Paper: Hydrolic Structure

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Q No: 1 Q: Define reserviour also explain which type of reserviour will be more economical and why?

Ans: Reserviour:-

A reserviour is manmade lake or large freshwater body of water. Many people think of reserviour as a lake and might even use the word interchangeably. However the key difference is that reserviour are artifical and made by humans, while lakes are naturally occuring bodies of water. Reserviour are great because they provide a supply of water for when naturally occuring bodies of water, like lakes or rivers, run dry.

Types of Reserviours:

Mainly three types of Resorviours.

1) Valley-dammed Reserviours.

2) Bank-Side Reserviours.

3) Service Reserviours.

In above three types of reserviours

Service reservious is more economical because it is entirely man made. fram construction is easy to construct as well as no need of any natural water bodies diversion it also require small space.

Q No1: B: Which type of Embankment dam you will suggest in a hilly area and why.

Ans:- An embankment dam is large artificial dam. It is tipically created by placement and compaction of a complex semi-plastic mound of various composition of soil, sand, clay or rocks. it has a semi-perious water proof naturall covering for its surface and a dense, impervious core.

As embankment and are categorized as earth fill embankment and Rockfill embankment Earth fill embankment are the one which consist of 50% or more soil, which Rockfill embankment are the one. which consist of 50% or more rocks. If we have to build an embankment on hilly area we should build Rockfill embankment dam because it has more strength then soil fill and in hilly area rocks will be easly available which makes our project economical & save.

Q No.2:- List down different types..... ..... in winter and why?

Ans:

Types of spillways:-

Spillway have the following types:

1:- Straight drop spillway.
2:- Ogee spillway.
3:- Shaft spillway.
4:- Chute spillway.
5:- Side channel spillway.
6:- Siphon spillway.
7:- Labyrinth spillway.

In condition where freezing point of water is less than -10 degree centegrade in winter the most efficient spillway is chute spillway. Because chute spillway disposed water from upstream to down stream throught steepy sloped open chennel so that the flow will be very fast. The flowing water pressure will be high and will be in supercritical condition that will dissipate energy from the falling water, energy dissipates are also provided in this type of spillway. Thus the temprature of water go high and it will not allow water to freez and stop so the water will move freely in this cold area.

Q No. 3 :- Design the gravity ..... uplift pressure.

Sol:-

Force	Force formulas	FV (KN)	FH (KN)	Lever Arm (m)	Mr (Fv x L.A)	Mo
W1	1/2 x 33 x 6 x 24	2376	0	57.00	135432	
W2	24 x 10 x 74	17760	0	50.00	888000	
W3	1/2 x 58 x 45 x 24	31320	0	30.00	939600	
PV1	1/2 x 6 x 33 x 10	990	0	59.00	58410	
PV2	6 x 36 x 10	2160	0	58.00	125280	
PU	-1/2 x 61 x 10 x	-21045	0	40.67	0	855900.15
Ph	-1/2 x 69 x 10 x 69	0	0	23.00	0	547515
		ΣFv =	ΣFH =		ΣMr =	ΣMo =
		33561	-23805		2146722	1403415.15

Assume Unit Weight of concrete = 24 kN/m³

Assume Unit weight of water = 10 kN/m³

Now for factor of safety Against tension

condition $e < \frac{B}{6}$

$\frac{B}{6} = 10.16$

Now eccentricity e of resultant forces

$e = \frac{B}{2} - \bar{X}$ ∴ $\bar{X}$ = location of resultant force from here.

$$\bar{X} = \frac{\Sigma M_r - \Sigma M_o}{\Sigma FV}$$

$$= \frac{2146722 - 1403415.5}{33561}$$

$$\boxed{\bar{X} = 22.15}$$

So $$e = \frac{61}{2} - 22.15$$

$$\boxed{e = 8.35 m}$$ Condition in tension is [ok]

→ For FOS Against stress.

Condition; $\gamma_{heel} > 0$

As

$$\gamma = \frac{\Sigma FV}{B}\left(1 + \frac{6e}{B}\right)$$

$$= \frac{33561}{61}\left(1 + 6\frac{(8.35)}{61}\right)$$

$$\boxed{\gamma_{toe} = 1002.049}$$

Also

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

$$\frac{33561}{61}\left(1 - \frac{6(8.35)}{61}\right)$$

$$\boxed{\gamma_{heel} = 98.31\ kN/m^3}$$

Condition is safe in stress so [Ok]

For FOS Against over turning.

Condition $\frac{\Sigma M_r}{\Sigma M_o} > 2$

$\Rightarrow \frac{2146722}{1403415.15} = 1.53 < 2$

Condition is not ok.

So.

Condition ($\Sigma M_r > \Sigma M_o$)

$2146722 > 1403415.15$ [Ok]

$\Rightarrow$ For FOS Against sliding.

Condition $\frac{\mu \Sigma FV + B \times q}{\Sigma FH} > 1$

$q = 1400$

$\mu = 0.7(0.65 - 0.75)$

So

$\frac{0.7(33561) + 61 \times 1400}{23805}$

$= 4.57$

So condition is safe in sliding [Ok]

Q No: 3: Diagram.