OBJECTIVE

To determine the California bearing ratio by conducting a load penetration test in the laboratory.

NEED AND SCOPE

The california bearing ratio test is penetration test meant for the evaluation of subgrade strength of roads and pavements. The results obtained by these tests are used with the empirical curves to determine the thickness of pavement and its component layers. This is the most widely used method for the design of flexible pavement.

APPARATUS USED

1. Cylindrical mould with inside dia 150 mm and height 175 mm, provided with a detachable extension collar 50 mm height and a detachable perforated base plate 10 mm thick.

2. Spacer disc 148 mm in dia and 47.7 mm in height along with handle.

3. **Metal rammers.** Weight 2.6 kg with a drop of 310 mm (or) weight 4.89 kg a drop 450 mm.

4. **Weights.** One annular metal weight and several slotted weights weighing 2.5 kg each, 147 mm in dia, with a central hole 53 mm in diameter.

5. **Loading machine.** With a capacity of atleast 5000 kg and equipped with a movable head or base that travels at an uniform rate of 1.25 mm/min. Complete with load indicating device.

6. Metal penetration piston 50 mm dia and minimum of 100 mm in length.

7. Two dial gauges reading to 0.01 mm.

8.Sieves.4.75 mm and 20 mm I.S. Sieves.

9. Miscellaneous apparatus, such as a mixing bowl, straight edge, scales soaking tank or pan, drying oven, filter paper and containers.

DEFINITION

It is the ratio of force per unit area required to penetrate a soil mass with standard circular piston at the rate of 1.25 mm/min. to that required for the corresponding penetration of a standard material.

C.B.R. = { Test load / Standard load }x 100   eq.1

The following table gives the standard loads adopted for different penetrations for the standard material with a C.B.R. value of 100%

Penetration of plunger (mm)	Standard load (kg)
2.5	1370
5.0	2055
7.5	2630
10.0	3180
12.5	3600

Fig 1 Standard Loads for Test

PROCEDURE

1)Place the mould assembly with the surcharge weights on the penetration test machine. (Fig 2)

2)Seat the penetration piston at the center of the specimen with the smallest possible load, but in no case in excess of 4 kg so that full contact of the piston on the sample is established.

3)Set the stress and strain dial gauge to read zero. Apply the load on the piston so that the penetration rate is about 1.25 mm/min.

4)Record the load readings at penetrations of 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 7.5, 10 and 12.5 mm. Note the maximum load and corresponding penetration if it occurs for a penetration less than 12.5 mm.

5) Detach the mould from the loading equipment. Take about 20 to 50 g of soil from the top 3 cm layer and determine the moisture content.
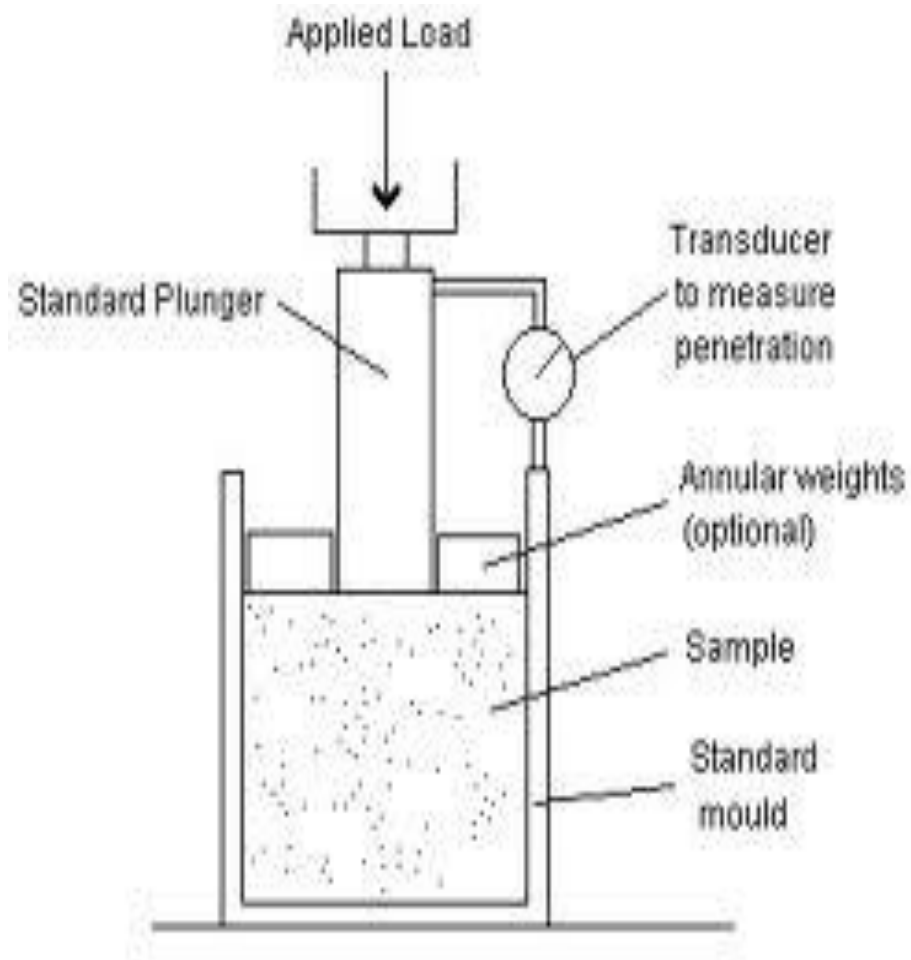
Fig 2.Schematic of CBR Test
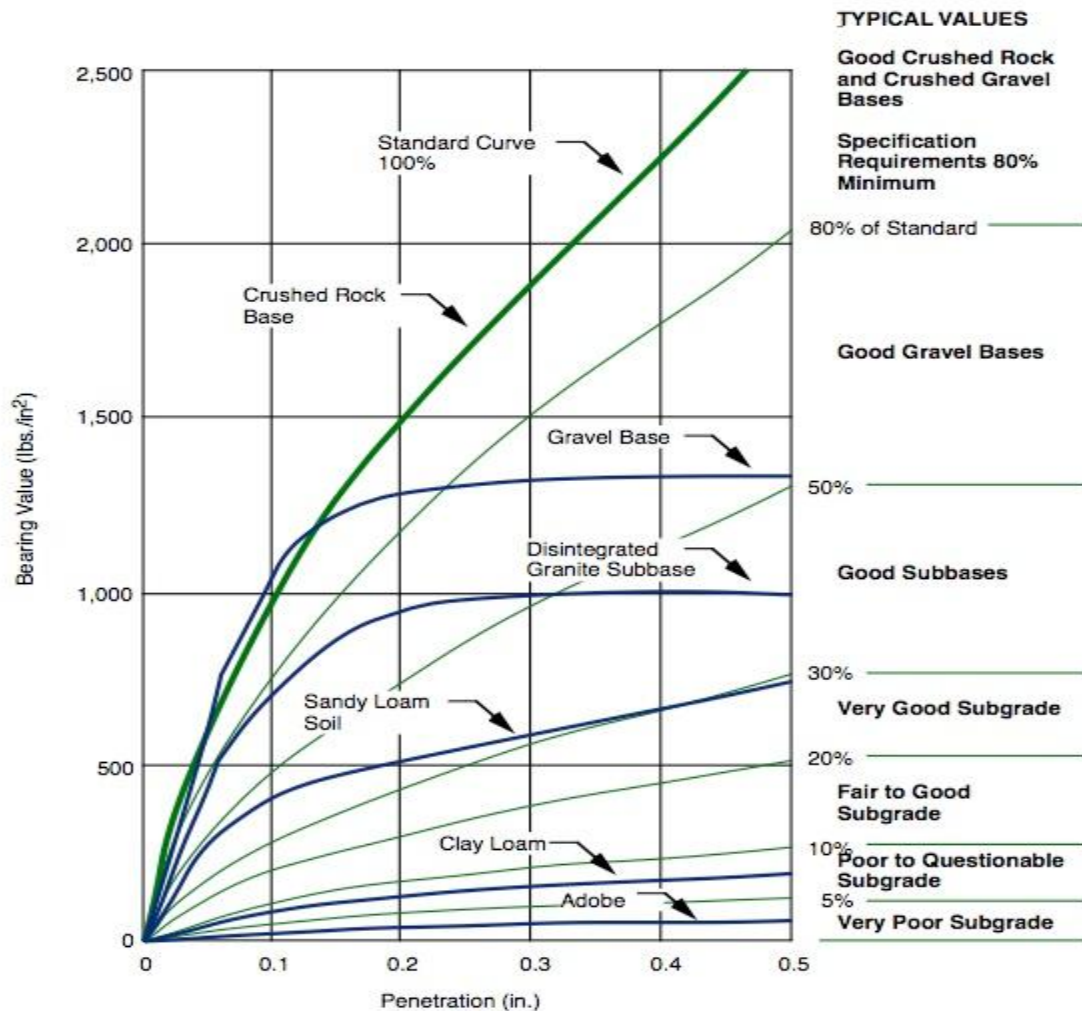
Fig 3Load Penetration Curve for a CBR test

OBSERVATIONS AND CALCULATIONS

Penetration (mm)	Proving Ring Dial gauge reading (Divisions)	Load on Plunger (Kg)	Corrected Load (Kg) From Fig 3	Standard Load (Kg) From Fig 1	CBR (%) From eq.1

Calcuations:

C.B.R. = { Test load / Standard load }x 100

C.B.R. of specimen at 2.5 mm penetration………………………..

C.B.R. of specimen at 5 mm penetration……………………………

PRECAUTION

1) Clean the holes of the base plate and that of perforated disc thoroughly.

2)Align the surcharge weight with the plunger so that the plunger penetrates freelyin to the soil.

REFERENCES

1) IS: 2720 (Part 16) 1979.

QUIZ

1) What is the need and scope of CBR test?

2) What are the CBR ranges for coarse grained and Fine grained soils?

3) What is the effect on the CBR value if we move from soft to hard soil? Is it increases or decreases.

4) Name one standard material used in the CBR test which has a value of 100.