

Correlation For Vertical Thrust of Water & Settlement of Pavement In Case of Flood

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Abstract

Vertical thrust on pavement & settlement parameters are correlated. The thrust coming on the pavement is compared with the bearing capacity of a compacted layer of soil & hence settlement parameter is found. Excessive settlement of pavement is very dangerous

Keywords – Vertical thrust, Settlement, Bearing Capacity of soil.

Introduction

The depth of standing water on the pavement is taken into account & vertical thrust is found. The different velocity of flow of water is taken, and vertical thrust is found due to the velocity of the water. Similarly, vertical load due to heavily loaded truck is taken into account & total vertical thrust on the pavement is found. Since water will penetrate through pores & soil will be in moist condition & its bearing capacity will be reduced as compared to a dry state. The vertical thrust & bearing capacity are taken into account to determine settlement. The bearing capacity of moist soil = 10 t/m². Load of vehicle = 13.10 t/m².

Observations:-

Table 1: Data for vertical thrust on pavement & settlement.

S. No. (1)	Vertical thrust (T) in tonne/m ² (2)	Settlement Pf in mm (3)
(1)	45.46	77.00
(2)	18.95	19.39
(3)	21.44	25.00

Table 2: Data for $\frac{T}{T_{\max}}$ & $\frac{P_f}{P_{f \max}}$:-

S. No. (1)	$\frac{T}{T_{\max}}$ (2)	$\frac{P_f}{P_{f \max}}$ (3)
(1)	1.000	1.000
(2)	0.417	0.252
(3)	0.472	0.325



Discussion & Results

$$\frac{P_f}{P_{f \max}} = -0.278 + 1.276 \left(\frac{T}{T \max} \right) \quad - (1)$$

If $V = 17$ m/sec

Thrust = 14.73 t/m²

Standing water = 1 m

Thrust = 1 t/m²

Thrust due to vehicle = 13.10 t/m²

Total vertical thrust = 28.83 t/m²

Using (1) equation settlement = 40.90 mm.

The excessive settlement will be avoided because it will damage the road.

Conclusions

- The movement of the vehicle is strictly restricted if flood water is on the road.
- Also, in flood areas, the bearing capacity of soil should be high.
- Soil stabilization is to be done.

References

[1] Soil Mechanics – By Dr. B.C. Punmia.

Appendix 1- Notation

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|-----|----------------|---|---|
| (1) | T | = | Vertical thrust on the pavement in t/m ² |
| (2) | P _f | = | Settlement of pavement in mm |