ERRATA for

PE Civil*: *Water Resources and Environmental Practice Exam

ISBN: 978-1-947801-33-2

Errata posted 03/03/2025

Revisions are shown in red.

Question 10, p. 8:
This item was replaced with the following:

A hot-mix asphalt mix design consists of the following:

Aggregates:
Coarse = 42%
Fine = 54%
Mineral filler = 4%
Asphalt cement = 5.8%

The amount of coarse aggregate (tons) required to produce 3,000 tons of hot-mix asphalt is most nearly:

- A. 1,187
- B. 1,260
- C. 1,639
- D. 2,826

Question 12, p. 9:
Select the **two** that apply.

Question 21, p. 13:
A western community uses a water treatment facility to treat raw well water for iron and manganese removal. The water plant is no longer allowed to direct discharge backwash waste to the local receiving stream. The facility has four, 12-ft square gravity filters. A new red water lagoon is proposed to contain all backwash waste. Assume the average backwash rate is 15 gpm/ft^2 and the facility backwashes each filter in a single day once per week for 25 min. each. According to TSS Water Works 2018, the minimum lagoon size (ft) required is most nearly:

Question 28, p. 16:
A water system is replacing a 5,000-ft section of 48-in. cast iron discharge pipe from a 25-MGD water treatment plant with C900 plastic. If the Hazen-Williams head loss coefficient for the cast iron is 100 while the C900 coefficient is 130, the **minimum** new line size (in.) that would **not** result in added head loss is most nearly:

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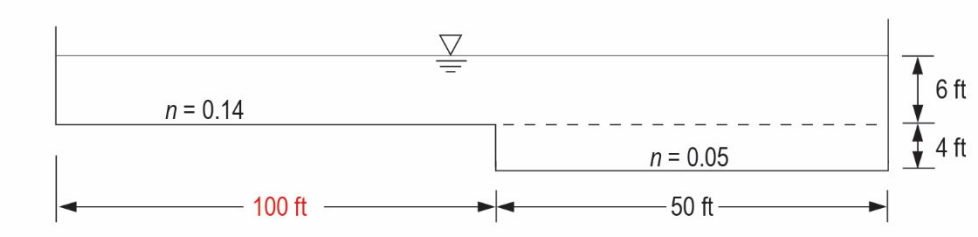
Question 33, p. 19:

The channel shown has a longitudinal slope of 0.001 ft/ft and a 100-ft-wide overbank section necessary to keep the water depth in the channel no greater than 10 ft under uniform velocity. The maximum design flood (cfs) that this channel can support is most nearly:



- ○ A. 2,512.9
- ○ B. 2,380.5
- ○ C. 2,240.1
- ○ D. 1,932.9

Question 54, p. 33:

Select the **four** that apply.

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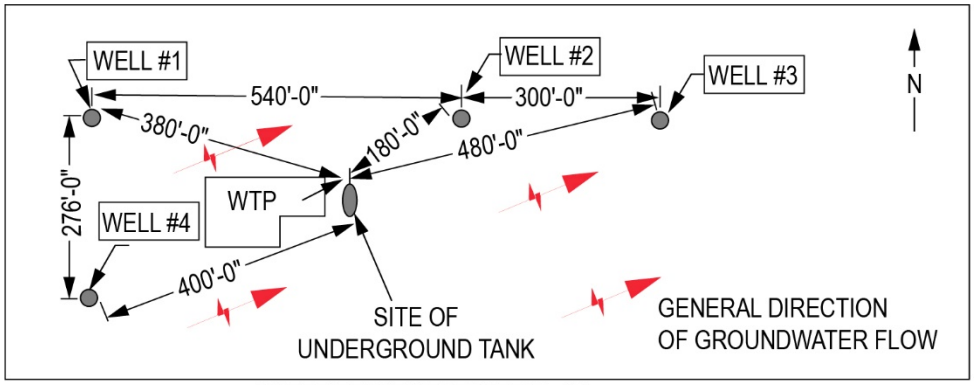
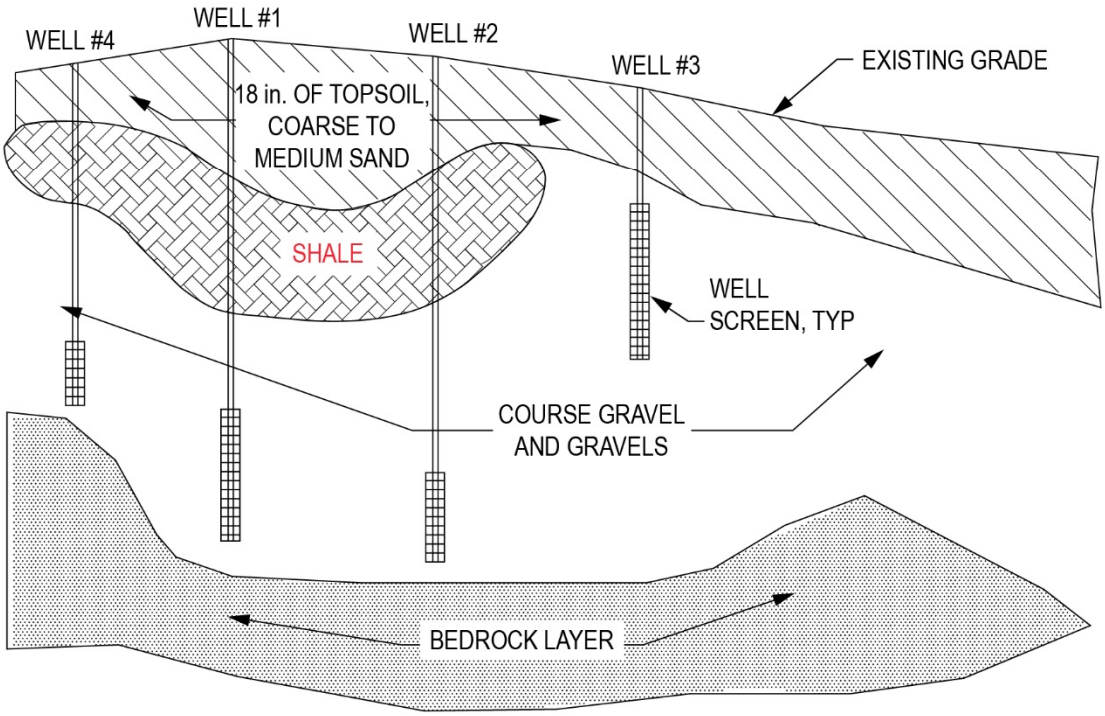
Question 56, p. 34:



WATER TREATMENT SITE PLAN



HYDROGEOLOGIC CROSS-SECTION OF WELL FIELD

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Question 66, p. 39:

The primary clarifier of a trickling filter plant receives 1,000 lb of solids daily. The clarifier has a solids capture rate of 90% and produces an underflow sludge concentration of 9% (SG = 1.05). The volume of primary sludge (ft^3/day) is most nearly:

- ○ A. 2
- ○ B. 80
- ○ C. 150
- ○ D. 210

Question 70, p. 41:

- ○ C. 867.51

Solution 10, p. 53:

Weight of asphalt = 3,000 tons × 0.058 = 174 tons
3,000 tons – 174 tons = 2,826 tons
2,826 tons × 0.42 = 1,187 tons

THE CORRECT ANSWER IS: A

Solution 12, p. 52:

The following options are correct.

Option B: Polyvinyl chloride pipe (PVC) is commonly used for small sewers.

Option D: Vitrified clay pipe (VCP) is old technology but could be used.

THE CORRECT ANSWERS ARE: B, D

Solution 18, p. 55:

B. 120 ft × 115 ft × 12 ft = 165,600 ft^3— too small

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Solution 28, p. 61:

Use the Hazen-Williams equation for head loss.

$$Q = 25{,}000{,}000 \text{ gal/day} \rightarrow \frac{25{,}000{,}000}{7.48 \text{ g/ft}^3}\left(\frac{1}{24 \text{ hr/day} \times 60 \times 60}\right) = 38.68 \text{ cfs}$$

$L = 5{,}000$ ft

$C = 100$

$D = 48$ in./12 = 4 ft

$$\text{Existing } h_f = \frac{4.73(5{,}000)}{100^{1.852}\,4^{4.87}}(38.68)^{1.852} = 4.762 \text{ ft}$$

$$\frac{4.73(5{,}000)(38.68)^{1.852}}{130^{1.852}\,4^{4.87}} = 2.92 \text{ ft}$$

48-in. pipe is the smallest size that doesn't increase head loss.

Solution 33, p. 62:

$n_1 = 0.14$

$S_1 = 0.001$ ft/ft

$A_1 = 6 \times 100 \text{ ft}^2 = 600 \text{ ft}^2$

$P_{w1} = 6 + 100 = 106$ ft

$$R_{H1} = \frac{A_1}{P_{w1}} = \frac{600}{106} \text{ ft} = 5.66 \text{ ft}$$

$$Q_1 = \frac{1.49}{n_1} A_1 (R_{H1})^{2/3} (S_1)^{1/2} = \frac{1.49}{0.14} \times 600 (5.66)^{2/3} \times (0.001)^{1/2}$$

$$= 645 \text{ ft}^3/\text{sec}$$

$n_2 = 0.05$

$S_2 = 0.001$

$A_2 = 50 \times 10 \text{ ft}^2 = 500 \text{ ft}^2$

$P_{w2} = 4 + 50 + 10 = 64$ ft

$$R_{H2} = \frac{A_2}{P_{w2}} = \frac{500}{64} \text{ ft} = 7.81 \text{ ft}$$

$$Q_2 = \frac{1.49}{n_2} A_2 (R_{H2})^{2/3} (S_2)^{1/2} = \frac{1.49}{0.05} \times 500 (7.81)^{2/3} \times (0.001)^{1/2}$$

$$= 1{,}867.9 \text{ ft}^3/\text{sec}$$

$Q = Q_1 + Q_2 = (645 + 1{,}867.9)$ cfs

$= 2{,}512.9$ cfs

THE CORRECT ANSWER IS: A

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Solution 49, p. 68:

Specific capacity = Q/D_w

Solution 52, p. 70:

$$\left[(6.2-5.5)\,\text{mg/L}\right]\left(\frac{115\ \text{ft}^3}{\text{sec}}\right)\left(\frac{7.48\ \text{MG}}{\text{ft}^3\times10^6}\right)\left(\frac{86{,}400\ \text{sec}}{\text{day}}\right)\left(\frac{8.34\ \text{lb}}{\text{MG•mg/L}}\right)=433.9\ \text{lb/day}$$

Solution 54, p. 71:

Option A: In a water/wastewater environment, red, green, and brown algae all contain chlorophyll.

THE CORRECT ANSWERS ARE: A, B, C, E

Solution 66, p. 75:

Refer to the Sludge Production section in the *PE Civil Reference Handbook.*

Using equation $V_S=\dfrac{M}{P_S S_S g_w}$

Use SG of sludge = 1.05

$M=1{,}000\ \text{lb/day}\,(0.9)=900\ \text{lb/day}$

$P_S=0.09$

$S_S=1.05$

$g_w=62.4\ \text{lb}/\text{ft}^3$

$$V_S=\frac{900\ \text{lb/day}}{(0.09)(1.05)\left(62.4\ \text{lb}/\text{ft}^3\right)}=152.6\ \text{lb}/\text{ft}^3$$

$V_S=153\ \text{lb}/\text{ft}^3$

Round to tens digits $=150\ \text{lb}/\text{ft}^3$

Solution 70, p. 77:

v^2 = 1.056 (ft/sec)^2 → v = 1.028 ft/sec

$Q = VA$

A = 5.41/1.028 = 5.26 ft^2/2.5 ft wide = 2.11 ft deep

Wet well elevation minimum = 2.11 ft + 865.40 = 867.51 ft