and solution to Example 1.13 (corrections below).

Example 1.13: Computing Vertical Curve Grade

A road's vertical curve is shown below. What is the approximate elevation (ft) at point C?



A. 26.10 ft
B. 26.40 ft
C. 27.45 ft
D. 28.11 ft

Solution

Find the rate of change:

$$R = \frac{G_2 - G_1}{L} = \frac{-3\% - 2\%}{(15.2 - 1.3)} = \frac{-5\%}{13.9} = 0.3597 = -0.36\%/\text{sta}$$

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Therefore, the elevation at point C is:

$$\text{elev}_C = \frac{Rx^2}{2} + G_1 x + \text{elev}_B = \frac{-0.36\ \frac{\text{ft}}{\text{sta}^2} \times (1.5\ \text{sta})^2}{2} + 2\ \frac{\text{ft}}{\text{sta}}(1.5\ \text{sta}) + 23.80 = 26.40\ \text{ft}$$

Answer: B

Chapter 2: Estimating Quantities and Costs

(1) p. 2-11: There are a few typographical errors in the solution to Example 2.4 (corrections below).

Length of footing = 150 + 150 + (130 – 2.0) + (130 – 2.0) = 556 ft

Width of footing = 1 ft

Volume of footing = 556 × 1 × 0.6 = 333.60 ft^3 or 12.4 yd^3

(2) p. 2-13: In the solution to Example 2.5, remove the two final lines of the solution, discussing the incentive amount, as it is not mentioned in the problem statement. The correct answer is B. See the corrections below.

~~Incentive amount = $456~~

~~Therefore, total cost to do formwork = $2,544 + $456 = $3,000~~

Answer: B

(3) pp. 2-14 to 2-15: In the solution to Example 2.6, there are some calculation errors (shown below in red boxes). As a result, the answer should be C (not D).

Option B:

$$\text{Duration} = \frac{7{,}300\ ft^2}{(50\ ft^2/hr \times 8\ hr/day)} = 18.25 \text{ days (nearly 19 days)}$$

$$\text{Crew hourly rate} = \frac{[(3 \times \$15/hr) + (4 \times \$30/hr)]}{7\ hr} = \$23.57/hr$$

Cost = 7 × $23.57/hr × 8 hrs/day × 19 days = $25,078.48

Option D:

$$\text{Duration} = \frac{7{,}300\ ft^2}{(60\ ft^2/hr \times 8\ hrs/day)} = 15.20 \text{ days (nearly 16 days)}$$

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Cost = 6 × $30/hr × 8 hrs/day × 16 days = $23,040.00

Answer: C

Chapter 4: Scheduling

(1) p. 4-6: The answer to Example 4.1 is incorrect. It should be B (not A). The solution is correct as-is.

Chapter 5: Material Quality Control and Production

(1) p. 5-4: In the first paragraph, 4 × 6 in should be 4 × 8 in.