

## 2.2 FACTORS INFLUENCING DESIGN OF FLEXIBLE PAVEMENT

### Various factor considered for the design of pavements

- a. Pavement design consists of two parts
  - ✓ Mix design of materials
  - ✓ Thickness design of pavement and component layers.
- b. Factors for the design of pavement
  - ✓ Design wheel load
  - ✓ Subgrade soil
  - ✓ Climatic factors
  - ✓ Pavement component materials
  - ✓ Environmental factors.

Design wheel load:

The various wheel load factors to be considered in pavement design are:

1. Maximum wheel load
2. Contact pressure
3. Dual or multiple wheel loads
4. Repetition of loads.

Maximum wheel load:

- ☐ The wheel load configurations are important to know the way in which the loads of agiven vehicle are applied on the pavement surface.
- ☐ For highways the maximum legal axle load as specified by Indian road congress is 8170 kg with a maximum equivalent single wheel load of 4085 kg.
- ☐ The evaluation for vertical stress computations under a uniformly distribute of circular load based on Boussineq's theory is given by:

$$\sigma_z = p \left[ 1 - \frac{z^3}{(a^2 + z^2)^{\frac{3}{2}}} \right]$$

$\sigma_z$  = vertical stress at depth z

P= surface pressure

Z=depth at which  $\sigma_z$  computed.

A=radius of loaded area.

### Contact pressure:

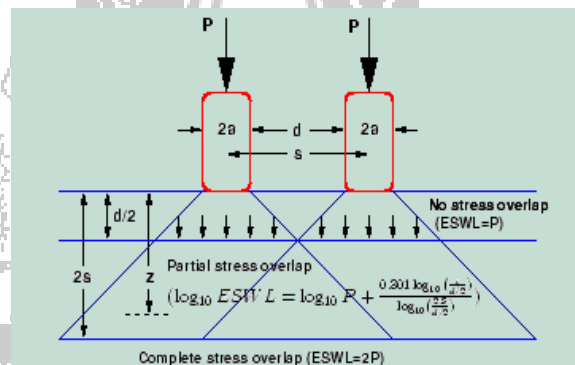
- Generally the wheel load is assumed to be distributed over a circular area. But by measurement of the imprints of tyres with different load and inflation pressures. Three terms in use with reference to tyre pressure are:

1. Tyre pressure
2. Inflation pressure
3. Contact pressure

The ratio of contact pressure to type pressure is defined as **rigidity factor**. Thus value of rigidity factor is 1.0 for an average tyre pressure of 7 Kg/cm<sup>2</sup>. This value is higher than unity for lower type pressures and less than unity for tyre pressures higher than 7 kg/cm<sup>2</sup>.

### ESWL:

- ESWL is the single wheel load having the same contact pressures, which produces same value of maximum stress, deflection, tensile stress or contact pressure at the desired depth. The procedure of finding the ESWL for equal stress criteria is provided below. This is a semi-rational method, known as Boyd and Foster method.



- ESWL may be determined based on either equivalent deflection or equivalent stress criterion. Multiple wheel loads are convert to ESWL and this value is used in pavement design. The ESWL is usually determined by the equivalent stress criterion using a simple graphical method.
- A straight line relationship is assumed between ESWL and depth on log scales.

### Repetition of loads:

- The deformation of load pavement (or) sub grade due to a single application of wheel load may be small. It required carrying out traffic surveys for accounting the factor of repetitions for wheel loads in the design of pavement.
- Data collected are converted to some constant equivalent wheel loads. Equivalent wheel load is a single load equivalent to the repeated applications of any particular wheel load

on a pavement which requires the same thickness and strength of pavements.

- ✓ McLeod has given a procedure for evolving equivalent load factors for designing flexible pavements.

