

Explain how the elastic moduli of subgrade and base course are estimated using plate bearing test data.

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Plate bearing test is a field test used to determine the ultimate bearing capacity of soil and the deflection characteristics of soil and other layers. It is used in pavement design to determine the elastic modulus of the subgrade and base course. The elastic modulus is the ratio of the stress to the strain in a material.

To estimate the elastic moduli of the subgrade and base course using plate bearing test data, the following steps are taken:

1. Conduct a plate bearing test on the pavement section. This involves placing a steel plate of known dimensions on the pavement surface and applying a load to the plate. The load is increased in stages until the plate begins to sink into the pavement. The load at which the plate begins to sink is recorded.
2. Measure the deflection of the pavement surface at different stages of loading. This is done using a dial gauge or other

measurement device. The deflection measurements are taken at the center of the plate and at points around the plate.

3. Calculate the elastic modulus of the subgrade and base course using the deflection measurements and the load at which the plate begins to sink. The elastic modulus is calculated using the following formula:

$$E = (q \delta) * (D)^3 / (4 * (I * h))$$

where  $E$  is the elastic modulus,  $q$  is the load at which the plate begins to sink,  $\delta$  is the deflection of the pavement surface,  $D$  is the diameter of the plate,  $I$  is the moment of inertia of the plate, and  $h$  is the thickness of the pavement layer being tested.

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4. Use the elastic moduli of the subgrade and base course to calculate the design parameters for the pavement, such as the required thickness of each layer and the allowable stresses under traffic loading.

*It is important to note that the plate bearing test only provides an estimate of the elastic moduli of the subgrade and base course.*

*Other factors, such as the moisture content of the soil and the type of material used in the base course, can also affect the performance of the pavement. Therefore, it is recommended to use a combination of field tests and laboratory tests to accurately estimate the properties of the pavement layers.*

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