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Subject # Hydraulic Structures

Submitted To # Engr Adeed Khan

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Q No 1

Ans: RESERVIOR

A Natural or artificial place where water is collected and stored for use especially water for supplying a community, irrigation land etc.

⇒ Service Reservoir :- it will be more economic as compared to other type of resirvior. It is also known as distribution reservior There are the store treated water.

⇒ Service reservoirs store fully treated potable water close to the limit point of distribution so need less cost and energy for distribution of water.

⇒ large service reservior can also be managed to reduce the cost of pumping by refilling the voservior at times of day when energy costs are low.

Economical Reservior :-

Service Reservior is economical because its entirely man-made its frame easily construction as well as no need of any water body direction. less space is require for Service Roservior.

Q1 (b)

Ans:- I will suggest Rock fill embankment because The earth fill embankment consist of 50% or more soil and The rockfill embankment for hilly area because in hilly areas rocks are easily availble it would have more strength and due to easily availability of material our project will be economical and safe.

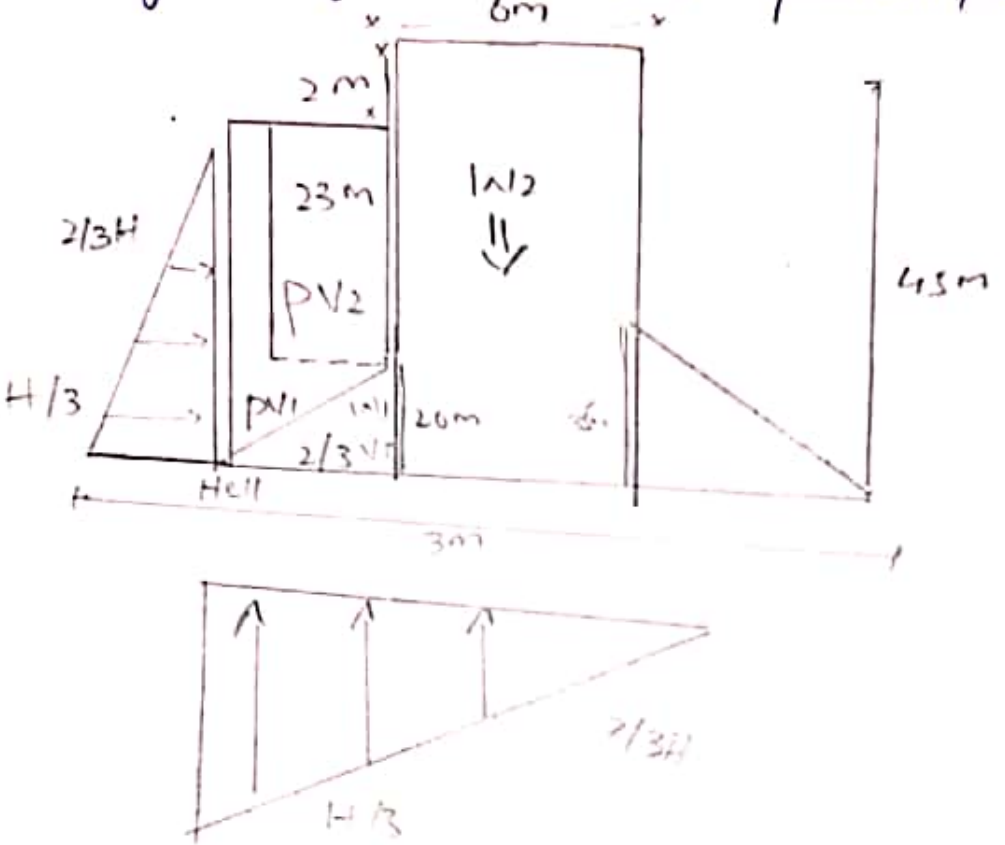
Q2: Different Type of spillways.

=> Ogee spillways
=> Shaft Spillways
=> Straight Drop spillways
=> Chute spillways
=> Side channel spillways
=> Siphon spillways
=> Labyrinth spillways.

But I will suggest siphon spillways Reasons- Because when The air is bend has been exhausted, siphonic action starts and continious flow is mainted until air enters The bend. The inlet end of The condit is placed well below The normal reservior water level to prevent ice and dwift from entering The conduit.

Q3: Gravity Dam:-

For Gravity Dam as shown in Figure, we will check the stability. In reservior full condition considering weight of dam, water pressure & weight pressur.



Assume

γ_d = 24 KN/m³ (conc)

γ_w = 10 KN/m³ (water)

Page Turn over.

Moment calculation.

Mc						157080	13248086	ΣMo 28956035
								ΣEv 457305
MV	23040	181441	22050	9900	22425			
level arm LA	31+3×1/3 = 32	25+6/2 = 28	31+2/3 = 21	31+3×2/3 = 33	31+3/2 = 32.5	33×2/3 = 32	43×1/3 = 14.33	
EH							-9245	ΣFH -9245
FV (kN)	720	6480	10500	300	690	-7140		ΣFV 11550
Force calculation	1/2×3×20×24	6×4×24×24	1/2×25×30×24	1/2×3×2×10	1/2×3/2	3×23×10	-1/2×34×42×10	-43×3/2×10
Force	W1	W2	W3	PU	PV2	PU	PH1	

Essentricity Given as.

$e = B/2 - \bar{x} \rightarrow A$

$\bar{x} = \frac{\Sigma M x - \Sigma M o}{\Sigma F V} = \frac{457305 - 289560.85}{11550}$

$\bar{x} = 14.52$

$e = 34/2 = -14.52 = 17 - 14.52$ $\quad e = 2.48$

Factory of ~~Tension~~ safety for Tension :-

$\Rightarrow e < B/6 = 2.48 < 34/6 \rightarrow 2.48 < 5.67$ Ok.

Stress :-

$\sigma_{heel} > 0$

$\Rightarrow \sigma = \frac{\Sigma fV}{B}\left(1 \pm 6e/B\right)$

$\Rightarrow \sigma_{Toe} = \frac{\Sigma FV}{B}\left(1 + 6e/B\right)$

$\Rightarrow \sigma_{Toe} = \frac{11550}{34}\left(1 + \frac{6(2.48)}{34}\right)$

$\Rightarrow \sigma_{Toe} = (339.71)(1 + 0.48)$

$\Rightarrow \sigma_{Toe} = (339.71)(1.48)$

$\Rightarrow \sigma_{heel} = \frac{\Sigma FV}{B}\left(1 - 6e/B\right)$

$\Rightarrow \frac{11550}{34}\left(1 - \frac{6(2.48)}{34}\right)$

$\Rightarrow 339.71\ (1 - 0.44)$

$\Rightarrow \sigma_{heel} = 190.24 > 0$ Ok ✓

$\Rightarrow$ Factor of safety against "over turning"

Given as:

$$\frac{\Sigma M_R}{\Sigma M_O} > 2$$

$$= \frac{457305}{2895685} > 2$$

$\Rightarrow 1.58 > 2$ Not safe

$457305 > 2895685$ | safe

For against sliding.

$$\frac{\Sigma FV + BQ}{\Sigma FH} > 1$$

Given

$\mu = 0.7$

$q = 1400$

$= 0.65 - 0.75$

$$\Rightarrow \frac{(0.7)(11550) + (34)(1400)}{9245} > 1$$

$$\Rightarrow \frac{8085 + 47600}{9245} > 1$$

$\Rightarrow$ $6.02 > 1$ = OK

" Thus design is safe "