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Sec: B

Q1 Hydraulic structure.

(a) Ans

Culvart	Causeway
Culvart is of a tunnel shape carrying a stream of water under a road or railway. I	A cause way is of course a raised road. it is built an an ambankment.
It water as a brige to pass an it.	It is supported mostly by earth or stone.
It is normally uses for natural flow of water for controlling it.	And it is not a bridge because it supports a roadway between Piers.

Q1. b
Ans:

Cross Drainag Work:-

is a Structure carrying the discharge from a natural stream across a canal intercepting the stream.

Necessary:

It is required to dispose of the drainage water so that the canal supply water remains uninterrupted.

Types:

Some types of cross drainage are following.

(i) Adequates:

It carries an irrigation canal over a drain.

(ii) Super Passage:

It carries a drain over an irrigation canal.

(iii) Level Crossinge:

This structure makes it Possible to dispese off drain water Safely at Same level as that of a canal.

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(iv) Inlet and Outlet:

When Possible drain water is taken in the canal to be discharged afterwards into a drain at suitable location.

Q 9

Ans 9

Wair:

Wiers are commonly used to control the flow rates of rivers during Periods of high discharge.

Sluice gates are used to increase or decrease the volume of water going out.

Barrage:

It is used to convert tidal energy into electricity by forcing water through turbines by activating a generater.

Q.2
(B)

Reynolds Number:

The Product of density times length divided by viscosity coefficient. This is Proportional to the ratio of inertial forces and viscous forces in a fluid flow.

Laminar:

The flow in a Pipe is laminar if the reynolds Number is less than 2100.

Turbulent:

If the reynolds Number is greater than 4000 then it is turbulent.

Neither Laminar nor turbulent flow:

When the Reynalds number is between 2000 and 2800, the flow is neither Laminar nor turbulent.

Lower Critical velocity:

The velocity at which flow changes from Laminar to transition is called Lower critical velocity.

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Higher Critical velecity:

The velecity at which flow change from transition to turbulant is called Higher Critical velecity.

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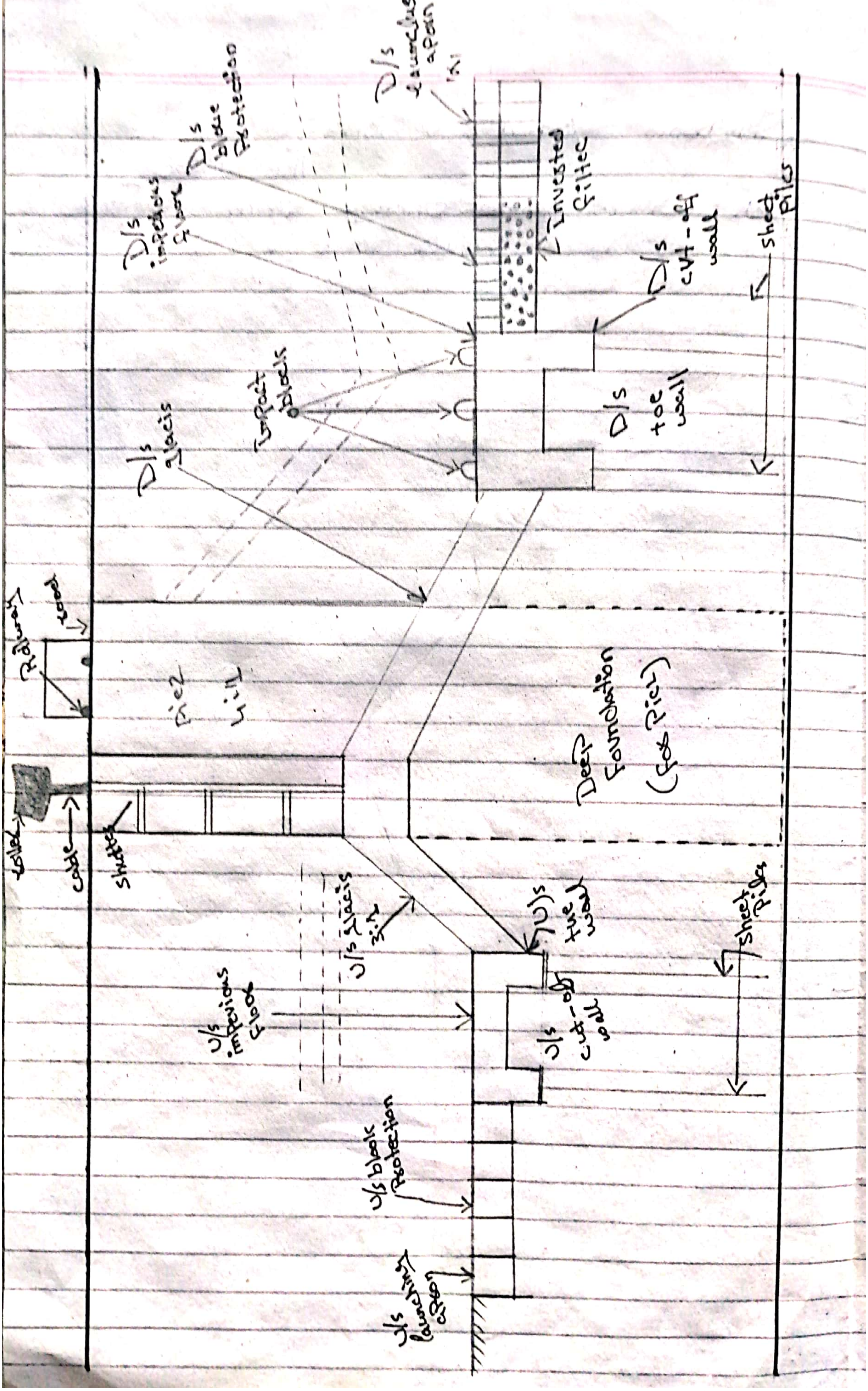
Question No 3 Part (i)



Question No 3 Part (ii)

Several formulae based on experimental results have been proposed to predict the "maximum" or "equilibrium" scour depth (y_s below general bed level around bridg piers. In general than assome the relationship.

$$y_s/b' = \phi(y_o/b', fr, d/b')$$

where b' is the pier width. y_o is the upstream flow depth. d is the sediment size and fr is the flow froud number.

Courseris (1962) experimental results understimade the scour depths. compared to many Indian experiments (Inglis, 1949) which suggest the formula (approach flow is normal to the brige pier)

$$y_o/b' = 4.2\,(y_o/b')^{0.78}\,Fr^{0.52}$$

The Indian field data also suggest the scour depth should be taken as twice the regime scour depth.

In case of live beds the formula

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$$y_o / y_a = (B/b')^{5/7} - 1$$

Predict the maximum equillibrium scour depth.

In relevity deep flow a first order estimate of scour may be obtained by

$$y_s = 2.3\, k_s\, b'$$

where k_s = angularity co-efficient which is a function of the pier alignment.

Question No 4
Answer No 4

Given Data

L.L = 1.5 kip/ft^2
D.L = 300 lb/ft^2

θ = 30°
Unit weight of soil = 100 lb/ft^2

Dimension = 15' x 15'
Fy = 60 ksi steel
Concrete = 1:2:4 = M15
D = 0.92m thicknees.

Sol: ① Load
Total load on top = self weight + l.l + D.l
Self weight = 3x5 = 4 kN/m^2
45 kw/m^2 = 0.939 kip/ft^2
w = 1.5 + 0.939 + 0.3
w = 2.739 kip/ft

(2) Co.efficient of earth pressure.

$$Ka = \frac{1 - \sin\theta}{1 + \sin\theta}$$

$$= \frac{1 - \sin(30)}{1 + \sin(30)}$$

Ka = 0.33

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3) Caferal Pressoure due to (Dead Load + live load)

Total unfical load × ka

$= (C.C + D.C) \times Ka$

$= (1.5 + 0.3) \times 0.33$

$= (0.594 \ kip/ft^2$

$28.4 \ KN/m^2$

4) Lateral Presure due to soil

$= Ka \times \gamma soil \times h$

$= 0.33 \times 0.1 \times 18$

$= 0.594 \ kip/ft^2$

or

$= 28.4 \ KN/m^2$

5) Lateral Pressure at top due to P.C + D.C

$= 0.594 \ kip/ft^2$

$= 28.4 \ KN/m^2$

6) Lateral Pressure at bellom.

Lateral Pressure due to (C.C + D.L) + Lateral Pressure due to soil

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$= 0.594 + 0.594$

$= 1.188 \text{ kip/ft}^2$

$= 56.88 \text{ kN/m}^2$

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