

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Model Answer

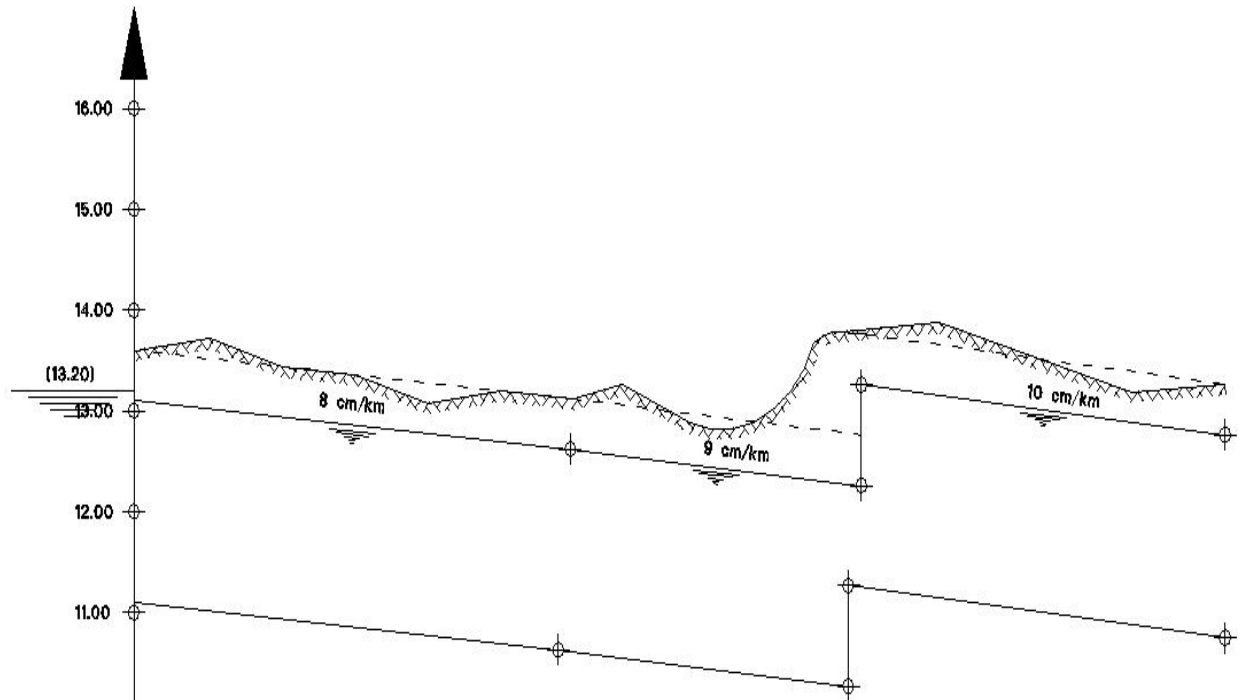
Sheet (1)

(1) بفرض ان نسبة التعويضات = 50%

وان معامل الفائض = 40%

القطاع	دور (أ)	دور (ب)	دور (ج)	دور (أ) 50%+ دور (ج)	دور (ب) 50%+ دور (أ)	دور (ج) 50%+ دور (ب)	الزمام التصميمي
1-1	9000	9800	9500	13750	14300	14400	14400
2-2	_____	9800	9500	4750	9800	14400	14400
3-3	_____	_____	9500	4750	_____	9500	9500
4-4	_____	_____	1500	750	_____	1500	1500
5-5	_____	_____	600	300	_____	600	600

(2)



Kilometer	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0
Land level	13.71	13.45	13.36	13.09	13.19	13.12	13.15	13.03	13.01	13.01	13.77	13.65	13.37	13.27	13.28	13.28
Water level	13.02	12.94	12.86	12.78	12.70	12.62	12.53	12.44	12.35	12.26	13.02	13.02	13.02	13.02	13.02	13.02

3) **Data :**

$$Q = 15 \text{ m}^3/\text{s} , S = (1/4000) , Z = 1.5 , b/y = 2 , 1/n = 40$$

(solution)

$$A = by + zy^2 = 2y^2 + 1.5y^2 = 3.5y^2$$

$$P = b + 2y\sqrt{1 + Z^2} = 5.606y$$

$$R = \frac{A}{P} = .624 y$$

$$Q = A V = A (1/n) (R^{\frac{2}{3}}) (S^{.5}) \quad 15 = (A)(40) (R^{\frac{2}{3}}) (1/4000)^{.5}$$

$$(A) (R^{\frac{2}{3}}) = 23.71 \quad (3.5y^2) (.624y)^{2/3} = 23.71 \quad Y = 2.305 \text{ m}$$

$$b = 2y = 4.611 \text{ m} \sim 4.5 \text{ m}$$

$$\text{So } A_{\text{act}} = (4.5 * 2.305) + (1.5 * 2.305^2) = 18.34 \text{ m}^2$$

$$V_{\text{act}} = (15/18.34) = .817 \text{ m/sec} \quad \text{allowable velocity} = (.3 \sim .8) \text{ m/s}$$

$$\text{So } V > V_{\text{max}} \quad \text{assume } V = V_{\text{max}} = .8 \text{ m/s}$$

$$Q = A V \quad A = Q/v = 15/.8 = 18.75 \text{ m}^2$$

$$V = (1/n) (R^{\frac{2}{3}}) (S^{.5}) \quad .8 = (40) (R^{\frac{2}{3}}) (1/4000)^{.5} \quad R = 1.422 \text{ m}$$

$$R = A/P \quad P = A/R \quad P = (18.75/1.422) = 13.179 \text{ m}$$

$$A = by + zy^2 , \quad P = b + 2y\sqrt{1 + Z^2}$$

Solve A with P and find b, y

$$b = 5.298 \text{ m} \sim 5.5 \text{ m} , \quad y = 2.185 \text{ m}$$

$$A_{\text{act}} = (5.5 * 2.185) + (1.5 * 2.185^2) = 19.178 \text{ m}^2 \quad V_{\text{act}} = .782 \text{ m}$$

$$V_{\text{act}} < V_{\text{all}} \quad \text{ok}$$

Final Dimension of section b = 5.5m , Y = 2.185m , Z = 1.5

4) **Data :** $Q = 150 \text{ m}^3/\text{s} , Z = 1.5 , S = 8 \text{ cm/km} , n = .025 , b/y = 5.0$

(Solution)

$$A = by + zy^2 = 6.5y^2$$

$$P = b + 2y\sqrt{1 + Z^2} = 8.6055 y$$

$$R = A/P = .755y$$

$$Q = A V = A (1/n) (R^{\frac{2}{3}}) (S^{.5}) \quad 150 = (40) (R^{\frac{2}{3}}) (8/100000)^{.5} (A)$$

$$A (R^{\frac{2}{3}}) = 419.262 \quad (6.5y^2) (.755y)^{2/3} = 419.262 \quad y = 5.118 \text{ m}$$

$$b = 25.59 \text{ m} \sim 26 \text{ m}$$

$$A_{\text{act}} = (26 \times 5.118) + (1.5 \times 5.118^2) = 172.35 \text{ m}^2$$

$$\text{check } V_{\text{act}} = (150/172.35) = .8702 \text{ m/s} \quad \text{So } V > V_{\text{max}} \quad \text{assume } V = .8 \text{ m/s}$$

$$A = (Q/v) = 187.5 \text{ m}^2$$

$$V = (1/n) (R^{2/3}) (S^{.5}) \quad .8 = (40) (R^{2/3}) (8/100000)^{.5} \quad R = 3.34 \text{ m}$$

$$R = A/P \quad P = A/R$$

$$P = (187.5/3.34) = 56.075 \text{ m}$$

$$A = by + zy^2, \quad P = b + 2y\sqrt{1 + Z^2}$$

Solve A with P and find b, y

$$b = 41.93 \text{ m} \sim 42 \text{ m}, \quad y = 3.921 \text{ m}$$

$$A_{\text{act}} = 187.74 \text{ m}^2, \quad V_{\text{act}} = .798 \text{ m/s} \quad \text{ok}$$

Final Dimension of section $b = 42 \text{ m}$, $Y = 3.921 \text{ m}$, $Z = 1.5$

5) **Data :** $Q = 50 \text{ m}^3/\text{s}$, $Z = 1.5$, $S = 10 \text{ cm/km}$, $n = .025$, $V_{\text{max}} = .75$

(Solution)

$$A = (Q/v) = 66.67 \text{ m}^2$$

$$V = (1/n) (R^{2/3}) (S^{.5}) \quad .75 = (40) (R^{2/3}) (10/100000)^{.5} \quad R = 2.56 \text{ m}$$

$$R = A/P \quad P = A/R$$

$$P = (66.67/2.56) = 25.967 \text{ m}$$

$$A = by + zy^2, \quad P = b + 2y\sqrt{1 + Z^2}$$

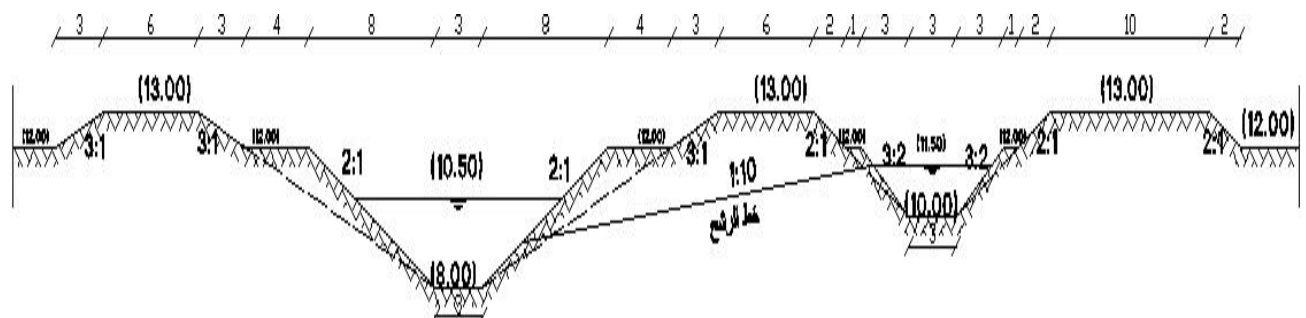
Solve A with P and find b, y

$$b = 12.833 \text{ m} \sim 13 \text{ m}, \quad y = 3.643 \text{ m}$$

$$A_{\text{act}} = 67.266 \text{ m}^2, \quad V_{\text{act}} = .743 \text{ m/s} \quad \text{ok}$$

Final Dimension of section $b = 13 \text{ m}$, $Y = 3.643 \text{ m}$, $Z = 1.5$

6)



7)

