DEPARTMENT OF CIVIL ENGINEERING

TRANSPORTATION ENGINEERING LABORATORY

Transportation engineering laboratory is well established with the covering area of 94.5 m^2 to strengthen ongoing research and testing activities of the Department of Civil Engineering. This lab is frequently used to investigate different material properties of Highway Materials such as Bitumen and Aggregates as well as design mixes for flexible pavements. The detailed descriptions of the equipment are listed below:

1. **Marshall Stability Testing Machine**

   Manufacturer: Aimil

   New Model for 4"/6" dia sample (AIM 550-5)Digi modified Marshall Apparatus, 100kN Single Speed, New Model for 4"/6" dia sample (AIM 550-6)

   Marshall Stability Testing Machine is calibrated to test stability as well as flow values of design mixes of bitumen for flexible pavement. All the tests are performed as per Indian Standards.

Marshall Stability Testing Machine and Marshall Compactor

2. **California Bearing Ratio (CBR) Testing Machine**

Manufacturer: Contass (Continental Scientific Syndicate)

CBR Testing machine is calibrated and equipped with proper molds and gauges to determine the CBR value of soil. It is primarily used to test the subgrade soil strength while designing flexible pavements.

CBR Testing Machine

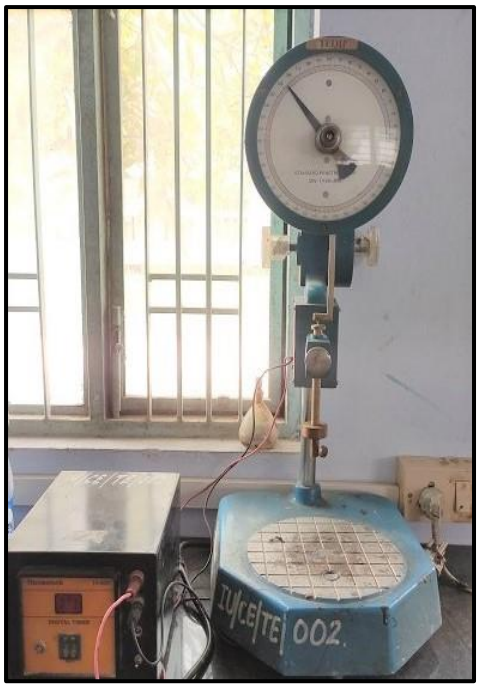
3. **Ductility Testing Machine**

Ductility Testing machine is equipped with proper Briquette Mould and Water Bath tomeasure adhesive property of bitumen and its ability to stretch.

Ductility Testing Machine

4. **Penetrometer**

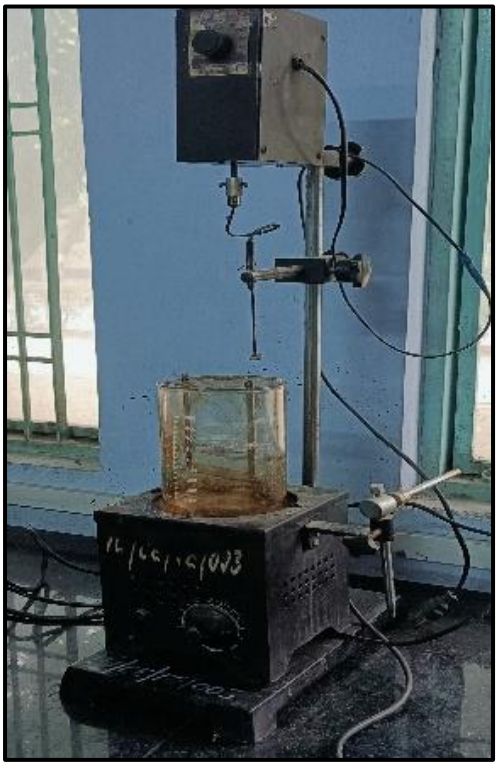
Machine is equipped with needle and other required accessories to perform penetration test on bitumen samples to determine its grade.



Penetrometer

5. **Ring and Ball Apparatus**

Ring and ball apparatus well equipped to determine the softening point of the bitumen. Itconsists of rings, steel balls, stirrers, bath and thermometer.



Ring and Ball Apparatus

6. **Flash and Fire Point Test Apparatus**

Manufacturer: Aimil

Flash and Fire point test is conducted on bitumen to know the safe mixing and application temperature values of particular bitumen grade. Setup is equipped with thermostatically controlled heater, bitumen sample holder and thermometer.

Flash and Fire Point Test Apparatus

7. **Bitumen Extractor**

Bitumen Extraction Test is used to determine the percentage of bitumen content present in the asphaltic pavement by cold solvent extraction. The properties of flexible pavement such as durability, compatibility, and resistance from defects bleeding, raveling, and aging of flexible pavement are majorly dependent on the percentage of bitumen used with the aggregate to lay the pavement. Setup is equipped with extractor, filter paper and solvent.

Bitumen Extractor

8. Stripping Value Testing Machine

The stripping value of aggregates is determined as the ratio of the uncovered area observed visually to the total area of aggregates, expressed as a percentage. Bitumen and tar adhere well to all normal types of aggregates provided they are dry and are not exceptionally dusty. This problem of stripping is experienced only with bituminous mixtures, which are permeable to water. This test gives the procedure for determination of the stripping value of aggregates by static immersion method, when bitumen and tar binders are used. Setup is equipped with Thermostatically controlled water bath, Oven to heat aggregate, Sieves of sizes 20 mm and 12.5 mm, Beaker of 500 ml capacity and Mixer to mix aggregate and bitumen.

Stripping Value Testing Machine

9. Aggregate Impact Testing

The apparatus as per IS: 2386 (Part IV) - 1963 consists of: (i) A testing machine weighing 45 to 60 kg and having a metal base with a painted lower surface having 30 cm in diameter. It is supported on level and plane concrete floor of 45 cm thickness. (ii) A cylindrical steel cup of internal diameter 102 mm, depth 50 mm and minimum thickness 6.3 mm.(iii) A metal hammer weighing 13.5 to 14.0 kg the lower end being cylindrical in shape, 50 mm long, 100.0 mm in diameter, with a 2 mm chamfer at the lower edge and case hardened. Free fall of hammer is within 380±5 mm. (iv) A cylindrical metal measure having internal diameter 75 mm and depth 50 mm for measuring aggregates. (v) Tamping rod 10 mm in diameter and 230 mm long, rounded at one end. (vi) A balance of capacity 60kg with least count of 10 g.

Aggregate Impact Testing

10. Los Angeles Abrasion Testing Machine

Los Angeles abrasion test on aggregates is the measure of aggregate toughness and abrasion resistance such as crushing, degradation and disintegration. This test is carried out by AASHTO T 96 or ASTM C 131: Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine. Setup consist of Los Angeles Machine, Abrasive charge: Cast iron or steel balls, approximately 48mm in diameter and each weighing between 390 to 445 g, Sieve: 1.70, 2.36, 4.75, 6.3, 10, 12.5, 20, 25, 40, 50, 63, 80 mm IS Sieves, Balance of capacity 60 kg, Drying oven and tray.

Los Angeles Abrasion Testing Machine

11. Shape Tests

Tests conducted on coarse aggregates under shape tests are: the elongation index of the given aggregates and the flakiness index of the given aggregates.The apparatus for the shape tests consists of A standard thickness gauge, A standard length gauge, IS sieves of sizes 63, 50 40, 31.5, 25, 20, 16, 12.5,10 and 6.3mm and a balance of capacity 60kg with least count of 10 gm.

Elongation and Flakiness Test Equipment