Assignment No # 1

Name: Hedayat Ullah Shah

ID : 7743

Section : "C"

Subject : Hydroulic Engineering

Deptt : BE CIVIL

Date : 14 April 2020

Instructor. Engr. Adeed Khan

Q NO: 1

(a) Reservior :

A reservior is a man-made lake or large freshwater body of water.

Many peaple think of reservior as a lake and might even use the words interchangeably. However the key difference is that reservior are artificial and lake are naturally.

⇒ We have three main types of Reservior

- Valley demond reservior
- Bank-side reservior
- Service reservior

The most economic type of reservior is the service reservior. Because the service reservior requires less time to construct comparatively to the other two types of reservior, which will save us

labour cost and other material such as, michenery rent and other things which help us to construct a reservior, it will couse less material other than valley demand reservior and barda-side reservior, which will also help us in reduce our cost in the construction of reservoir.

Q:1 (part - B)

We have two types of embankments dam, Earth fill embankment and Rock fill embankment.
Earthfill embankment is the one which consists of 50% or more soil while Rock fill embankment consists of 50% or more rock.
Rockfill embankment have more strength than soil fill embankment, So if we are building an embankment in a hilly area we should build

rock fill embankment because the rocks there will be easily available which will make our project economical and will have more strength comparative to earth fill embankment.

Q No: 2

Ans:

Different types of spilways

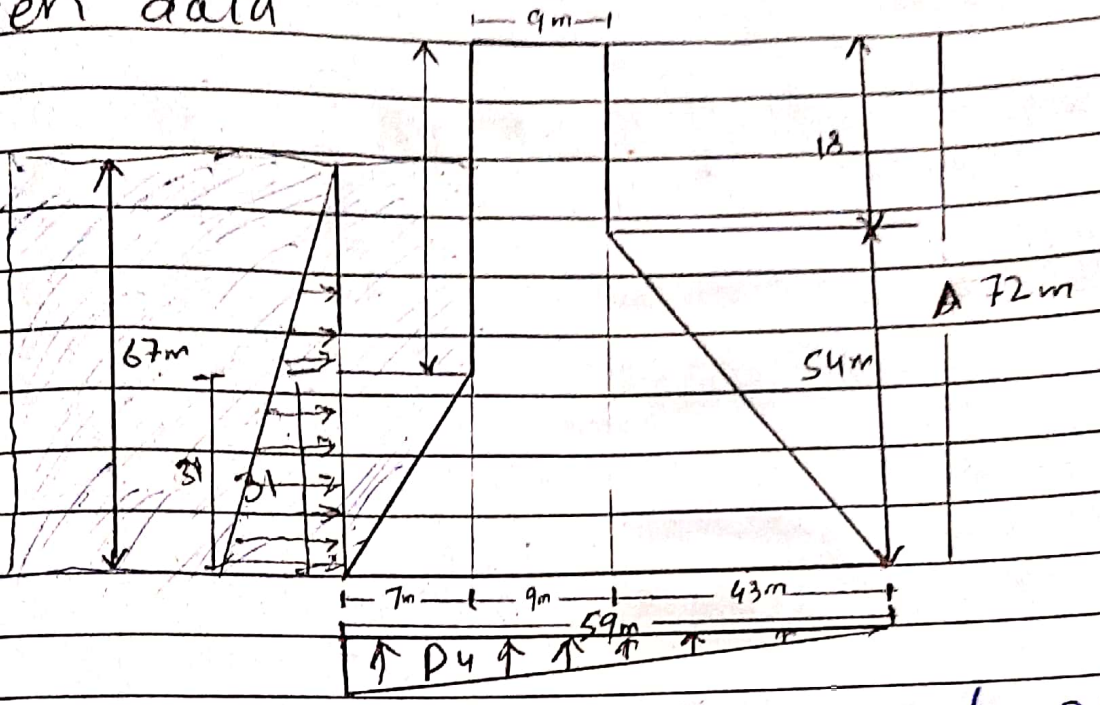
(1) Straight Drop Spilway
(2) Ogee Spillway
(3) Shaft Spillway
(4) Chute Spillway
(5) Side chenel spillway
(6) Siphon Spillway
(7) Labyrinth Spillway

A shaft spillway or bell mouth spillway should be used in area having temprature -10°C or below. As this spillway is designed like an inverted bell where water can entre around the entire perameter. These uncontrolled spillways are also morning glory or glory hole spillway.

In the areas where the surface of the reservoir may freez. This type of spillway is normally filled with ice breaking arrangment to prevent the spillway from becoming ice-bond.

Q No: 3

Given data



Assume unit weight of Concrete = 24 KN/m³

Assum Unit weight for water = 10 KN/m³

Forced and Moment Calculations

Forces	Forced Formula	Fv (KN)	FH (KN)	Lever Arm (m)	Mr	Mo
W1	(1/2) x L x W x γd	2604	0	54.33	141484.0	0
W2	L x W x γd	15552	0	47.50	738720	0
W3	(1/2) x L x W x γd	27864	0	28.67	798768	0
PV1	(1/2) x L x W x γw	1085	0	56.67	61483.3	0
PV2	L x W x γw	2520	0	55.50	139860	0
PL	(-(1/2)) x L x W x γw	-19765	0	39.33	0	777423.33
Ph	(-(1/2)) x L x W x γw	0	-22445	22.33	0	501271.67
	Σ	29860	-22445	Σ	1880315.3	1278695

For Factor of Safety Against Tension.

Condition → $e < B/6 \rightarrow B/6 = 9.83\ m$

Eccentricity of the Resultant Force

$$e = (B/2) - \bar{X}$$

$\bar{X}$ = Location of Resultant Force from Toe

$$\bar{X} = (\Sigma M_r - \Sigma M_o) / \Sigma F_v$$

$$\bar{X} = (18803153 - 1278695) / 29860$$

$$\bar{X} = 20.15$$

So $$e = \left(\frac{58.86}{2}\right) - 20.15$$

$$\boxed{e = 9.35\ m}$$

Condition Safe in tension.

For Factor of Safety Against Stress

Condition → $\gamma_{heel} > 0$

$$\gamma = (\Sigma F_v / B)(1 \pm (6e/B))$$

$$\gamma_{Toe} = (\Sigma F_v / B)(1 + (6e/B))$$

$$\gamma_{Toe} = 987.42833 \quad KN/m^3$$

$$\gamma_{heel} = (\Sigma F_v / B)(1 - (6e/B))$$

$$\gamma_{heel} = \left(\frac{29860}{58.98}\right)\left(1 - \frac{(6(9.35))}{58.98}\right)$$

$$\gamma_{heel} = 24.78 \quad KN/m^3$$

Condition → Safe in Stress (OK)

For Factor of Safety Against overturning

Condition → $(\Sigma M_r / \Sigma M_o) > 2$

$$= (\Sigma M_r / \Sigma M_o) = \frac{1880315.3}{1278695}$$

$$\Sigma M_r / \Sigma M_o = 1.47$$

Condition → Not Safe

$\Sigma M_r > \Sigma M_o$

$\Sigma M_r = 1880315.3$

$\Sigma M_o = 1278695$

Condition → Safe (ok)

For Factor of safety Against Sliding

Condition → $((u\Sigma F_v + Bq)/\Sigma F_H) > 1$

$q = 1400$

$u = 0.7$

Now $\frac{((0.7)(29860)) + ((58.98)(1400))}{-27445}$

$((u\Sigma F_v + Bq)/\Sigma F_H = 4.61$

Condition → Safe in Sliding

The End