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Sec :- "A"

Subject :- Hydraulic Structure

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QNo 1:- "Part A"

1 Differentiate B/w Culvert and Causeway

→ Causeway is a road that is raised, as to be above water, murshland etc

→ Culvert is a transverse channel under a road or railway for for the draininey of water.

→ Causeway can be Constructed of earth, masonry, Wood or Concrete

→ Causeway is not Proper movable.

→ The Components of a Culvert are Comparatively Simpler and Include Concrete bones or Cells Pipes, a top deck and Supporting Parts.

P(2)

→ Culverts are built at less than 20 feet high over the obstruction.

→ The length of the culvert is typically not more than 6 meters.

→ Culvert are usually embedded in the soil which bear the major portion of the Culvert load

→ A Culvert is an enveloping structure that consist of two sides, a roof and floor.

→ If a causeway has not vent to flow the water then it is called low level causeway

→ A high level causeway is submersible road bridge designed to be over toped in floods.

QNo 1:- "Part B"

Cross (1) Drainage Work

A Cross drainage work is structure carrying the discharge from a natural Stream across a Canal intercepting the Stream. Canal Comes across obstruction like river, natural drain and other Canal. The Various Types of Structure that built to Carry the Canal water across the above mentioned obstruction or Vice Versa is Called Cross drainage works.

It is generally a Very Costly Item and Should be avoided by Diverting one Stream into another and Changing the alignment of the Canal So that it Crosses below the Junction of two Stream.

P(4)

why it is necessary.

→ The water-shed canal do not cross natural drainage. But in actual condition of canals network the ideal condition may not be available & the abstacle like natural drainage may be present across the canal.

So the cross drainage work must be provided for running the irigation system.

→ If the crossing point the water.

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

Types of Cross Drainage work.

(i) Inlet & outlet

when possible drain water as taken of the canal is be discharged afterward into a drain at suitable location.

(ii) level Crossing

This structure make at possible to dispose off drain water safely at same level as that of a canal

(iii) Adequte

It carries irrigation canal over drain.

(iv) Super Passage

It carries a drain over an irrigation canals.

P(6) P(6)

Q No 2 :- "Part A"

1) Differentiate blw Weir and Barrages.

→ A Weir is an impermeable barrier that is built across a river to raise the water level on the upstream side, here the water level is at the required hieght and excess water then can flow over the weir.

→ Barrage usually built on the other side of a flooded river on the other hand; a barrage involve adjustable gates installed over a dam to maintain the water surface at different levels and a different times.

→ Barrage are built near City so that the amount of water flowing in the river can be controlled by opening and designing the gates to save the City from flooding

~~P(8)~~ P(7)

→ In weir after long time Silting Problem occure, while in barrage no Silting occures.

→ Barrage low Set crest

→ Weir high Set crest

→ Barrage longer Construction Period

→ Weir Shorter Construction Period

→ Barrage IS Costly Structure

→ Weir IS relative Cheaper Struc.

→ In Barrage Silt removed IS done through under Sluces.

→ Weir No mean for Silt disposal.

QNo 2 "Part B"

Reynold Number

The ratio of inertia force to viscous force is said to be the reynold no.

Laminar

The flow in a pipe is laminar if the reynolds number is less than 2100.

Turbulant

If the reynolds number is greater than 4000 then it is turbulent

Neither Laminar nor Turbulent Flow

when the reynold no is blw 2000 and 2800, the flow is neither laminar nor turbulent.

lower Critical Velocity

The velocity at which flow changes from laminar to ~~turbulent~~ transition.

P(9)

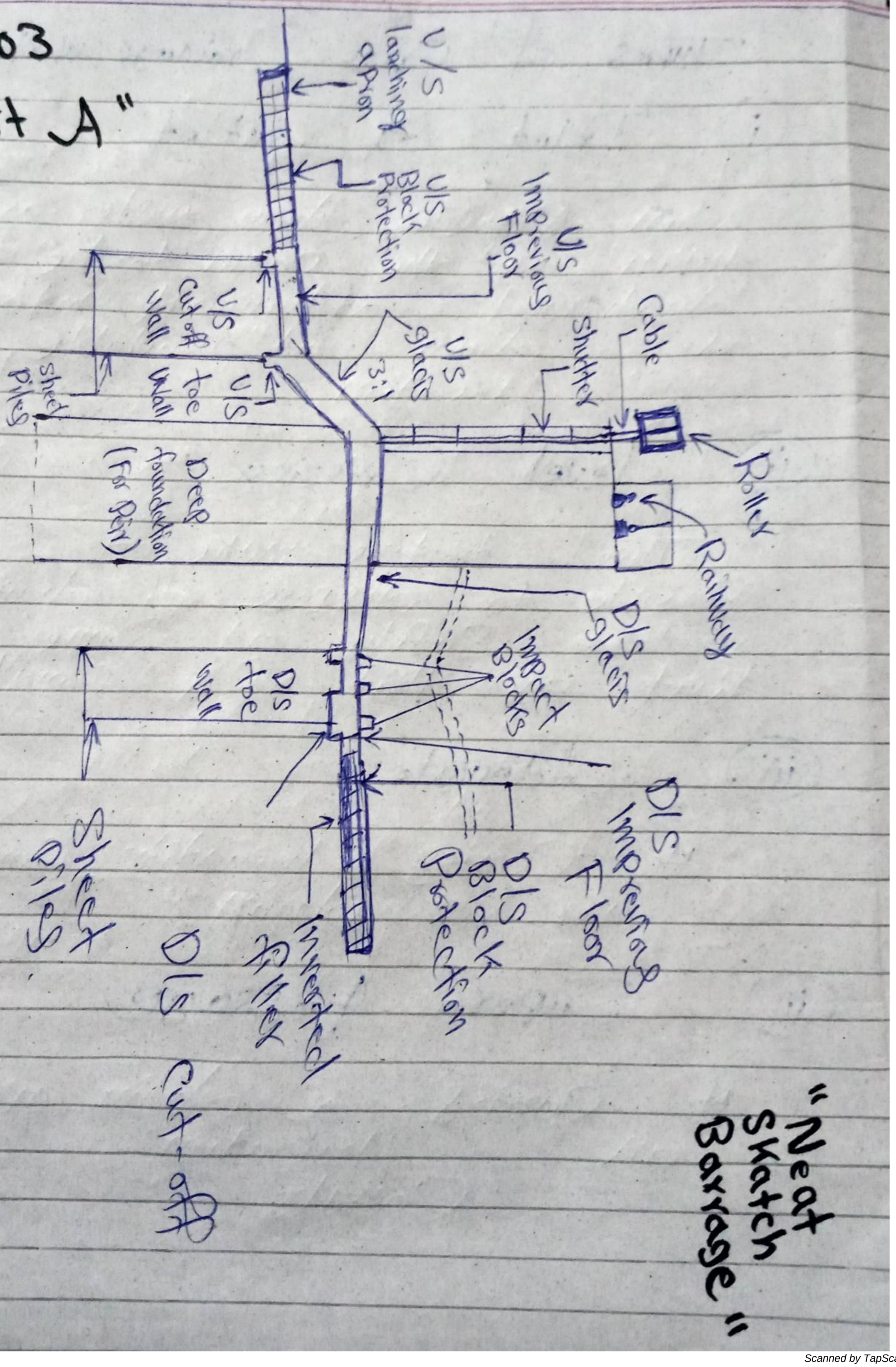
Higher Critical Velocity

The Velocity at which flow change from transition to turbulent is Called Higher Critical Velocity.

P(10)

Q No 3

"Part A"



"Neat Sketch Baxrase"

P(12) P(11)

Q No 3. "Part B"

① $D_N = R_S (W/L)^{0.61}$ ——→ ①

where R_S is the regime Source depth.

The maximum Source depth in a Single-Span bridge (no Piers) with a Straight approach (case 1) about 25% more than the normal Source given by equation ①, where the case of multispan Structure with a Curved approch reach (case 2), it is 100% more than the normal Scour.

Predominant if the Construction depth is the maximum Source case 1 or case 2, or the value given by,

① $D_{max} = R_S (W/L)^{1.56}$

⟺

Q No 4)

Given Data :-

L.L = 1.5 kip/ft²

D.L = 300 lb/ft²

ϕ = 30°

Unit weight of Soil = 100 lb/ft²

Dimension = 15' x 15'

fy = 60 ksi Steel

Concrete = 1:2:4 = M15

D = 0.92 m thickness

Solution

(1) Load

Total load on top = Self wt + L.L + D.L

Self wt = 3 x 15 = 45 kN/m²

45 kN/m² = 0.939 kip/ft²

W = 1.5 + 0.939 + 0.3

W = 2.739 kip/ft²

(2) Coefficent of Earth Pressure

$$K_a = \frac{1-\sin\phi}{1+\sin\phi}$$

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

$$\boxed{K_a = 0.33}$$

(3) lateral Pressure due to (D.L + L.L).

= Total Vertical load x Ka

= (L.L + D.L) x Ka

= (1.5 + 0.3) x 0.33

= $\boxed{0.594 \text{ kip/ft}^2}$

or

$\boxed{28.4 \text{ kN/m}^2}$

(4) lateral Pressure due to Soil

$= K_a \times \gamma_{soil} \times h$

$= 0.33 \times 0.1 \times 18$

$= \boxed{0.594 \text{ kip/ft}^2}$ OR

$\boxed{28.4 \text{ kN/m}^2}$

(5) lateral Pressure at top due to L.L + D.L.

$= 0.594 \text{ kip/ft}^2$

$= \boxed{28.4 \text{ kN/m}^2}$

(6) lateral Pressure at Bottom.

= lateral Pressure due to (L.L + D.L) + Pressure due to Soil

$= 0.594 + 0.594$

$= \boxed{1.185 \text{ kip/ft}^2}$ OR

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