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Assessment of Railway Embankment

Dr. Birendra Kumar Singh

Civil Engineering Department, Birla Institute of Technology, Mesra, Ranchi-835215 (Jharkhand)

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Abstract
The depth of the compacted layer of soil in the subgrade is found to resist the load coming from the train. The compaction of sub-grade soil is done with respect to its OMC & MDD. Where soil is of poor bearing capacity, stabilization of soil is done to get more bearing capacity. Here soil (Clayey) is taken, which is locally available & with respect to its bearing capacity depth of the compacted layer of soil is found to resist the load coming from the top.

Keywords – *Load of the train, Compacted layer of soil, Bearing capacity of soil.*

Introduction

Case (1)
Wt of train = 60 t (one boogie)
Bearing area = 3.5 m x 1.2 m
Case (2) :
Wt of train = 50 t.
Case (3)
Wt of train = 45 t taken.
For different loading conditions, the depth of the compacted layer of soil is found. The bearing strength of soil = 150 KN/m^2 taken. With respect to the bearing capacity of the soil, the depth of the compacted layer of soil is found for different loading conditions using the bending equation.

Observations:-

Table 1: Data for thrust due to train and depth of the compacted layer.

S. No. (1)	Vertical thrust due to train in t/m^2 (T) (2)	Depth of compacted layer of soil in cm (d) (3)
(1)	14.29	71.00
(2)	11.90	59.40
(3)	10.71	54.00

Table:- Data for $\frac{T}{T_{max}}$ & $\frac{d}{d_{max}}$: –

S. No. (1)	$\frac{T}{T_{max}}$ (2)	$\frac{d}{d_{max}}$ (3)
(1)	1.000	1.000
(2)	0.833	0.837
(3)	0.749	0.761

Discussion & Results

The regression equation $\frac{T}{T_{max}}$ & $\frac{d}{d_{max}}$ is

$$\frac{d}{d_{max}} = 0.051 + 0.949 \left(\frac{T}{T_{max}} \right) \quad -(1)$$

Suppose wt of the train of one boogie = 55 t the depth of compacted layer = 62.83 cm taken using (1) equation, due to the increase in vertical thrust of train 16.18% the increase in depth of compacted layer 15.50% required.

In case of flood, suppose 1m depth of water is on railway track & velocity of flood = 20 m/sec in case of flood taken. Vertical thrust due to water = 21.39 t/m^2 and due to train = 14.29 t/m^2 if load of train = 60 t taken. Total vertical thrust = 35.68 t/m^2 & bearing capacity of soil in moist condition = 10 t/m$^{2;}$ hence vertical thrust coming from the top will not be sustained by soil; hence it is advisable to stop the train to run.

Conclusions

- There is nearly the same increase in depth of the compacted layer of soil required as compared to the increase in vertical thrust due to train.

References

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

Appendix 1- Notation

(1)	T	=	Vertical thrust of the train in t/m^2.
(2)	d	=	Depth of compacted layer of soil in cm.