(1)

1
Q.

"Difference b/w culvert and causeway"

"Culvert:-

Culvert as define as the that part of the structure which an opening through embakement for the conveyance of water through by means of pipe or other channels.

The culvert is many type is made from pipe, reinforced concrete or other materials.

OR

The culvert is a tunnel carrying a stream under a road or rail way.
A culvert may be acts as a bridge on which the traffic is passed on it.

"Cause way:-

The cause way is define as it is

a track, road or railway on the upper point of an embakement across a low or wet places.

It is also define as Cause way is road that is constructed across and above water and marsh Land. It is also constructed of earth on different materials like concrete or stone etc.

Q 2

part (B)

Cross Drianage work:-

It is define as an irrigation canal while carrying water from head works to drop field have to cross flow natural drinage stream. To cross these drinage safely by the canal some / suitable structure are required to construct work required to construct to cross the drinage are called cross drainage work.

N The necessity of cross drianage work are given below:-

★ The water shed canals do not cross natural drinage but in actul orentation of the canal network this ideal condition may not be Available and obstacls like natural drinage may be present across the canal, so the cross drinage works must be provide for running the irrigation system.

★ That point at which canal and drinage water are intermixed so for the smooth running of the canal with its design discharge the cross drinage work are required.

★ The site condition of the crossing point may be such that without any suitable surface, the water of the canal and drinage can not be divided to their natural directions. So the cross drinage work must be provided to maintain their natural directions of flow.

Types of cross drinage work:

(1) Irrigation canal passes over the drinage.
(a) Aqueduct
(b) Siphon Aqueduct

(2) Drianages passes over the irrigation canal.
(a) super passage
(b) siphon super passage

(3) Drainage & canal intersection to each other.

(a) Level crossing
(b) Inlet & out let

(1) (d) **Aqueduct**:- The hydrulic structure in which the irrigation canal is taken over the drinage (such as river, stream etc) is know as Aqueduct.

(b) **Siphon Aqueduct**:- In a hydrulic structure where the canal is taken over the drinage, but the drainage water cannot passes clearly below the canal. it flow under the siphon action, so it is known as siphon Aqueduct.

(2) (a) **Super passage**:- The hydrulic structure in which the drainage is taken over the irrigation canal is

as a super passage.

(b) **Siphon super passage:.**
The hydrulic structure in which the drianage is taken over the irrigation canal, but the canal water is passes below the drianage water siphonic action is know as siphon super passage.

(3) (a) **Level crossing:-**
When the bed level of the canal & stream are approximatly in canal & stream is not much different, the cross drianage work constructed is called level crossing.

(b) **inlet & outlet:** ~~when~~
when irrigation canal meet a small stream or ~~dam~~ drain at same level, drain is allowed to

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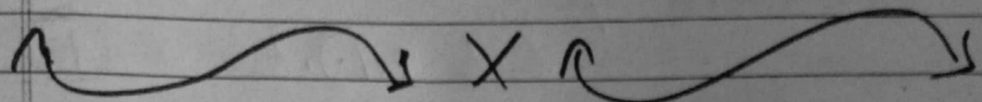
enter the canal as in inlet. At some distance from this inlet point a part of water is allowed to drain as outlet.



Q 4

given Data:

~~L.L = 1.5 kip/ft²~~
~~D.L = 300 lb/ft² = 0.3 kip/ft²~~

Q 4:

given Data:

Diamension = 15ft × 15ft
live load = 1.5 kip/ft² = 1500 lb/ft²
Dead load = 300 lb/ft²
unit of soil = γs = 100 lb/ft²
Angle of response = ϕ = 30°
grade of concrete = 1:2:4 = m15
fy = 60 ksi

Thickness of slab = 0.92 ft.

Required Data:

To Design box culvert.

★ Load Calculation:

as we know that.

Total load carrying on Top Slab = self wt of slab + L.L + D.L —— ①

Self wt of Top Slab =

Thickness x grade of concrete.

= 0.92 X 15

= 13.8 lb/ft

put in eq ①

= 300 + 1500 + 13.8 = 1813.8 lb/ft

★ Co-efficient of earth pressure:

$$Ka = \frac{1-\sin\phi}{1+\sin\phi} = \frac{1-\sin 30^\circ}{1+\sin 30}$$

= 0.33

P.T.O

★ Lateral pressure due to dead and live load:

= Total vertical load

(Dead + live) X Ka

= (300 + 1500) X 0.33

= $\boxed{594\ lb/ft^2}$

Lateral pressure due to soil.

K = γ x h

= 0.33 X 100 X 15 + 0.92

= $\boxed{525.36\ lb/ft^2}$

★ Lateral pressure due to Top:

D.L + L.L

Which we calculate above which is 594.

★ Lateral pressure at bottom:

lateral pressure due to (D.L + L.L) + taken pressure

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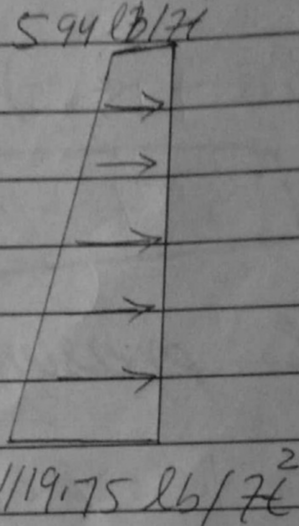
due to soil.

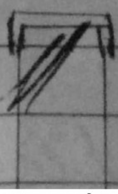
$594.36 + 525.39$

$= \boxed{1119.75 \ lb/ft^2}$



Q3 = Draw Sketch Diagram:

P.T.O



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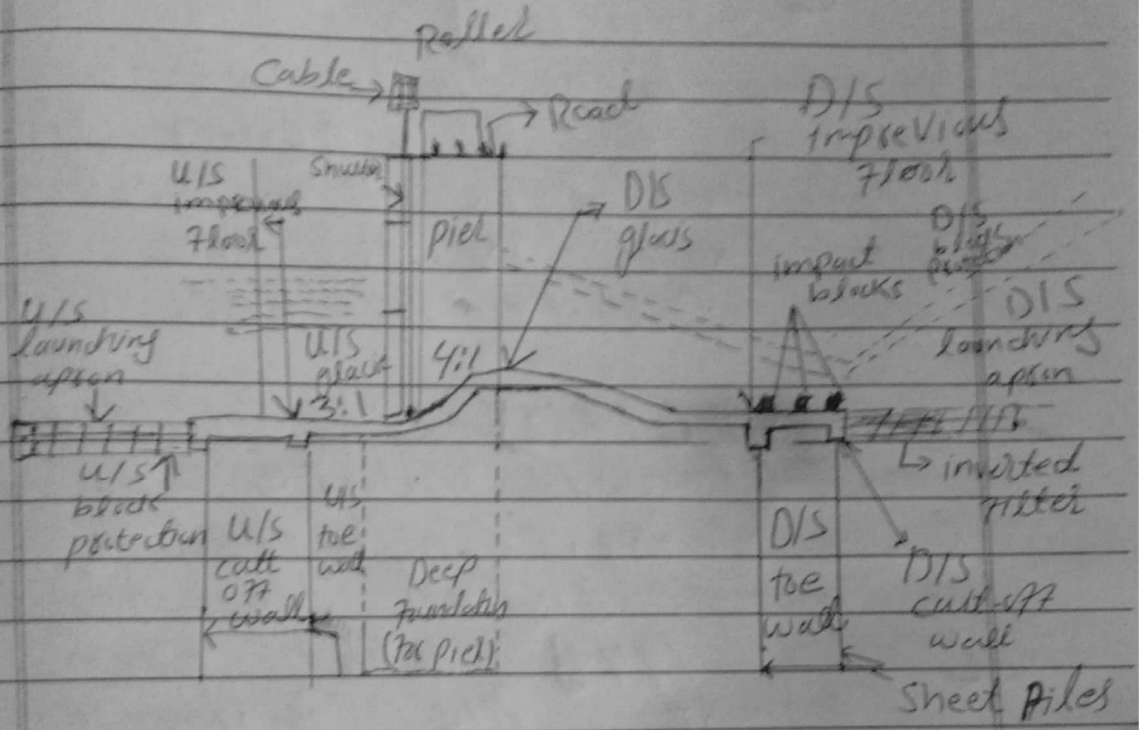
$\frac{3}{①}$ (a) Draw Skitch Diagram Components:



* Component part of Barrage *

$\frac{3}{①}$ part (B)

Several formulae based on experimental results have been proposed to predict the maximum "equalibrium" scour depth (y_0 below general bed level). around bridge piers. In general, these assume the relationship

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

where b' is the pier width, y_o is the upstream flow depth, d is the sediment size, and Fr is the flow Froude number.

Laursen (1962) experimental results underestimate the scour depth, compared to many Indian experiments (Inglis 1949) which are suggest the formula (approach in normal to the bridge piers).

$$y_s/b' = 4.2(y_o/b')^{0.78} F_r^{0.52}$$

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

So ~~y/~~o.

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

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predict the maximum equilabrium scour depth.

in a relative deep flow a first-order estimate of clear local scour Socour (around pier) be obtained as,

$$Y_s = 2.3 K_a b'$$

Where K_a = angularity cofficient which is a function of the pier alingment.

* Socour around bridge piers:.

Several formuale based on experimental results have been proposed to predict the "maximum" or "equlabrium" scour depth (Y_{sa} - below genral bed level) around bridge piers - in genral assume the relationship

$$Y_{sa}/b' = \phi[y/b' , Fr, d/b]$$

Where b' is the pier

width, y_0 is the up stream flow depth. d is the sediment size, and F_r is the flow Froude number.

Q2

(a) **Weir:**

* Weir is the structure constructed across the river to rise the level of water.
* Weir are cheaper structure.
* Weir is mostly constructed in hilly areas only to be rise the level of water.
* In weir after some time setting problems occurs.

Barrages:

* Barrages is a

structure constructed across a river in which adjustable gates (sluice gates) are installed over a dam to maintain the water surface different level at different time.

* Barrages in which much expensive than weir.
* Barrages is constructed near the city which controlled the flow of water with the help of gates.
* In Barrages no setting problem occurs due to gates.

part(B)

Reynold Number.

Reynold number is define as:
It is the ratio of inertial force and viscous forces.

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It has dimension less quantity because It is the ratio of two similar quantity.

It is represented by "Rn".

Formula of "Rn"

$$Rn = \rho v d / \mu$$

ρ = density
V = velocity
d = diameter
μ = viscosity.

★ **Liminar Flow:**
The Flow which Reynold number value less than 2000 is known as laminar Flow.

★ **Turbulant Flow:**
The Flow which have Reynold number value greater than 4000 is known is Turbulant flow.

Neither laminar Nor Turbulant
The Flow which have

Reynold number range 2000 – 4000 is known as neither laminar nor Turbulant flow.

★ Lower critical velocity:
It is also called Sub - critical velocity, which have Froude Number less than 1 is know as lower critical velocity.

$Cr < 1$
lower critical velocity.

★ Higher critical velocity:
The flow which have Froude number greater than 1 is known as higher critical velocity.

It is also called super critical velocity-

$Cr > 1$ super critical velocity

end.

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